

**ECONOMICS OF GRAPE CULTIVATION IN  
MIZORAM: A CASE STUDY OF CHAMPHAI  
CLUSTER**

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

**BY**

**LALENGKIMA**

**TO**

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SCHOOL OF ECONOMICS, MANAGEMENT  
&  
INFORMATION SCIENCES  
MIZORAM UNIVERSITY**



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I

**MIZORAM UNIVERSITY**  
**DEPARTMENT OF ECONOMICS**  
**AIZAWL, MIZORAM – 796004, Phone: 0389-2330708/2330709, Fax:**  
**0389-2330709**

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CERTIFICATE

This is to certify that Mr Lalengkima has worked under my supervision and guidance on a research topic entitled, **“Economics of Grape Cultivation in Mizoram: A Case Study of Champhai Cluster ”** for the degree of Master of Philosophy in Economics, Mizoram University, Aizawl. The work embodies a record of original investigations and no part of it has been submitted for any other degree in other universities.

Date: .....

(Dr. LALRINTHANGA)  
Supervisor

## **II**

### **DECLARATION**

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I, Lalengkima, do 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 base 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.

**(LALENGKIMA)**

**(PROF. LIANZELA)**

**(Dr. LALRINTHANGA)**

**Head**

**Supervisor**

### III

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(LALENGKIMA)

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## VII

### LIST OF ABBREVIATIONS

AAY = Antyodaya Anna Yojana

AD = Anno Domini (in the year of Lord)

AIBP = Accelerated Irrigation Benefit Programme

AMFU = All Mizoram Farmers' Union

APEDA = Agricultural and Processed Food Products Export Development  
Authority

APL = Above Poverty Line

BPL = Below Poverty Line

BC = Before Christ

CDB = Coconut Development Board

CSO = Central Statistics Office

CSS= Centrally Sponsored Scheme

DAC = Dept. of Agriculture & Cooperation

GDP = Gross Domestic

GSDP = Gross State Domestic Product

Ha = Hectare

HMNEH = Horticulture Mission for North East and Himalayan States

IWMP = Integrated Watershed Management Programme

MGNREGS = Mahatma Gandhi National Rural Employment Guarantee Scheme

MGGA = Mizoram Grape Growers Association

MHIP = Mizo Hmeichhe Insuihkhawm Pawl

MIDH=Mission for Integrated Development of Horticulture

MLPC = Mizoram Liquor Prohibition and Control Act

MLTP = Mizoram Liquor Total Prohibition Act

MRB = Mizoram Rural Bank

MUP =Mizoram Upa Pawl

MT = Metric Tonnes

NABARD = National Bank for Agriculture and Rural Development

NAPCC = National Action Plan on Climate Change

NFSM = National Food Security Mission

NHB = National Horticulture Board

NHM = National Horticulture Mission

NICRA = National Initiative for Climate Resilient Agriculture

NMIDH = National Mission on Integrated Development of Horticulture (

NLUP = New Land use Policy

NMMP = National Mission on Medicinal Plants

NMSA = National Mission for Sustainable Agriculture

PAC = Potential Area Connectivity

PMCCC = Prime Minister's Council on Climate Change

PMKSY = Pradhan Mantri Krishi Sinchai Yojana

RKVY= Rashtriya Krishi Vikas Yojana

SHM = Soil Health Management

SLSC = State Level Sanctioning Committee

UNO = United Nations Organisation

VIUC = Vegetable Initiative for Urban Clusters

WDPSA = Watershed Development Programme in Shifting  
Cultivation Areas

WTO = World Trade Organisation

## 1.1 INTRODUCTION

Agriculture plays a vital role in India's economy. Over 58 per cent of India's population depends on agriculture as their principal means of livelihood. Agriculture, along with fisheries and forestry, is one of the largest contributors to the Gross Domestic Product (GDP). But the contribution of agriculture in NI is still decreasing. As per estimates by the Central Statistics Office (CSO), composition of Agriculture & allied activities was 51.81 per cent in 1950-51 which has declined to 18.26 per cent in 2013-14 and then to 15.35 per cent of the Gross Value Added (GVA) during 2015-16 at 2011-12 prices. The decrease in the share of Agricultural and allied Sectors in GDP of the country in comparison to other sectors is on account of structural changes due to a shift from a traditional agrarian economy to industry and service dominated one.

In Mizoram, Primary Sector comprising agriculture & allied activities contributed 16.26% (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.

Horticulture contributes substantially to Mizoram State Domestic Products.

Out of the total horticulture potential area of 11.56 lakh ha, only 1.21 lakh

ha is covered under horticulture plantation which shows that 10.35 lakh Ha (89.54%) of horticulture potential area is still lying untapped indicating vast scope for settlement of jhumia families into permanent settlement as well as development of horticulture in the State. Because of its hilly terrain, horticulture is the only sustainable land base activities for development of the State and its farmers. Considering the present horticulture scenario, government, banks, line departments, AMFU and other organisations have to play significant role in uplifting the horticulture sector and converting the untapped potential areas for horticulture based activities through awareness and implementing the central government schemes, recently launched National Mission on Integrated Development of Horticulture (NMIDH), other developmental schemes and linked up with financial institutions for bank credit.

## **1.2 THE ORIGIN AND EVOLUTION OF GRAPES**

Grape (*Vitisvinifera L.*) is basically a sub- tropical crop belonging to the Vitaceae family. Grape is believed to have originated in Armenia near the Black and Caspian seas in Russia. An independent and recent origin of grapes is also traced to North America. Its leaves and seeds were discovered in North America and Europe in fossil deposits of the Tertiary period of geological time. Seeds were also found in the refuse mounds of



the pile dwellers of lakes in south central Europe belonging to the Bronze age. From Armenia grapes spread westwards to Europe and Eastwards to Iran and Afghanistan. Grape cultivation flourished in Baluchistan and North-west frontier province during the 16th century.

The old *Vitisvinifera* grapes, originating in Armenia, have perfect flowers while the grapes of America, which are of recent origin, usually have imperfect flowers. It is believed that originally varieties with pure male / female flowers to varieties with various degrees of maleness / femaleness to those with perfect flowers existed and during the course of evolution only the varieties with perfect flowers have been selected. China, Italy, United States of America, Spain, France, Turkey, Chile, Argentina, India and Iran are major producer of grape in the world.

Grape was introduced into India in 1300 AD by the Moghul invaders. In India, grape cultivation declined after the fall of Moghul rulers but was reintroduced in south India (Aurangabad district of Maharashtra) by Mohammed-Bin-Tughlak and since last 50 years grape is commercially cultivated in India. Now, Grape cultivation in India covers an area of 118 thousand hectares occupying 1.70% of the total area. According to UN's Food and Agricultural Organization India ranks 9<sup>th</sup>, accounting for 4.51 percent of the global share with its production of 2.48 million metric tons in 2013. Major producing states in India are Maharashtra, Karnataka, Punjab,

Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Mizoram, Punjab, Haryana and Rajasthan. In recent years grapes are produced and exported from Champhai district of Mizoram. Since the area under grape cultivation is increasing in Champhai cluster in recent years, its profitability and economic viability needs to be tested. In this view, the present study on, economics of grape cultivation in Mizoram state was undertaken.

### **1.3 GRAPE CULTIVATION IN MIZORAM**

Grape cultivation has been successfully taken up by horticulture department in Mizoram, especially at champhai district. Plantation of grape in and around Champhai started in 1992 and cultivated large scale in the year 1997. Then the Government of Mizoram through Horticulture Department took initiative in 2005. With the helping hand from the governments-centre and state, nearly 500 families from Hnahlan and around 250 families in and around Champhai has started Grape plantation. The variety being cultivated is Bangalore Blue (*Vitis Lubrusca*), which is very suitable for red wine (Port wine). Mizoram Grape growers' Society (MGGA) has been formed at Champhai town and Hnahlan village on 28<sup>th</sup> November, 2006. They decided to establish wineries one each at Hnahlan village and Champhai town under the amendment of Mizoram Liquor Total Prohibition (MLTP) Act 1995 in 2007. The Act had earlier prevented them from large-scale commercialization of wine-making from grape. Mizoram Rural Bank

(MRB) and Horticulture department granted loans for establishment of winery. Then, construction of winery building started in the year 2007, plants and machineries were collected in 2008 and thus processing of grapes was done in 2010. At present these wineries are functioning under the supervision of excise and narcotic department, government of Mizoram. As a Result of setting up of these two wineries, a hygienic 'red wine' named 'zawlaidi' locally means 'love potion' has been produced in the state since 2010, which is being sold within Mizoram at retail outlets through vendors. The grape growers are today not only self-sufficient but are also in good economics condition because of successful grape cultivation that led to setting up of two wineries. Within a short span of time, more than 3 lakhs litres of grape wine have so far been produced from Hnahlan and Champhai wineries and even with the prevailing low rate, they are able to earn an income of over Rs. 400 lakhs.

Recently, the department of horticulture has introduced a Spanish grape variety 'Tempranillo', for processing as red wine which has been given for cultivation to 60 families at Mualkawi. Once the fruits are processed, it is expected to be sent to foreign countries. Besides this, two other varieties viz. 'Pusa Navrang' and 'Pusa Urvashi' are being tried at present, as advised by the Grape Expert of Indian Agricultural Research Institute, New

Delhi. In addition, Taiwanese varieties like 'Kyoho' and 'Muscat' (Black Queen) are also under trial cultivation in Mizoram.

Moreover, the Government of Mizoram implemented Mizoram Liquor Prohibition and Control Act (MLPC) Rules in 2015 to replace Mizoram Liquor Total Prohibition Act, 1995. This Act greatly affects the income of Hnahlan and Champhai grape growers and their production also steadily declined.

#### **1.4 HORTICULTURE SCENARIO OF MIZORAM**

**Sectoral Overview:** Owing to the fact that more than 70% of the State population depends on land based activities for their livelihoods, horticulture plays a vital role and occupies very important place in the economy of Mizoram thus having large chunk of contributions to the State Gross Domestic Products. Out of the total horticulture potential area of 11.56 lakh Ha, only 1.21 lakh Ha is covered under horticulture plantation which shows that 10.35 lakh Ha (89.54%) of horticulture potential area is still lying untapped indicating vast scope for settlement of jhumia families into permanent settlement as well as development of horticulture in the State. Because of its advantageous agro-climatic condition, hilly terrain nature of the landscape and well distributed rainfall during monsoon season horticulture is the only sustainable land based activities/industries for

development of the State economy. Considering the present horticulture scenario, government, banks, line departments, AMFU and other organisations have to play significant role in uplifting the horticulture sector and converting the untapped potential areas for horticulture based activities through awareness and implementing the central government schemes and linked up with financial institutions for bank credit. Thus, Horticulture Department implements various developmental schemes with the following objectives to achieve sustainable economic development of the State: —

- a) Uplift the economy of the farming communities through cultivation of sustainable horticulture crops.
- b) Increase area, production and productivity of horticulture crops in the State with latest technologies and adopt cluster area approach and cultivation at commercial scale for market surplus production.
- c) Settlement of Jhumia families to permanent cultivation with intensive farming practices.
- d) To ensure availability of quality inputs like improved planting materials, fertilizers and manures, plant protection materials by improving and strengthening delivery system.

e) Promotion of protected cultivation along with supporting infrastructure for quality production of high value crops all round the year.

f) Promotion of INM through vermin composting, popularization of bio-fertilizers in addition to judicious and balanced nutrients to crops.

g) Promotion of micro-irrigation for efficient management and delivery of required quantities of water as per crop needs.

h) Promotion of mechanization conducive to hill farming by providing equipment and implements to reduce labour.

i) Create water harvesting structure potential for irrigation and to augment ground water.

j) Human resource development through capacity building of departmental staff and skill development of farmers through transfer of technology.

k) Collect revenues from beneficiary contribution on materials issued to the public such as

i) 25% of the cost of materials on all tools, implements, equipments, machineries etc, and also

ii) 10% of the cost of materials on all items other than tools, implements, equipments and machineries with a provision that items under Integrated Nutrient Management and Integrated Pest

Management would be issued on free of cost as such materials are usually small items and are usually of emergency uses.

**1.4.1 Contribution of Horticulture Department in the economy (Role of the Sector):** Under Horticulture sector, the main contributing factor towards GSDP is Fruit, Vegetable, Spices, Flowers and plantation crop production bringing out 7.95% GSDP in 2011-12 and 7.25% in the year 2012-13. Having compiled record of crop production for the year 2013-14 as 12,93,980 Metric tonne and 12,93,430MT during 2014-15, actual figure of GSDP for the said years are yet uncertain. Tonnes of Squash, Ginger, Grape juice, Orange, Bird eye chilly, Betel nuts, Anthurium etc. are exported outside the state during this year. More or less, Horticulture Department does have considerable contributions to Mizoram economy. The Department implements 5(five) Central Sponsored Schemes namely, MIDH, RKVY, PMKSY, NMMP and State flagship programme NLUP. With total financial outlay of Rs 8030.72 lakhs under CSS, it is expected that thousands of farmers and landless agricultural laborers will have self employment. As far as possible, reservation for women and persons with disabilities is being provided as permissible. Effort is being made under NLUP so that more than 9000 beneficiaries have self-employment under 1st Phase, and 14,502 families are further being covered under 2nd, 3rd and 4th Phase to provide self-employment and sustainable income. Capital

assets like community water tanks, Hi-tech Green House, tubular structure green houses, shade houses, centre of excellence, individual water tank, Drip and Sprinkle irrigation system are being established under various Centrally sponsored schemes. The Department gives full effort to not only achieving self-sufficiency in fruit, vegetable, flowers, spices and plantation crops in Mizoram but also building commercial scale production for identified horticulture crops with a mission to enhancement in production, marketing and processing of Horticulture produces for increasing income of farmers, providing employment and establishing brand value in horticulture produces where the state has competitive advantage. It plays vital role in development of fruit, vegetable, spices, floriculture, Mushroom, plantation crops, Research education and training, quality seed production/plant protection and integrated pest and nutrient management.

#### **1.4.2 Activities of Horticulture Department in the current fiscal year**

Horticulture Department implements five important CSS and State's flagship programme - NLUP for Development of Horticulture in Mizoram bringing out remarkable achievements in increased production of various Horticulture crops as follows.

**Mission for Integrated Development of Horticulture (MIDH):** Large number of farmers in the State have been benefitted and uplifted to earn sustainable income under this scheme. During the current financial year



(2015-16), the approved financial outlay is Rs.38.33 crores out of which Rs.17.25 crores only has been released recently and the following activities are being taken up. Establishment of new garden of fruit, Vegetable, Mushroom, Flower, Spice crops and Aromatic plants, Rejuvenation/replacement of senile plantation and canopy management on fruit crops, creation of water sources for irrigation of crops, encouragement of protected cultivation of vegetable and flowers in Green House and Shade House, Integrated Pest and Nutrient management, Pollination support through Bee keeping, human resource development by conducting training, exposure visit for farmers, study tour to progressive states and outside the country for Technical Staff and field functionaries are major activities being implemented.

**Rashtrya Krishi Vikan Yojana (RKVY):** Various programmes are being taken up under this scheme. The overall financial target under the scheme during the current financial year is Rs.1425.00 lakhs only. And out of the total project cost, 50% of the total fund only is being released by GOI. There is neither physical nor financial achievement under the scheme as no fund is received till date. Under RKVY, various activities like cultivation of Mandarin Orange, Dragon fruit, Strawberry and Hybrid vegetable, Integrate Nutrient Management, Integrated Pest Management, Farmers Training, construction of Tubular structure Green House, individual Water Tank and

allocation of 10% flexi fund for link road construction are being taken up. RKVY scheme is being implemented in cluster approach in six Districts excluding two Districts viz. Lawngtlai and Saiha wherein the local autonomous district councils implement the scheme themselves separately.

**Pradhan Mantri Krishi Sinchai Yojana (PMKSY):** This is one of the sub-schemes of National mission for Sustainable Agriculture (NMSA) being implemented from this year only. To make up with irrigation problem in dry season is one of the biggest challenges in Horticulture farming in Mizoram. To overcome this problem Government of India layout this scheme so as to manage on farm water in meaningful and judicious way. Out of the approved total outlay of Rs 900.00 lakhs for the current financial year, Ministry of Agriculture and cooperation, Government of India has approved Rs 450.00 lakhs. Under this scheme, drip irrigation for wide space crops (i.e. M. Orange, Mango, Grapes etc.) and closed spaced crops(vegetable, spices etc.), Micro sprinkler system, Mini sprinkler system and Training are being provided to farmers. However, there is no new achievement under the scheme this year as fund is not yet available at hand.

**NMMP (National Mission on Medicinal Plants):** Cultivation of Value added crops having medicinal value are taken up under NMMP. During the last four years farmers of Aloe vera at Baktawng Tlangnuam of Serchhip District exposed the success of implementation of this programme in such

away that they have established a Micro Industry of Aloe vera soap. During the current fiscal year of 2015-16, with financial target of Rs.43.80 lakhs, cultivation of Aloe vera and Amla as well as construction of Storage Godown at Baktawng and N.Vanlaiphai are being taken up. However, there is neither physical nor financial achievement under the scheme as no fund is received till date.

**New Land Use Policy (NLUP):** Under this programme, the Department implements cultivation of 10(ten) different crops such as – Aloe vera, Arecanut, Chayote, Grape, M.Orange, Passion fruit, Pineapple, Mango, Tea and Tung. 1st to 4th Phase implementation of the programme was successfully achieved smoothly. So far, under Horticulture sector, 23,886 families have been covered with financial assistance amounting to Rs.205.16 crores. Production and productivity of fruit, plantation and Vegetable crops are increased by manifolds since the implementation of NLUP in the state (NLUP was implemented since 2010-11), and more are still expected to come in the near future.

Outcome of the Department's activities so far and expected outcome (Impact on Economy) Horticulture Department, giving all its efforts achieves tremendous success through implementation of various schemes resulting to increase in production of Horticulture crops which may lead to raising State economy to some extents during the ongoing year, brief

account of which may be pointed out as follows. 1) Provision of Poly house/Green house to farmers brings about availability of vegetables almost all round the year.

2) More varieties of Fruit (e.g. Dragon fruit, Strawberry, disease free tissue culture banana, Red Lady Papaya etc.), Vegetables and Flowers which earns more revenues are made available for local farmers.

3) Other Infrastructure and assets created, being created and earmarked to be created in the interest of farmers and farmers –groups such as, Drip, Sprinkler system for Irrigation, Water Tank, and Geo-membrane for water storage, polythene pipe, tools and implements give good result in increase in productivity and production and more is expected in the years to come.

4) Promotion of Integrated Pest Management solved farmers problems brought about by Insect pests and diseases like Rhizome rot of ginger, powdery mildews of Orange, Vegetables etc. Integrated nutrient management made Plant nutrients like Vermi compost, Nature vel, Neem kasto, Plant micro nutrient etc. available to the local farmers.

5) Implementation of NLUP leads to permanent cultivation of crops resulting to earning sustainable income is no doubt one of the clear impacts of the Department activities.

### 1.4.3 Area and production of Horticulture crops.

**Table 1.1**

Area=000'ha  
Production=000' mt

Sl. No	CROPS	Area and Production 2015-16	
		Area	Production
1	Fruits	60.67	350.91
2	Vegetables	43.57	261.52
3	Aromatics	1.08	0.94
4	Plantation Crops	11.93	11.5
5	Spices	22.55	64.91
6	Roots and Tubers	1.55	12.74
7	Flowers	198	475.42
	<b>Grand Total</b>	<b>339.35</b>	<b>1177.94</b>

Source: Economic Survey Mizoram 2015-16

### 1.4.4 Policy constraints requires to be addressed

Presently crop production, processing and marketing of produces are not merged in one stream. As such, producer farmer has to find way out to dispose of his produces through other agencies or the other, which is a big burden for him. Therefore, it is felt necessary that Government needs to bear with such a policy wherein production, processing and marketing are channelized under one umbrella.

## **1.5 AREA OF STUDY**

Champhai District is the third largest of the 8 (eight) districts in Mizoram in terms of size and population following Aizawl and Lunglei Districts. The district lies in the eastern part of Mizoram between 93.21°E longitude and 23.26°N latitude. It has 80 kms long international boundary with Myanmar in the east and Myanmar border is about 8 kms from the District headquarters Champhai. The district is bounded by Manipur state in the north, Serchhip District in the west and Aizawl District in the north-west.

According to 2011 census Champhai District has a population of 1,25,370 out of which 6,32,99 males and 6,20,71 females. The district has a population density of 39 per square kilometre. Champhai district has a sex ratio of 981 females for every 1000 males and literacy rate of 93.51 .

The District comprises of 4 (four) R.D.Blocks viz. Champhai, Ngopa, Khawzawl and Khawbung. There are eleven villages in Champhai RD Block Viz. Champhai, Hnahlan, Khuangphah, Lungphunlian, Murlen, N.E.Diltlang N.Khawbung, Ngur, Tualcheng, Vaikhawtlang, Vapar, out of which Hnahlan village and Champhai town are selected based on highest area and production under rapes cultivation among districts of Mizoram and no empirical studies or research has been conducted on this area in respect of condition and economics of Grape cultivation.

## **1.6 STATEMENT OF THE PROBLEM**

More than half of the households in Mizoram are still dependent on traditional method of agriculture known as Jhum cultivation. Shifting cultivation has frequently been attacked in principle because it causes soil erosion, deforestation, soil degradation and environmental pollution etc. In Mizoram, the cultivation of crops under jhuming is evident to be both Primitive and uneconomical which result in an extremely low production of agriculture output. Hence, it tends to provide only for the subsistence of the farmers. By knowing this, the Government of Mizoram introduced various schemes to replace shifting cultivation into settled cultivation for economic development of the state and in order to avoid land degradation and other problems. Grape cultivation is one of the settled cultivation. In Mizoram, grape cultivation is concentrated only in Champhai district and about 800 families in the district heavily depend on Grape cultivation as their only source of their income. But in 2015, Government of Mizoram implemented MLPC act that allows sale and purchase of wine within Mizoram. The MLPC act greatly reduces the sale and purchase of indigenous wine product called 'Zawlaidi' and 'Zo' wine which affect the income of grape growers and further reduces the contribution of wineries to government. Therefore, no empirical studies or research has been conducted so far

regarding the condition of grape cultivation, problems faced by growers, contribution of wineries to GSDP of Mizoram and whether grape cultivation alone is sufficient as an alternative source of livelihood for the cultivators. Therefore, this study is necessary to fill in the gap of this unavailable source and to further suggest measures for policy implications for the policy makers of the state.

### **1.7 OBJECTIVES:**

The specific objectives of the study are as follows:-

1. To analyse the trend and potential of grape production in the study area.
2. To examine how far grapes cultivation is suitable as an alternative source of livelihood.
3. To analyse the problems on the production and productivity of grape cultivation.
4. To suggest suitable measures to promote grapes production and marketing.

### **1.8 RESEARCH QUESTIONS**

1. What is the income behavior of the grapes growers after cultivation of grapes?
2. What is the marketing pattern and problems of the grapes growers in the study area?



## **1.9 RESEARCH METHODOLOGY**

The study was undertaken in Champhai district, where grapes cultivation is concentrated in Mizoram. The study was mainly based on primary data which has been collected through a well-designed questionnaire and also from secondary sources.

Primary data have been collected from 80 number of grapes growers (80 samples Size) through a well-designed questionnaire. Also personal interview with the board member of Champhai and Hnahlan wineries. The primary data on the socio-economic characters of the farmers, land holding, family size, annual income etc. are collected.

Secondary data have been collected from annual reports of NABARD, National Horticulture Board (NHB), published and unpublished sources, magazines, journals, website and other online resources etc, newspaper, reference books and the official records made by Grape Growers Association in Hnahlan and Champhai. Besides, data related to area under grape cultivation, production and productivity of grapes was collected from Horticulture department, government of Mizoram. The data so collected were analysed using suitable and appropriate statistical tools.

Following Model was used to estimate compound annual growth rate (CAGR) of area, production and productivity of grapes.

$$Y_t = Y_o(1+r)^t$$

Or

$$\log (Y_t) = b_1 + b_2 t$$

Where

$$b_1 = \log (Y_o)$$

$$b_2 = \log (1+r)$$

$$r = e^{b_2} - 1, \text{ is the compound growth rate.}$$

Again, the following formula was used to estimate percentage growth rate of area, production and productivity of grapes.

$$Gr = \frac{V2 - V1}{V1} \times 100$$

Where,

Gr= Percentage Growth Rate

V1= Previous Year

V2=Current Year

There is no available empirical data on grapes cultivation in the study area, though there are few secondary data generated by government of Mizoram. This study will try to fill in the gap in order to have a clear picture of grapes cultivation in Mizoram.

The aim of this chapter is to review and present some of the relevant information and findings from publications that are related to the focus of this study. It also serves to contextualize and frame the study within an existing body of literature as a contribution thereof. Focuses have been given on the phenomena which deal with the objectives of the study. The reviews will provide a deep insight into the subject matter, justifying the need of the study and its relevance in the present day.

Papachristodoulou et.al (1989) examined the impact of policy measures on grape Production employment and growers income for the main viticultural zones of cyprus. They argued that the main problems of viticulture and tests the extent to which alternative policies for restructuring may improve the quality and limit the quantity of grapes and enhance family incomes. Replanting of 3000 ha of low productivity vineyards with new wine grape varieties in combination with permanent abandonment of 4000 ha of vineyards and replacement of a further 1000 ha of mean productivity vines with other crops and livestock, establishment of three vintage wineries in the major viticultural zones and construction and maintenance of 1800 km farm roads could have the following impact.

1. In the short-run the total production of grapes could be reduced by 40-50 thousand t and in the long-run by 20 thousand t, with

the replacement of 12.5 thousand t of Local black grapes by 35 thousand t of high quality grapes.

2. Labour is expected to be released (460 full-time jobs) which if employed off-farm (currently there are opportunities) will increase family income of growers.
3. Annual income will increase by 1.8 to 7.6% depending on the zone, and therefore, would slow or even eliminate the relative declining of incomes in the years to come.

Cormier et.al (1990) studies 'Effects of sucrose concentration on the accumulation of anthocyanins in grape (*Vitisvinifera*) cell suspension'. They found out that a cell suspension of *Vitisvinifera* L. cv. Gamay Frédaux var. teinturier composed of 50% pigmented cells was grown in Gamborg B5 medium supplemented with (per litre) 250 mg casein hydrolysate, 0.1 mg  $\alpha$ -naphthalenacetic acid, 0.2 mg kinetin, and either 20, 30, 50, or 60 g sucrose. In the presence of 20 and 30 g sucrose/L, growth of cells was characterized by a typical sigmoid pattern and maximum cell density was obtained in 30 g sucrose/L. In both media, the anthocyanin content of pigmented cells did not change significantly throughout the growth cycle.

Hough (1997) found that confusion still exists regarding the meaning of the organic production system. It can be defined as a holistic production system

which enhances the agricultural eco-system by prohibiting the use of synthetic production mediums. It focuses on the improvement of soil fertility and the protection of the environment. The environmental advantages by themselves are not reason enough for farmers to adopt organic practices. The financial implication of organic agriculture in comparison with conventional practices is very important. It does not matter how ecologically advantageous organic farming is, if a farming system does not show sufficient profit for the farmer to stay in business in a free market, an organic system will not be adopted. Ecological agriculture tends to have slightly lower yields, but production costs also tend to be lower during full production, due to the reduced use of purchased inputs. The net income (gross margin) from organic and conventional practices is thought to be comparable, although either can be advantageous under specific conditions. Many South African producers are interested in the organic production practices of wine grapes. Some of the producers are already busy converting their vineyards to organic practices. An important question relating to the organic production of wine grapes, is the cost associated with the practice. The farm is 12 hectares in extent of which 3 hectares are under the production of organic wine grapes. The purpose of the research was to compare the financial issues relating to conventional and organic practices. The results had shown that the price of the wine grapes and specially the price premium of organic wine, would determine

whether the organic production of wine grapes was financially viable, as the production was lower and the production costs were higher.

Anderson (1999) examines how well has Australia's wine industry performed over the past decade. In absolute terms, and relative to other Australian industries, the wine industry has done extremely well since the late 1980s, providing a wonderful example of export-led growth. It is now the world's second largest exporter of wine after the European Union. Relative to other New World wine export suppliers, however, Australia's trade performance is not outstanding. Australia has confined its exports mostly to just four English speaking markets (the UK, the US, Canada and New Zealand). Given that competition from other New World suppliers, and the quality upgrading of several large wine regions in Europe (the south of France, La Mancha in Spain, northern Italy, Southeastern Europe), the continued prosperity for the Australian industry requires numerous challenges to be confronted.

Noguera et.al (2005) presented production budgets for wine and juice grapes suitable for cultivation in Arkansas. Varieties examined include *V. labruscana*, French-American and American hybrids, *V. aestivalis*, *V. rotundifolia*, and *V. vinifera*. Important production considerations specific to each of these varieties are summarized. Results indicate considerable variation in profit potential among varieties. However, one or more

varieties can be profitably grown in most regions of the state. With the exception of Sunbelt, *V. labruscana* varieties showed the least profitability. *V. rotundifolia* (muscadine) varieties hold promise as a new crop for the warmer southern regions of Arkansas, while Chambourcin shows strong profit potential as a red wine grape in parts of the state with more temperate climates. Other promising varieties include Chardonel, Traminette, and Cynthiana. *V. vinifera* varieties also show strong profit potential, but are limited by their intense management requirements and can only be grown on the best sites.

Harbertson et.al (2005) stated that flavonoids are a large and diverse group of compounds that, by their presence or absence, contribute greatly to wine quality. While the flavonoid content and composition of a wine reflects the vinification process to some extent, the primary determinant is the composition of the grapes at harvest. Thus, considerable research has been directed toward understanding the nature of flavonoids in grapevines, the factors that influence their biosynthesis, and how this knowledge might be used to manage and manipulate the flavonoid composition of berries at harvest. This review examines the flavonoids as a class of compounds, the role these compounds play in the plant, their contributions to wine quality, and recent research on the impacts of environmental factors and cultural practices on the flavonoid content and composition of grape berries.

Shah (2005) examined Economics of Grape Cultivation in Maharashtra. He obtained that annual maintenance cost and returns for various categories of grape orchardists are in conformity with the financial analysis. The gross returns from grape orchards during various stages of production are noticed to be twice the cost of production for various categories of orchardists. The results of financial analysis also show a B-C ratio in grape cultivation in the range of 1.86 and 2.15 for various categories of orchardists with an average of 2.07. Among various categories, the medium and large categories of orchardists not only show quicker payback period but they also show higher NPV and B-C ratio as compared to marginal and small categories of orchardists. The large and medium categories of orchardists are, therefore, noticed to manage their grape gardens more efficiently as compared to small and marginal categories of orchardists. However, in general, the cultivation of grapes is noticed to be a lucrative proposition for all the categories of orchardists because of substantially high element of profit involved in the cultivation of this high value crop.

Fogarty (2006) explains the relationship between reputation characteristics and consumers' willingness to pay for wine; estimating the rate of return to Australian wine; and using financial analysis to reveal the risk diversification benefits available by including wine in an investment



portfolio. Beer own-price elasticity estimates range from -.02 to -3.00, with a mean estimate value of -.46, and standard deviation of .41 ( $n = 139$ ); wine own-price elasticity estimates range from -.05 to -3.00, with a mean estimate value of -.72, and standard deviation of .53 ( $n = 140$ ); and spirits own-price elasticity estimates range from -.01 to -2.18, with a mean estimate value of -.74, and standard deviation of .47 ( $n = 136$ ). The relationship between the price a consumer is willing to pay for a bottle of wine, and the underlying attributes embodied in the wine. The approach used to investigate this relationship is the hedonic price equation approach. The return to a portfolio of wine in any given period is some average of the  $n$  individual returns, and from such information, if desired, a wine price index can be constructed. Unfortunately, wine sales are infrequent, and all  $n$  wines are not sold in all periods. So, while there is an underlying price process for each wine, we observe prices only at infrequent and irregular intervals.

MKF RESEARCH LLC (2007) provides conservative estimates of the impact on the US economy of the wine, wine grape, raisin, grape juice, table grape and grape products segments of this industry for the calendar year ending 2005. The number of bonded wineries in the US has increased by 83% since 1999, from 2688 to 4929. Wineries can now be found in all fifty states. Total revenues from wine sales by US wineries now approach

\$11.4 billion, including \$707 million in exports. Overall, the US had 934,750 grape bearing acres in 2005, with a total crop value in excess of \$3.5 billion. Grape production of all kinds has increased by 5% since 2003, with the total value of the crop rising by more than 15% in the same period, primarily through rising values for wine grapes and raisins. Grapes are the highest value fruit crop produced in the United States and the sixth highest value of all US crops. 2.3 million tons of raisins, representing 30% of total grape production, generated \$560 million in retail value in 2005. 95.8 million 19-pound box equivalents of table grapes were shipped out of California with a value of \$3 billion in 2005. The large and growing economic impact of the grape and wine industry is in contrasts with the economic situation of many other American industries. Much of the country has experienced the sudden loss of economic impact when a large industrial complex, whether automobile or steel or even semiconductors and telecommunications, or a group of smaller enterprises, such as the garment and footwear industries, closes a factory. The impact of these actions comes not only from the direct loss of jobs but the loss of business for suppliers and the loss of spending power and tax bases in local communities. These are the “direct, indirect, and induced effects” of economic activity – in essence, the “ripple effect,” which can be negative for an industry in decline or relocating and positive when an industry is

growing. In the case of the wine industry, as this analysis shows, the ripple effects are very positive and spread across many sectors of the economy.

Muniyandi et.al (2008) said that grape production of the Theni district in Tamil Nadu, leads with 85.01% share of total production of grape in the year 2008-2009. In a season, the production of small farmers per acre is 6,500 kg, which is relatively higher than the medium and large farmers. Further, it is evident that wholesalers, commission agents and retailers are involved in the purchase of grapes from the farmers. In this study, the farmers report that they are facing the problems like lack of remunerative price for their product and protecting the grape vineyard from the diseases; whereas the traders complain that there are no adequate infrastructural facilities such as road, transportation, cold storage, etc. Therefore, the study suggest certain measures such as opening agricultural clinics for the effective pest management and productivity of the vineyard, provision of cold storages, support prices for grapes, procurement centers to purchase grapes from the farmers for export.

Gough et.al (2008) examined hundred acres of vines, producing undistinguished grapes for undistinguished wines, to a major state industry. Horticulturists, plant pathologists, entomologists, food microbiologists,

enologists, climatologists, soil scientists, agricultural engineers worked to solve the problems of cold hardiness and efficient vineyard management, trellising and mechanical harvesting, certification of virus-free stock and testing of hundreds of grape varieties, balance of sugars and acidity in wines, and consumer preferences. Their research results were shared with growers, processors, and winemakers in several ways: they corresponded with individual viticulturists and enologists, they spoke at local luncheons, state conventions, and national meetings, and they published their results in scholarly journals, popular magazines, newspapers, conference proceedings, and through the University's outreach and Extension programs. This intersection between basic research and practical application was the crux of the University's obligations to the citizens of the state, and testament to the value WSU added to their lives.

Dastagiri (2009) conducted a research on "Estimation of Marketing Efficiency of Horticultural Commodities under Different Supply Chains in India" in 7 states viz. Andhra Pradesh, Karnataka, Tamil Nadu, West Bengal, Manipur, Rajasthan and Punjab and Innovative Models in Horticulture Marketing in India study by NCAP. The main objective of the study are to estimate marketing cost, market margin, price spread and producer share in consumer rupee and suggest suitable strategies for

improvement of marketing efficiency of different horticultural commodities. The executive summary of these states is furnished below.

The study was taken up in Ranga Reddy, Medak and Hyderabad districts of Andhra Pradesh. The crops included were Potato, Tomato, Baby corn, Roses and Grapes. A sample of 90 farmers each for all the selected crops except for grape was selected. The data pertaining to grapes could not be collected from more than 50 farmers due to limitation of availability of required sample size and thus the total sample size was 410 farmers.

Sanguankeo (2009) conducted a research on Impact of weed management practices on grapevine growth, yield components, plant and arthropod abundance, and carabid seed predation in Paso Robles vineyard in which he evaluated the effect on Zinfandel grape-vine growth and production, groundcover plant, and ground dwelling arthropod communities of five weed control practices: 1) flumioxazin, 2) simazine, 3) cultivation, 4) cover crop, and 5) untreated control.

The herbicide treatments had the lowest weed biomass followed by the cultivation, being approximately 10 and 2 times lower than the weed biomass of either the cover crop or untreated control treatments respectively. However, the differences in grape yield were not as evident. In 2006, a rainy year, the herbicides and cultivation treatments did not differ in grape yield, but the cover crop and untreated control had a

reduction of approximately 20% compared with the other treatments. In 2007, a dry year, in comparison to the herbicide treatments, the grape yield reductions of cultivation were around 22%, and of the cover crop and untreated control around 48%. Although the cover crop reduced grape yield, it suppressed weed species considered important such as horseweed, panicle willowherb, scarlet pimpernel, and sowthistle. The cover crop, cultivation and untreated control had 4 to 50 times higher plant density and more than 15 times higher plant diversity compared to the herbicide treatments. The arthropod abundance differed among treatments only in 2007 being higher in the cover crop and untreated control. Also, there was a positive relationship between plant and arthropod diversity. The cultivation treatment balanced the benefits of promoting diversity while minimizing yield reductions due to weed competition.

Shah (2010) said that diversification to more productive and remunerative crops has become the new milestone to be achieved in Indian agriculture, and, a shift in favour of horticultural development as a more viable and attractive alternative is a part of such diversification drive and strategy. Though there are several factors behind this kind of shift, one of the major reasons could be traced in economic and cost advantages involved in the cultivation of these crops. Recognizing the significance of horticultural crops in generating substantial income and employment opportunities,

several states in the country have diversified their cropping pattern in favour of these high value crops. The state of Maharashtra is not an exception to this phenomenon, which leads the country in the cultivation of grapes and a host of other fruits and The studies grape economy of Maharashtra, and, therefore, attempt to comprehensively examines the cost structure and returns in the cultivation of grapes encompassing various categories of grape orchardists. The study shows more than twice gross returns from grape orchards as against cost of production for various categories of orchardists. The large and medium categories of orchardists are noticed to manage their grape gardens more efficiently as compared to small and marginal categories of orchardists. However, in general, the cultivation of grapes is noticed to be a lucrative proposition for all the categories of orchardists because of substantially high element of profit involved in the cultivation of this high value crop. Due to high element of profit, the onus of technological efforts have been more favourably inclined and concentrated behind the cultivation of grapes in the state of Maharashtra.

Vijay (2010) carried out a research to understand the role of weather factors on downy mildew incidence in Grapes (cv. Anab-e-Shahi) and disease progression over time epoch by developing suitable statistical models. Efforts were made to develop models individually for backward and fore

pruning periods, resulting in meaningful interpretation to the researchers. Also, an attempt was made to investigate statistical considerations involved in the error structure and subsequent methodologies to be followed, while developing non-linear models. Using the nonlinear models developed, an index was also developed to compute quantitative information about the biological parameters concerning intrinsic infection rate and maximum mildew severity over time-epoch. Statistical models developed for backward pruning data (May-June) showed that maximum temperature, Evaporation and relative humidity at 7.30 hrs, observed with a time lag of one week, collectively explain about 89.4% of the variation in downy mildew incidence. Statistical models developed for fore pruning data (September-October) showed that minimum temperature, relative humidity at 7.30 hrs and 13.30 hrs, observed with a time lag of one week, collectively explain 88% of the variation in weekly downy mildew incidence. Logistic and Gompertz nonlinear stochastic statistical models developed expressed the disease progression to the extent of 97-99%. These models when used to compute quantitative information about the biological parameters concerning intrinsic infection rate and maximum mildew severity over time-epoch showed that, in general, for backward and fore pruning data, the rate of disease severity was maximum during the fourth-fifth week and fifth- sixth week after pruning, respectively. Hence, appropriate management strategies for controlling the disease should be



oriented within the period identified in the investigation, separately for backward and fore pruning. Resultant nonlinear models were used to compute the Area under Disease Progressive Curve (AUDPC). A perusal indicates that the values obtained by logistic and Gompertz are ranged from 48 to 84 and 25 to 65 respectively for backward pruning data. However, for the fore pruning data the results showed that AUDPC values were higher as it ranged from 78 to 86 and 61 to 65 respectively. These results indicate that the downy mildew rate of progression in Fore pruning is much severe than in backward pruning. SAS programming codes were generated for model building. The message arising out of this present investigation is that proper prophylactic measures, if taken by considering the model resulted significant weather factors along with knowledge about disease progression over time as depicted by nonlinear models, separately for backward and fore pruning, not only results in an efficient and economic management strategies for controlling downy mildew incidence in grapes (cv. Anab-e-Shahi) but also considerably reduce crop yield loss thereby providing better return to the farmers.

Babybowna et.al (2012) examined Cost of Production of Grape in Dindigul District, Tamil Nadu and they found out that grape cultivation in India has reached to the extent of 50000 ha, with an annual production of 10-12 lac metric tons. Out of the total production, 87% of the produce is consumed as

table grape while 10% is dried and produced for raisin, two percent for juice and one percent for wine. Dindigul is one of the most important grape producing districts in Tamil Nadu. The district's soil and climatic conditions are highly suitable for grape cultivation. Hence, grape cultivation has increased spontaneously with an area of 1195 hectares in 1996-97 to 1709 hectares in 2003-04 and 2684 hectares in 2009-2010. Therefore, this paper attempts to analyse determinants of grape production, factors affecting the grape cultivation and also suggests how to improve the productivity of grape in the study areas. The study found that in the case of farmers cultivating High Yielding Varieties,  $r$  value indicated 78.41 percent of variation in yield caused by five explanatory variables. Labour cost, fertilizer, pesticides and capital flows were found to be statistically significant at 5 per cent level. The capital flows had a greater influence on the determination of yield, by the variables such as labour cost, fertilizer and pesticides.

Tasevska (2012) conducted an empirical analysis on the efficiency of commercial grape-producing family farms in the Republic of Macedonia in order to examine how farm performance is influenced by selected aspects of the current Rural Development Programme (RDP) (2007-2013). The emphasis was on Macedonian grape production on family farms and on instruments for more efficient use of resources, production modernization,

vine revitalization, and the knowledge and managerial capacity of Macedonian grape growers. A two-stage analysis was carried out on farm-level data for the period 2006- 2008. The estimated efficiency scores indicated that substantial efficiency improvements are possible on Macedonian grape-producing farms, with potential for a cost decrease of 29% (20% and 36% with parametric and bootstrapping applied) if farmers manage inputs more efficiently. Farm revenue can be improved by 47% (61% when bootstrapping applied) if farmers manage to increase the value of outputs. More efficient farms used a smaller area, irrigated a smaller proportion of total area, used less hired labour, used and paid less for inputs, but produced a larger quantity, with higher value per hectare. The technically more efficient farmers were: younger farmers, farmers with profit maximisation objectives; farmers with lower expectations of a better future for farming; farmers making choices with other family members; farmers monitoring production on the farm and maintaining bookkeeping records; those attending seminars, and those interested in competence-based knowledge such as plant protection, credit/investments. Interventions in production assortment and quality have potential to influence farm performance. Rural development policies can help improve farm efficiency. RDP measures targeted at achieving stable yield, yield improvement and modernisation of equipment, improving farmers' managerial performance

and strengthening the capacity of sources providing non-formal education should be a high priority.

Singh et.al (2012) carried out studies on 'Horticulture Based Farming System in Mizoram: An Alternative to Jhum Cultivation' that Jhum cultivation in Mizoram (shifting or slash-and-burn cultivation) is practiced in 40089 ha area which is about 38.64 % of net sown area. The Lushai terrain of state is endowed with wide agro-climatic conditions and sufficient genetic diversity; which provide virtuous scope for horticultural based farming system to replace non-productive and destructive Jhum practices by espousing soil conservation measures, in-situ moisture conservation, vermicomposting and nutrient management, crop diversification, use of high yielding varieties, proper crop rotation and orchard management, and high-tech horticulture. Most suitable horticultural crops are mandarin, banana, passion fruit, pineapple, areca nut, ginger, turmeric, bird's eye chilli, chow-chow, cabbage, French bean, cowpea, vegetable mustard, Chinese kale, tomato, radish, pumpkin, brinjal, African eggplant, *Solanum ferox*, *S. tarvum*, ash gourd, okra, cauliflower, rice bean, Colocasia, Anthurium, rose and orchids. The ICAR-RC-NEH Region has successfully demonstrated the various technologies at own Farm and farmers' field having significant impact on soil-water conservation and enhancing the Farm productivity such as soil and water conservation

practices (construction of contour trenches, bench terraces, half-moon terraces, drainage line treatments and water harvesting structures); adopting high yielding varieties and potential local genotypes (15-55 %); mulching with local dry grasses (15-45 %); vermicomposting, micronutrient and INM (10-30 %); leaf and branch pruning (12-25 %); and protected nursery management and cultivation (25-450 %). Horticulture based farming system in Mizoram would certainly reduce the area under Jhum cultivation, and improve Farm productivity, income and sustainability.

Jelliffe (2012) examined Connecticut Wine and he found out that Vineyard industry has grown at a steady 3.9% per year over the past decade (ATTTB, 2009). Economic models estimate that the wineries sub-sector contributes \$38 million dollars to the state economy and direct employment of 106 residents (Lopez et al., 2010). Programs to support and foster further growth of the industry and CT farm vineyard culture include the Department of Agriculture's CT Wine Trail and the annual CT Wine festival (DOAG, 2010). Farmland preservation groups also support vineyard development since grape growing tends to secure tracts of farmland for long periods of time. Investment analysis for a representative Connecticut farm vineyard over a 20-year time horizon suggests that wine grape production is profitable under a reasonable set of assumptions, including estimated CT grape prices. When prices from the New York

Finger Lakes region are included in the analysis the investment in wine grapes becomes unprofitable. The Monte Carlo simulation method is implemented to explicitly incorporate risk stemming from variability in expected yields and prices into the representative farm vineyard model. Consistent with the initial investment analysis, simulation results indicate significant variation in expected returns. Information collected during interviews with state growers provided multiple strategies for mitigating such variability. In particular, production of wine as a value-added product is a common approach to obtaining more consistent farm profits. Additional analysis is needed to evaluate the overall profitability of the vineyard coupled with a winery establishment.

Ramesh et.al (2012) said that adoption behaviour of farmers is affected by the attitude they possess for particular technology. Many grape growers became successful exporters by associating themselves to Mahagrapes, necessitating need to study their attitudes scientifically and empirically. Study of 90 grape growers who were members of cooperatives linked to Mahagrapes, from Nashik, Sangli and Pune districts of Maharashtra found that members had long association with Mahagrapes with average of 15 years. They earned average 13.3 lakh per annum by exporting their produce. Average land holding was 10 acres and productivity of grapes obtained was 11.7 tonnes/acre. Farmers had more favourable attitude

towards grapes cultivation as result of their association with Mahagrapes. Total annual income, risk taking behaviour and achievement motivation of members were positively and significantly related to attitude towards grape cultivation and export. Thus, study implied that farmer's organization like Mahagrapes helped in developing positive attitude among farmers towards grape cultivation and export, motivating them to earn more income annually by exporting their produce.

Hinge et.al, (2013) selected one hundred and sixty wine grape growers by adopting simple random sampling. About 40.00 per cent of the respondents belonged to medium level of adoption category. As high as 57.50 percent of the respondents had grown the Cabernet Sauvignon variety. A large majority of the respondents followed summer pruning in April (71.87%) and winter pruning in September (90.62%). Very negligible per cent of the respondents applied the filling material (10.00%), organic manure (11.87%) and chemical fertilizers to their orchards as per recommendation. A large majority of the respondents (80.00%) did not adopt the gibberlic acid treatment. The major problems perceived by the wine grape growers were high cost of planting material (100.00%), irregular and insufficient supply of electricity for irrigation (100.00%), high cost of plant protection chemicals (88.75%), inadequate guidance regarding improved technology (86.62%) and high cost of fertilizers (82.50%).

Kamble et.al (2014) examined Economics of grape production in Marathwada region of Maharashtra that they found out that The popular varieties of grape cultivated by sample growers were Thompson seedless, Tas-A-Ganesh, Sonaka, Manik chaman, Sharad seedless and Cheemashebi, out of which share of Thompson seedless variety was 60 per cent. The per hectare establishment cost of grape orchard was Rs. 3,55,520 out of which maximum expenditure was made on plantation. Regarding the profitability, grape cultivation was profitable at all cost levels. Benefit-cost ratio at cost A, cost B and cost C were 2.45, 1.46 and 1.31, respectively. Financial feasibility analysis showed that, NPW of the project was 2558845, BCR was 2.37 and IRR 149.37 per cent, which indicated investment made in grape production was financially highly feasible. The problem faced by sample cultivators in grape production were non-availability of labour in time, followed by non-availability of fertilizers, credit and pesticides reported by 100, 94, 90, 74 per cent growers, respectively.

Stonebridge Research Group LLC (2014) found that, in 2012, the full economic impact of the grapes, grape juice and wine produced and sold in New York, and allied industries in New York State, totaled \$4.8 billion. The last study reported on data for 2008, as the “Great Recession” was



building. The increased impact reflects the growth since 2008 in both the volume and value of wine sold in New York. We have also succeeded in capturing more supplier sectors (such as warehousing, trucking, ports, marketing services, vineyard maintenance), and more tourism related expenditures — the latter based on state studies — and better information on sales and property taxes. Over this period, the industry has expanded investment in these sectors, and in infrastructure development and construction. New York wines also represent a larger share of the wines sold in New York State than was true in 2008, responding to the industry's persistent marketing efforts. A major stimulus for recent growth has been the transformation of New York State government into a business friendly and strongly supportive environment since 2011. New York is a major U.S. market for sales of wine from all parts of the U.S. and the world. It is home to a vast network of wine importers, distributors, writers, educators, wine auctioneers and other wine professionals, as well as many of America's most distinguished specialty wine retailers and fine restaurants, wine bars and other food, drink and entertainment venues. The economic impact of these many activities in 2012 is estimated at \$4.6 billion, also a large increase from 2008. This year we captured more of the suppliers and services such as transport, education and marketing services, provided in New York to wines sold in New York from other regions, and more comprehensive sales and excise tax collections. Thus, the total economic

impact of the grapes, grape juice and all wines sold in New York State (including wine produced elsewhere) is \$9.4 billion in 2012, compared with \$7.02 billion in 2008, a 34% increase.

Deshetti et.al (2014) conducted research on the topic 'An Economic Analysis of Integrated Pest Management in Grape' in Bijapur District of Karnataka, a sample size of 30 (IPM) and 30 (Non-IPM) farmers were selected using grape sampling method and data was elicited for the agriculture year 2013-14. Through survey method, estimated the per hectare cost of cultivation in IPM farmers category at cost A, B and C as Rs 2, 94,743.03, Rs 2, 53,664 and Rs 5, 48,407 respectively. In case of non-IPM farmers, it was estimated to be, Rs 2, 80,962.84, Rs 2, 50,892 and Rs 5, 33,855 respectively. The Net Return per hectare of grape in IPM farmers was Rs 68,378.73 as against non-IPM farmers Rs 55,545.50 and net additional benefits from IPM was Rs 12,833.24 per hectare. The B: C ratio in IPM farmers was higher 1.81 as compared to non-IPM farmers 1.75. The financial feasibility analysis on investment in IPM and Non IPM farming practice of Grape Orchard had indicated that the investment on Grape cultivation is financially feasible and economically viable, as the NPV for IPM and Non-IPM farmers of Grape was Rs 9, 90,871.65 and Rs 9, 33,238.74 at 12 per cent rate of interest. Benefit-cost ratio was found to be 1.81 and 1.75 in case of IPM and Non IPM farmers of grape. The

internal rate of returns was 51% in IPM farmers and 54% in Non-IPM farmers of grape.

Gade et.al (2014) on their thesis '*Geoeconomical Analysis of Marketing Assessment of Raisin in India*' highlights the world production of grapes is presently 69 million tonnes out of which India accounts for 2.2 million tonnes of grapes making a share of 1.51 per cent of the world production and 3 percent of the total fruit production in the country. Area under this fruit has been increased up to 50 per cent and its production up to 71 per cent from our country in last decade (1994-2004) due to the economic importance of this fruit. Grape (*Vitisvinifera* L) cultivation is one of the remunerative farm enterprises in India. The processing of this fruit in our country is very less as compared to the traditional grape growing countries in the world where more than 80 percent of the production is processed in the form of wine, raisin and juice. There are 16 bi-products made from grapes viz. raisin, grape juice, squash, syrup, jam, jelly, vinegar, wine, pickles, chocolates, tartaric acid, oil, cattle feed, tannin, etc. The processed products viz. wine; raisins and grape juice are the most popular products from grapes in all over the world. Raisins are the second most important product of the grapevine, wine being the first. The raisin trade in international market is increasing day by day. USA is the largest raisin producer in the world. India was placing 3rd in the world after USA and

Turkey. In 2007-08 the raisin production of India was 156150 MT and 172900 MT in 2012-13. But it is clear that Raisin Industry in India facing several difficulties and problem such as climatic change, storage facilities, global financial situation and marketing strategy. He studied the marketing assessment of raisins with their production consumption and marketing of raisins industry in India. Secondary data have been used and basic statistical techniques are applied for the calculations. Raisins are mostly produced in Sangli, Solapur and Nasik districts of Maharashtra, Bijapur district in Karnataka, and some parts of Tamil Nadu, Andhra Pradesh and Punjab in India.

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### **3.1 INTRODUCTION**

The land-use pattern in Indian agriculture has traditionally promoted cereal-based cropping systems. In fact, in the past, horticultural crops received little attention from various development experts and policy makers and, as a result, this sector remained a neglected one for long. This is despite their inherent production and export advantages. However, diversification to more productive and remunerative crops has become the new milestone to be achieved in Indian agriculture. A shift in favour of horticultural crops as a more viable and attractive alternative is a part of such diversification drive and strategy. Many policy makers, trade analysts and development specialists today realise the potential that horticulture has in generating employment and earning foreign exchange for the country. This provides an excellent platform for the country to emerge as a leading producer of fruit crops. The production and productivity of horticulture crop have increased manifold. It is the fastest growing sector within agriculture thanks to the economic prosperity that has provoked market changes in the life styles and the consumption habits.

In terms of horticulture crop production, Maharashtra is considered to be the most important state of the country. This state leads the country in the production of grapes, bananas, oranges and onions. Grape has already been established as an important commercial crop in Maharashtra. Although the

cultivation is mainly concentrated in the three districts of Nasik, Sangli and Solapur, a large number of farmers in the neighbouring districts like Pune, Ahmednagar and Satara are switching over to grape cultivation. In fact, grape cultivation is chiefly confined to Deccan Plateau in Western Maharashtra because of the congenial agro-climatic conditions prevailing in this region. Nasik district of Maharashtra is the largest producer of grapes in the country. Maharashtra contributed more than 80 per cent in the country's total production of grape. Apart from Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Mizoram, Punjab, Haryana and Rajasthan are major producers of grapes in India.

### **3.2 HISTORY OF GRAPE CULTIVATION IN INDIA**

Grape cultivation is one of the most remunerative farming enterprises in India. Famous Indian medicine scholars, Sasruta and Charaka in their medical treatises entitled '*Sasruta Samhita*' and '*Charaka Samhita*', respectively, written during 1356-1220 BC, mentioned the medicinal properties of grapes. Kautilya in his '*Arthashastra*' written in the fourth century BC mentioned the type of land suitable for grape cultivation. Native spp. resembling *Vitis lanata* and *Vitis palmata* grow wild in the northwestern Himalayan foothills. Indigenous varieties known as 'Rangspay', 'Shonltu White' and 'Shonltu Red' are grown in Himachal Pradesh even today. Cultivated grapes are believed to have been introduced

into the north of India by the Persian invaders in 1300 AD, from where they were introduced into the south (Daulatabad in Aurangabad district of Maharashtra) during the historic event of changing the capital from Delhi to Daulatabad by King MohammedbinTughlak. Ibn Batuta, a Moorish traveller who visited Daulatabad in 1430 AD, reported to have seen flourishing vineyards in south India. Grape was also introduced in the south into Salem and Madurai districts of Tamil Nadu by the Christian missionaries around 1832 AD, and into Hyderabad province by HEH, the Nizam of Hyderabad in the early part of the 20<sup>th</sup> century. From Delhi, Daulatabad, Madurai, Salem and Hyderabad, grape cultivation spread to different parts of the country.

### **3.3 PRESENT STATUS OF GRAPE CULTIVATION IN INDIA**

In India, grape is grown under two distinct climatic conditions: (i) the subtropical climatic conditions of north where the winter temperatures rarely reach the freezing point but vines undergo dormancy in winter, and (ii) the tropical climatic conditions of the peninsular India where the winter are mild and the vines do not undergo dormancy and remain evergreen throughout. Based on the viticultural practices and the incidence of rainfall, the grape-growing regions in India are classified into three.

Region - I	The mid temperate to subtropical region comprising Punjab, Haryana, Uttar Pradesh, Rajasthan and Delhi
Region - II	Entire Telangana and Rayal seema areas of Andhra Pradesh, excepting the districts of Chittoor and Prakasam, north interior Karnataka and the rain shadow area of the Western Ghats in Maharashtra.
Region - III	All grape growing areas of Tamil Nadu, and the districts of Bangalore, Kolar and Mysore of Karnataka.

### 3.3.1 Major Grape Producing Belts in India

Andhra Pradesh :Hyderabad, Rangareddy, Anantapur

Himachal Pradesh :Kullu (Bajaura), Mandi (Nagwain), Kinnaur (Ribba, Rekongpeo), Solan (Gaura)

Haryana :Hisar, Fatehabad, Sirsa

Karnataka :Bijapur, Bengaluru (Rural), Kolar, Belgaum, Bengaluru (Urban), Gulbarga, Koppal, Bidar, Belgaum

Punjab :Bathinda, Mansa, Sangrur, Faridkot

Maharashtra :Sangli, Nasik, Solapur, Pune, Ahmednagar, Latur, Satara, Osmanabad, Buldhana (table Grapes), Nasik, Sangli, Osmanabad, Buldhana (Wine Grapes)

Manipur :Imphal West, Bishnupur, Imphal East, Thoubal, Churachandpur, Chandel

Mizoram :Champhai

Tamil Nadu :Coimbatore, Dindigul, Theni.

### 3.3.2 Harvesting Season of Grapes in India

Table 3.1

STATE	PEAK SEASSON	LEAN SEASON
MAHARASHTRA	March, April and May	January ,February, November and December
KARNATAKA	Round the year	
ANDHRA PRADESH	March and April	January and February
TAMIL NADU	May and November	April, August, September and October
MIZORAM	October	September
HARYANA	June	May
HIMACHAL PRADESH	July	June
JAMMU AND KASHMIR	June and July	
PUNJAB	May and June	
RAJASTHAN	June	July
UTTAR PRADESH	June	July

Source: Indian Horticulture Database-2014

### 3.3.3 Important Varieties of Grape Grown in India

In India different types of grapes are grown according to the climatic condition of area and the type of soil available in the state. Table 3.2 depicted the various types of grape cultivated within the state.

**Table 3.2**

Sl. No	State	Variety Grown
1	Andhra Pradesh	Thomson seedless, Anab-e-shahi, Sharad seedless,
		Dilkhush, Sonaka, madhu Angoor, Italia, Crimson seedless
2	Haryana	Perlette, Flame seedless, Anab-e-shahi, Cardinal, Angur
		Early, Beauty Seedless
3	Karnataka	Bangalore Blue, Thomson Seedless, Red Globe, Sharad
		Seedless, Flame seedless, Sonaka, Fantasy Seedless, Dilkhush,
4	Madhya Pradesh	Thomson seedless, Sharad seedless, Sonaka
5	Maharashtra	Thomson seedless, Tas-A-Ganesh, Sonaka, 2A clone,
		Sharad seedless, Red Globe, Fantasy seedless, Flame seedless,
6	Punjab	Perlette, Flame Seedless, Beauty Seedless, Punjab Purple,
		Pusa Navrang, Fosta Seedless, Cardinal, Black Hamburg, Delight,
7	Tamil Nadu	Muscat Hamburg (Panneer), Thomson seedless, Red Globe,
		Bangalore Blue, Sonaka,
8	Rajasthan	Anab-e-shahi, Sharad seedless, Perlette, Flame Seedless
9	Mizoram	Bangalore Blue (Viniferol Labrusea)

Source: National Horticulture database



### **3.4 INDIAN SCENARIO OF AREA, PRODUCTION AND PRODUCTIVITY OF GRAPE**

Grape is produced in over 91 countries worldwide (APEDA). Grape covers an area of 6976108 ha with a production of 68412467 metric tons in the world during the year of 2013-14. India occupies 9th position among grapes growing countries of the world. China and United States of America stood at First and second position among grape producing countries in the world with 9600000 and 6661820 metric tons respectively. The other major grape producing countries in the world during 2014 were Italy (5819010 metric tons), France (5338512 metric tones), Spain (5238300 tones) and Turkey (4275659 metric tones) respectively. Grape is grown almost in all the states of India. Maharashtra tops the list of grape producing states. Other major producing states are Karnataka, Andhra Pradesh, Mizoram, Panjab, Jammu & Kashmir, Rajasthan, Himachal Pradesh, Chhattisgarh, Haryana, Nagaland, Madhya Pradesh etc. Rest of the states has quite less production.

#### **3.4.1 Trends in the Area, production, and productivity of grapes in India**

The table 3.3 shows the area, production and productivity of grapes since 2004-05, the area under grape is increased from 60.5 thousand ha to 118.7 thousand ha during 2004-05 to 2013-14. Its growth rate was 9.09 % in 2005-06 and it decreased -1.51 % in 2006-07 but it was 33 % in 2009-10,

which is highest in the study period. The highest area under Grapes cultivation in India was observed in 2013-14.

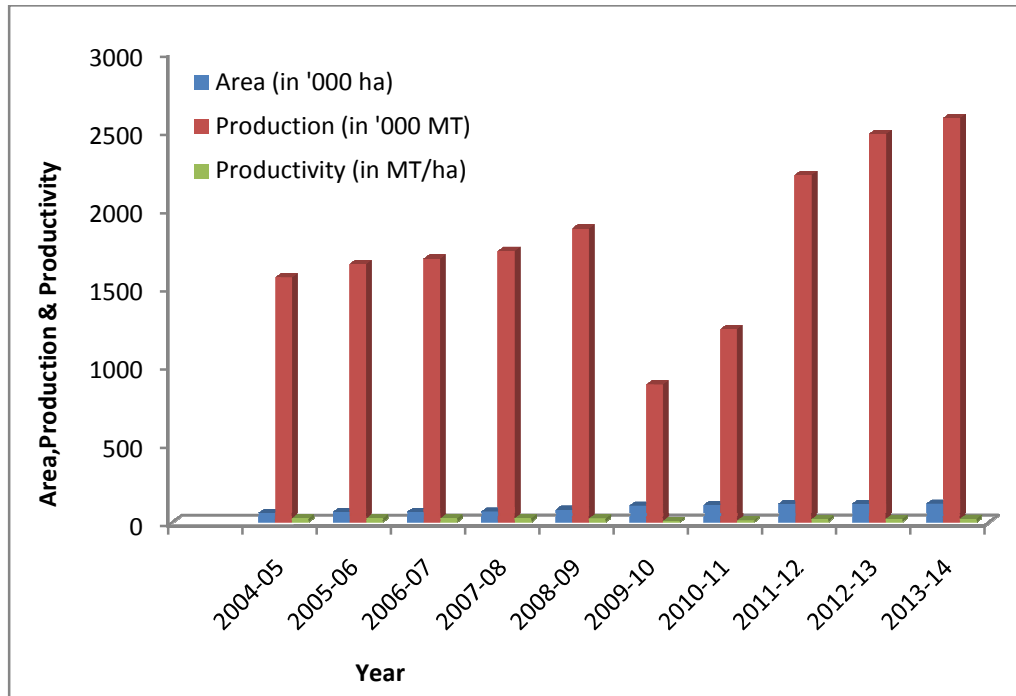
**Table-3.3**

**Trends in the Area, production, and productivity of grapes in India**

<b>Year</b>	<b>Area (in '000 ha)</b>	<b>Growth rate (%)</b>	<b>Production (in '000 MT)</b>	<b>Growth rate (%)</b>	<b>Productivity (in MT/ha)</b>	<b>Growth rate (%)</b>
<b>2004-05</b>	60.50	0.00	1564.70	0.00	25.90	0.00
<b>2005-06</b>	66.00	9.09	1649.60	5.42	25.00	-3.40
<b>2006-07</b>	65.00	-1.51	1685.00	2.14	25.90	3.60
<b>2007-08</b>	68.00	4.61	1735.00	2.97	25.50	-1.54
<b>2008-09</b>	80.00	17.64	1878.00	8.24	23.50	-7.84
<b>2009-10</b>	106.40	33.00	880.70	-53.10	8.30	-64.68
<b>2010-11</b>	111.00	4.32	1235.00	40.22	11.10	33.34
<b>2011-12</b>	116.00	4.86	2220.90	79.75	19.10	72.34
<b>2012-13</b>	117.60	1.38	2483.10	11.80	21.10	10.48
<b>2013-14</b>	118.70	0.94	2585.30	4.11	21.80	3.31

*Source: National Horticulture Board, Government of India*

**Graph 3.1 Trends in the Area, Production and Productivity of Grapes in India**



*Source: National Horticulture Board, Government of India*

The production of grapes was 1564.70 thousand tons in 2004-05 and it increase 2585.30 thousand tons in 2013-14. The growth rate in production of grapes was increased 5.42 % in 2005-06 and it was 8.24 % in 2008-09 that was reduced to -53.10 in 2009-10. The highest growth rate (79.75%) was observed in the year 2011-12. The productivity of grapes is crucial for earning higher income from agriculture. The per hectare productivity of grapes was observed 25.90 mt/ha in 2004-05, it decreased to 25 mt/ha in 2005-06 and, latter on it increased again at 25.90 mt/ha during 2006-07 that

was the peak year of productivity of grapes in India during 2004-2014. Even after 2007, the productivity of grapes declined to 8.30 mt/ha in 2009-10 and then it increased steadily to 21.80 mt/ha in 2013-14, it showing decreasing trend in productivity of grapes due to unseasonal rains in study region.

### **3.4.2 Major Grapes producing states in India**

Maharashtra is the leading grapes producing state with production of 1810 thousand tons in the year 2011-12 followed by Karnataka state which has produced of 288.10 thousand tons. The grape production of Tamil Nadu is 55.1 thousand tons, followed by Andhra Pradesh and Mizoram i.e. 28.9 and 24.3 thousand tons respectively. Area, production and productivity of grape in different states are given in table 3.4.

The following table 3.4 below reveals that the area, production and productivity of grapes from 2011-12 to 2013-14. The area under grape is increased from 116 thousand hectare to 118.74 thousand hectare during 2011-12 to 2013-14. The production of grape was 2220.9 thousand tons in 2011-12. It increased 2585.34 thousand tons in 2013-14. The productivity of grape was increased 19.14 tons in 2011-12 to 21.78 tons in 2013-1

**Table 3.4**

**Area, Production and Productivity of leading grape growing states in India**

State	Area('000 ha)			Production('000 tonne)			Productivity		
	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
<b>Maharashtra</b>	92	90	90	1810	2050	2160	19.67	22.78	24
<b>Karnataka</b>	16.8	19.7	20.46	288.1	320.9	302.39	17.14	16.29	14.78
<b>Tamil Nadu</b>	2.9	2.68	2.84	55.1	43.38	47.72	19	16.18	16.8
<b>Telangana</b>			1.23			25.79			20.97
<b>Mizoram</b>	1.9	2.38	2.45	24.3	20.8	23.87	12.78	8.73	9.74
<b>Andhra Pradesh</b>	1.4	1.58	0.43	28.9	31.51	8.93	20.64	19.94	20.76
<b>Others</b>	1	1.3	1.33	14.5	16.51	16.65	14.5	12.7	12.51
<b>Total</b>	<b>116</b>	<b>117.63</b>	<b>118.74</b>	<b>2220.9</b>	<b>2483.09</b>	<b>2585.34</b>	<b>19.14</b>	<b>21.1</b>	<b>21.78</b>

Source: National Horticulture Board, Government of India

Note: \* Estimates for Telangana for 2013-14, although it was part of Andhra Pradesh for majority of the period.

It is observed that Maharashtra is the highest grape cultivated state in India. With regard to agricultural land under grape cultivation and grapes production, Nasik and Sangli districts are at forefront in Maharashtra state. Apart from these, grapes are also grown in the district of Ahmednagar, Pune, Satara, Solapur and Osmanabad. However, Nasik and Sangli districts are ahead in the production of grapes in a scientific manner. Area under

grapes in Maharashtra was 90 thousand ha and production was around 2160 thousand tons of grapes that account for more than 80 % of total production in India according to latest data of National Horticulture Board in 2013-14. Karnataka stood at second position among grape producing states in the India with an area of 20.8 thousand ha and production is 302.4 thousand tons and the productivity is 14.8 mt/ha in 2013-14. The main producing districts in the state are Bijapur, Bengaluru, Kolar, Gulbarga, Koppal, Bidar and Belgaum. The third producing state is Tamil Nadu with an area of 2.8 thousand ha and production of 47.7 thousand tonnes and productivity is 16.8 mt/ha and major producing belts in the state are Coimbatore, Dindigul and Theni. And the fourth one is newly established state known as Telangana with an area of 1.2 thousand ha and their production and productivity during 2013-14 are 25.8 thousand tonnes and 21 mt/ha respectively. However, the fifth major producer of grapes in India is Mizoram with an area of 2.5 thousand ha and production was 23.9 thousand tonnes and productivity was 9.7 mt/ha which is quite low in comparison to others state because grapes are largely cultivated in a commercial scale in the year 2010 and mainly produced from Champhai district only and accounted for 0.93 % of total production of Grape in India. The sixth one is Andhra Pradesh with an area of 0.4 thousand ha and production and productivity during 2013-14 are 8.9 and 20.8 thousand tonnes respectively. Thus, besides these major producing states mentioned above, there are

other state that contributed the production of grape in India which are Manipur, Haryana, Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh. The production of all these state taken together was 16.6 thousand tonnes with an area of 1.3 thousand ha and their productivity was 12.5 mt/ha and they contributed 1.34 % of total production during 2013-14.

### 3.4.3 Trends in Export of Grape from India

Table 3.5 shows the export quantity and export value of grapes since 2004-05 to 2013-14.

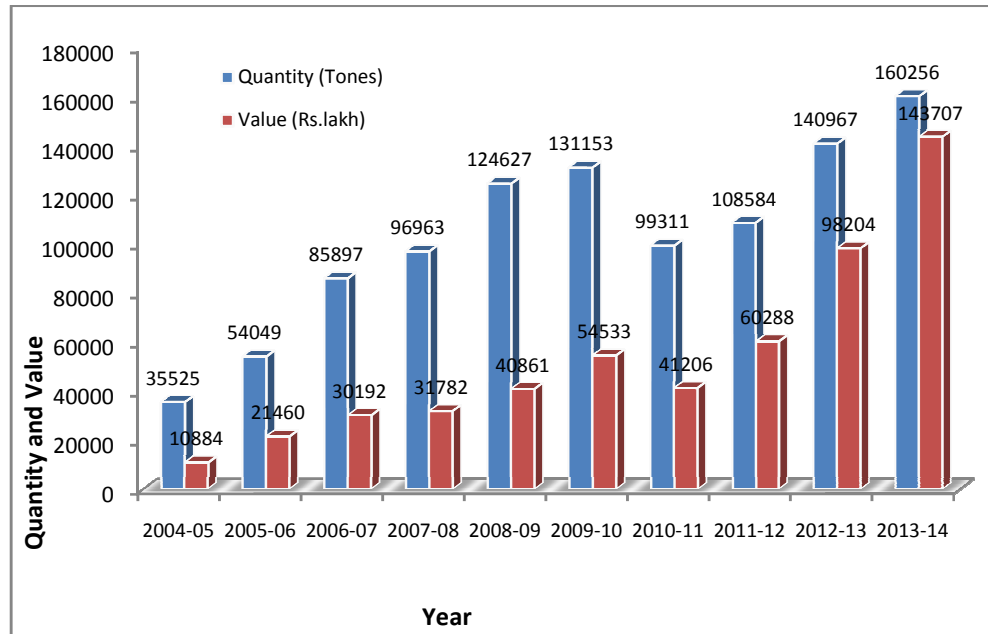
**Table-3.5**

#### **Trends in Export of Grapes from India**

<b>Year</b>	<b>Quantity (Tonnes)</b>	<b>Growth rate (%)</b>	<b>Value (Rs.lakh)</b>	<b>Growth rate (%)</b>
<b>2004-05</b>	35525	0.00	10884	0.00
<b>2005-06</b>	54049	52.14	21460	9.71
<b>2006-07</b>	85897	58.92	30192	40.68
<b>2007-08</b>	96963	12.88	31782	5.26
<b>2008-09</b>	124627	28.53	40861	28.56
<b>2009-10</b>	131153	5.23	54533	33.45
<b>2010-11</b>	99311	-2.42	41206	-24.43
<b>2011-12</b>	108584	9.33	60288	45.30
<b>2012-13</b>	140967	28.82	98204	62.89
<b>2013-14</b>	160256	13.69	143707	46.33

*Source: National Horticulture Board, Government of India*

**Graph 3.2 Trends in Export of Grapes from India**



*Source: National Horticulture Board, Government of India*

The India is exporting grape to the different countries. The highest export of grapes is observed 160256 tons in 2013-14. There is a phenomenal rise in export of grapes from India, as only 35525 tons were exported during 2004-05 which has increased to 131153 tons with a value of Rs. 54533 lakhs in 2009-10. The export quantity of grapes was declined to 99311 tons valuing of 41206 lakhs in 2010-11. The maximum quantity of grapes exported from India stood at 160256 tons valuing of 143707 lakhs during 2013-14.



### 3.4.4 Major Export Destinations of Indian Grape

Table 3.6 shows the export of quantity, export value and major importer countries of grapes since 2011-12 to 2013-14

**Table-3.6**

#### **Major Importing countries of India's Grapes**

<b>Value in Lakh and Quantity in Metric Tonne (mt)</b>						
<b>Country</b>	<b>2011-12</b>		<b>2012-13</b>		<b>2013-14</b>	
	<b>Qty</b>	<b>Value</b>	<b>Qty</b>	<b>Value</b>	<b>Qty</b>	<b>Value</b>
<b>Netherland</b>	18382	14198	35915	32480	46082	52663
<b>Russia</b>	4611	3870	15885	12438	23277	21621
<b>United Kingdom</b>	6564	5319	14829	15363	16701	20571
<b>United Arab Emirates</b>	10142	6243	13769	9445	10446	9216
<b>Bangladesh</b>	35640	10032	32562	5262	31109	7507
<b>Thailand</b>	1807	1851	2957	3421	3749	4962
<b>Sweden</b>	2196	1604	2978	3386	2787	3985
<b>Saudi Arabia</b>	4277	2438	5906	3433	7242	3141
<b>Germany</b>	599	407	1464	1101	2419	2723
<b>Hong Kong</b>	641	504	1579	1766	1640	2404
<b>Others</b>	10001	5201	13129	10110	14804	14915
<b>Total</b>	<b>94860</b>	<b>51676</b>	<b>140967</b>	<b>98204</b>	<b>160256</b>	<b>143707</b>

*Source: APEDA Website*

The India is exporting grapes to the different countries. India is the major exporter of Grapes in the world; the country has exported 160253 mt of Fresh Grapes worth Rs. 143707 lakhs during the year 2013-14. Netherlands and Russia stood at First and second position among grape importer

countries of India with 46082 metric tons valuing of Rs. 52663 lakhs and 23277 metric tons valuing of Rs. 21621 lakhs respectively. The other major grape importer countries in the world during 2014 were United Kingdom 16701 mt (Rs 20571 lakhs), United Arab Emirates 10446 mt (Rs 9216 lakhs), Bangladesh 31109 mt (Rs 7507 lakhs), Thailand 3749 mt (Rs 4962 lakhs), Sweeden 2787 mt (Rs 3985 lakhs), Saudi Arabia 7242 mt (Rs 3141 lakhs), Germany 2419 mt (Rs 2723 lakhs), Hong Kong 1640 (Rs 2404 lakhs) respectively.

### **3.5 CONCLUSION:**

On the basis of study we can conclude that; there is a tremendous potential of export of grapes from India. Grape is cultivated over an area of 118.7 thousand hectares with an annual production of 2585.34 thousand tones. Although, the returns per unit area of land are very high with grape cultivation, the area under grapes are not expanding fast owing to the high initial cost of establishing the vineyards and high recurring cost of production. There is a phenomenal rise in export of grapes from India, as only 94860 tons were exported during 2011-12 which has increased to 160256 tons in 2013-2014. Increase has been observed mainly in the last 10 years, because of the fact that India is meeting quality requirements including pesticide residues of all the importing countries in EU and supplying grapes at competitive prices. This is evidenced by decrease in

productivity during the recent years from more than 25.90 mt/ha to 8.30 mt/ha during the year 2009–2010 and 21.80 mt/ha during 2013–2014 due to unseasonal rains which lead to serious downy mildew incidence. Changes in cropping season to adjust to changed climate will bring market competition-related issues particularly for Indian table grape industry in domestic as well as global markets. Currently more than 80 percent of the produce is used for table purposes. The major bulk of the produce is harvested in March-April, but as cold storage facilities are currently inadequate there are frequent market gluts. There is a need to diversify of uses as wine, raisin, juice and export of table grapes can ease the marketing problem.

## **4.1 INTRODUCTION**

In this chapter, an empirical analysis of economics of grape cultivation in Mizoram with special focus to Champhai cluster and performance of grapes growers within the cluster has been analyzed and interpreted in a systematic manner with a table and bar diagram as well as pie chart. The performance indicators being adopted in the analysis are socio-economic conditions of growers, grapes cultivation, production, marketing, government intervention, problems faced by the growers, etc. As has been mentioned in the methodology, the study is mainly based on primary data which has been collected through a well-designed questionnaire and also from secondary sources. This chapter is broadly divided as introduction, General Profile, Income distribution, Cultivation of grapes, Production and Marketing, performance of wineries, perceptions and problems of growers, main findings, suggested measures and Concluding Remarks.

## **4.2 GENERAL CHARACTERISTICS OF GRAPES GROWERS**

An understanding of general characteristics of sample farmers is expected to provide a bird's eye view of the general features prevailing in the study area. Therefore, an attempt has been made in the study to analyse some of

the important characteristics of the sample farmers. The general characteristics of the respondents are presented in the following table.

**Table 4.1 Basic Profile of Grapes Growers**

Sl.No	Particulars	Value
<b>1</b>	Family Poverty Status (in %)	
	a) APL	68.75
	b) BPL	30
	c) AAY	1.25
<b>2</b>	Housing Status (%)	
	a) Families Staying Pucca House	17.5
	b) Families Staying Semi-Pucca House	31.25
	c) Families Staying Kutcha House	51.25
<b>3</b>	Percentage of Families staying owned house (Housing Status)	96
<b>4</b>	Average Family Size (No. of Persons)	6.05
<b>5</b>	Average Number of Workers per family	3.05

Source: Field Survey, 2016.

\*APL= Above Poverty Line

\*BPL=Below Poverty Line

\*AAY=Antyodaya Anna Yojana

It is observed that the majority (68.75 percent) are above poverty line (APL), 24 families of respondents are below poverty line which is 30 percent out of total respondents while the remaining 1.25 percent are under AAY category. It is found out that maximum number of growers i.e. 51.25 percent lived in kutcha house, 31.25 percent stayed in semi-pucca type of house and the rest 17.5 percent stayed in pucca type of house. Therefore maximum numbers of the respondents are living in Kutcha houses. This reflects that though the number of respondents below poverty line is lesser than that of families living above poverty line, their housing facility is more or less the same. The average family size is approximately 6 (i.e.6.05), of which half (3.05) of the respondent family members are counted as workers.

**Table 4.2: Occupation**

<b>Main Occupation of Respondents</b>		
<b>Particulars</b>	<b>No. of Growers</b>	<b>Percent</b>
<b>Farming</b>	40	50
<b>Agriculture</b>	11	13.75
<b>Others</b>	29	36.25

Source: Field Survey, 2016

The above table depicts the main occupation/activities adopted by sample families of the study area. It is observed that majority of growers (50 percent) had farming as primary occupation and they are dependent totally on farming, whereas 36.25 percent of the growers had shifting/jhum cultivation as their major livelihood. The rest 13.75 percent of the farmers are Government servants who had other business as their primary occupation and farming as subsidiary occupation of agriculture.

**Table 4.3 Average Age Group of Respondents**

<b>Age Group</b>	<b>No of Person</b>	<b>Percent</b>
<b>30-40</b>	6	7.5
<b>40-50</b>	17	21.25
<b>50-60</b>	29	36.25
<b>60-70</b>	14	17.5
<b>70-80</b>	10	12.5
<b>80-90</b>	4	5
Average age of Respondents=57.12		

*Source: Field Survey, 2016*

Table 4.3 shows that all the respondents are at the age above 30 years, maximum number of the respondents are at the age ranging from 50-60 years that accounts for 36.25 % followed by 40-50 age group that is 21.25 % and 35 % of the respondents are above 60 years of age and the minimum number of respondents are at the age between 30-40 that accounts only for 7.5 % out of total respondents.

Therefore, from the above analysis we may conclude that majority of respondents are above poverty line that shows a favorable living condition but they have to stay in Kutcha type of house. The average family member of sample families is about 6, of which half of family members are workforce and the main occupation adopted in Champhai cluster is grapes cultivation as it has been shown in the table 4.2. Also the average age of the sample respondents is about 57 years that indicate most of the respondents who are engaged in grape cultivation are above 50 years of age.

**Table 4.4 Educational Attainment**

<b>Educational Level</b>	<b>No. of Growers</b>	<b>Per Cent</b>
<b>Primary Level</b>	21	26.25
<b>Middle Level</b>	19	23.75
<b>High School Level</b>	12	15
<b>Higher Secondary Level</b>	9	11.25
<b>Graduate and Above</b>	19	23.75

*Source: Field Survey, 2016*



It is observed that 100 percent of the growers had received some level of education. The proportion of respondents who received primary level of education was largest (26.25 percent), 23.75 percent of the growers had received middle level of education and only 15 percent of the growers completed their high school education and 11.25 percent received higher level. The rest 23.75 percent of respondents were graduate and above. It can be concluded that the sampled farmers are educated enough when it comes to educational attainment which helps them in meeting their technological knowhow for cultivation of grapes. Better formal education helps the farmer in improving his/her ability to know science and modern technology and in utilizing them for the betterment of their livelihood. This shows that education contribute in adopting better cultivation practices of the crops as well appropriate modern technologies.

#### **4.3 INCOME DISTRIBUTION**

Income is the major indicator of the economic status of an individual. Every individual's living style influenced to great extent by his/her income. Expenditure on farming, allied occupations and household matters are decided by the income earned by an individual. A low level of annual income hinders acquisition of new skills, knowledge and also the assets. A better financial position enables farmers to be more enterprising in taking

risks involved in trying new and advanced farming techniques and motivates farmers to adopt new technologies.

This section highlights the comparison of income earned by grapes growers from all sources before and after the adoption of grapes cultivation of the study area i.e. Champhai cluster and annual family income from all sources is depicted in tables 4.5 and 4.6

**Table 4.5 Average Annual Income of the Respondents (pre grape cultivation)**

Sl. No	Income (in Rupees)	No. of Growers	Percent
1	10000-90000	50	62.5
2	100000-190000	9	11.25
3	200000-290000	8	10
4	300000-390000	4	5
5	400000-490000	2	2.5
6	500000-590000	3	3.75
7	600000-690000	1	1.25
8	700000-790000	1	1.25
9	800000-890000	2	2.5
<b>Average Income=Rs.160,625</b>			

*Source: Field Survey 2016*

**Table 4.6 Average Annual Income of the Respondents (post grape cultivation)**

Sl. No	Income (in Rupees)	No. of growers	Percent
1	10000-90000	39	48.75
2	100000-190000	15	18.75
3	200000-290000	7	8.75
4	300000-390000	6	7.5
5	400000-490000	1	1.25
6	500000-590000	2	2.5
7	600000-690000	4	5
8	700000-790000	3	3.75
9	800000-890000	3	3.75
<b>Average Income=Rs.235,062.5</b>			

*Source: Field Survey 2016*

It is rightly observed that the income earned by grape growers during pre-grape cultivation is less than post grape cultivation as it has been shown in tables 4.5 and 4.6. Therefore, this indicated that grape cultivation create a favorable living condition and is essential for livelihood promotional occupation of growers in the study area. As shown in the table 4.5, the average annual family income of respondents from all sources stood at Rs.

160,625 and the average monthly income is Rs. 13385.41 and the average per capita monthly income of sample respondents stood at Rs.2,212.47 that is above the existing poverty line as defined by Rangarajan Committee Recommendations. It also observed that there is highly income inequality among grapes growers. There are half of (50) sample families whose annual income is less than 1 lakh which is accounted for 62.5 % out of total sample families. Moreover the annual income of 23 sample families ranging from 1 lakh to 5 lakhs which is accounted for 28.75 % of total annual income and the rest top seven sample families earned above Rs. 500000 per year that accounts for 8.75 % during the period of pre grape cultivation. Then, after the adoption of grapes cultivation in the study area, the average annual family income among the 80 sample growers turned out to be Rs.235,062.5 which comes to Rs.19588.54 per month. This is a big amount taking into consideration the average family size of 6.05 because the average per capita monthly income Rs 3237.78, which is well above the existing poverty line. The number of families whose annual family income less than one lakh fall down from 50 to 39 families which is accounted for less than half of total sample families (i.e. 48.75%) after grape cultivation. It was also observed that the number of families whose annual income ranging from 1 lakh to 5 lakhs also rises from 23 to 29 which is 36.25 percent out of total respondent families and even the number of high income families whose annual income is more than 5 lakhs rises to 12 families and their contribution is

15 % out of the total annual income of respondents families. Therefore, grapes cultivation is no doubt an income generating occupation and has been sustaining the growers' families and also, is a promising means of livelihood for the year to come.

#### **4.3.1 Annual Income only from Grapes Cultivation**

Average annual income of sample grapes growers only from grapes is illustrated in the following table 4.7. The majority of respondent families (49) earned an annual income of less than Rs. 50000 which is 61.25 % of total annual income only from grapes, while the annual income ranging from Rs.50000 to Rs.200000 belongs to 27 sample families that accounts for 33.75 % of total annual income from grapes and the remaining 4 respondent families earned more than 2 lakhs within a year. Hence, it has rightly found that the average annual income of the respondent family turned out to be Rs. 61,250 that comes to Rs.5,104.16 per month. Here we have excluded other sources of income. Therefore, the average annual income of the respondents only from grape cultivation is more than BPL family's annual income which is Rs.11520.00 in the rural areas.

**Table 4.7 Annual Income of Respondents only from Grapes**

<b>Income</b>	<b>No of Grower</b>	<b>% Share</b>
<b>0-50000</b>	49	61.25
<b>50000-100000</b>	15	18.75
<b>100000-150000</b>	10	12.5
<b>150000-200000</b>	2	2.5
<b>200000-250000</b>	3	3.75
<b>250000-300000</b>	1	1.25
<b>Average annual income only from Grapes=Rs.61,250</b>		

*Source: Field Survey, 2016*

#### **4.4 CULTIVATION AND ITS RELATED ISSUES**

##### **4.4.1 Size of Land Holding**

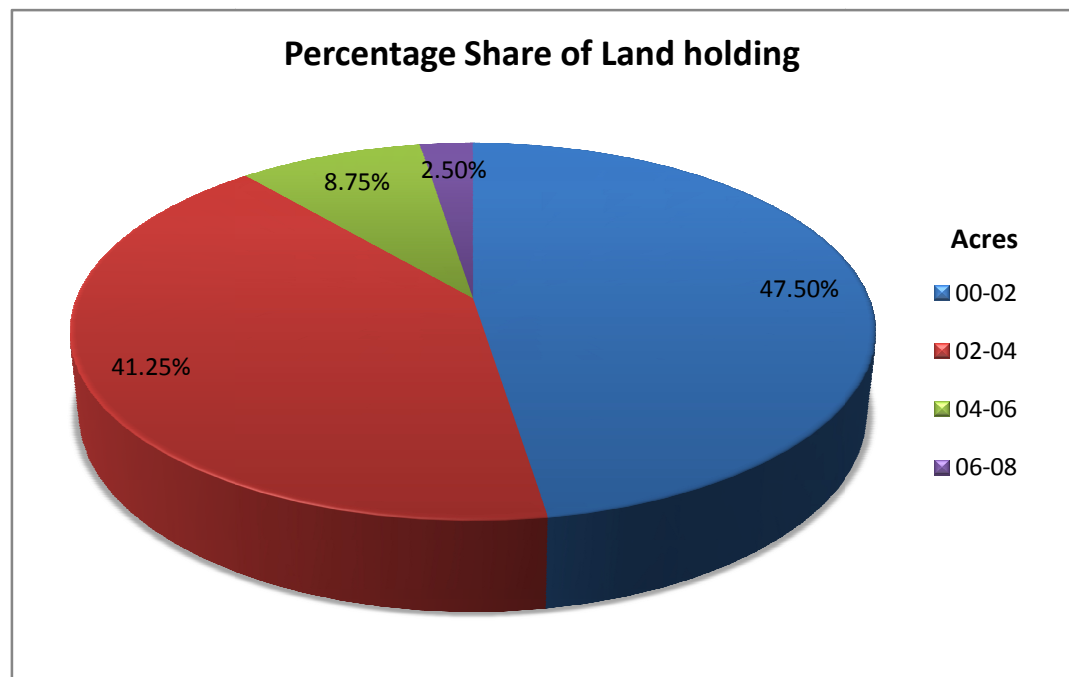
The size of land owned by a person is an important parameter to assess the economic standing of the person in the society. Landholding is also an important factor which influences acquisition of additional skills and adoption of new technologies. Land Holdings size of the respondents can be seen from the Table 4.8

**Table 4.8 Land Holding Size of Growers**

Acre	No of Family	Percentage share
0-02	38	47.5
02-04	33	41.25
04-06	7	8.75
06-08	2	2.5
<b>Average size of land holding=2.325</b>		
<b>Irrigated</b>	<b>= 21</b>	<b>26.25</b>
<b>Non-irrigated</b>	<b>= 59</b>	<b>73.75</b>

Source: Field Survey, 2016

**Graph 4.1**



Source: Field Survey, 2016

The above table and diagram reveals that majority of grapes growers (38) families holds their grapes farm with an area of 0-2 acres which is 47.5 % of sample respondents, 33 families holds an area of 2-4 acres that is 41.25% and 7 families holds an area of 4-6 acres and then top 2 families have an area of 6-8 acres that accounts for 2.5%. Therefore, the average land holding size of the respondents was 2.325 acres, out of which of which 0.61 acres was irrigated and remaining 1.71 ha was rain fed in Champhai cluster.

#### **4.4.2 Plantation of Grape Bushes**

This section presents the number of grape bushes planted and held by sample grapes growers. It can be seen from table 4.9 that the average number of grapes bushes planted and held by sample respondents stood at 618.75. More than half of the respondent families (41) have less than 500 bushes of grape which is accounted for 51.25 % out of total sample respondent, 27 sample growers have 500-1000 bushes that is 33.75 %, the number of bushes ranging from 1000-1500 belongs to 7 sample families that accounts for 8.75 % and the top 5 sample respondent growers holds more than 1500 bushes of grapes.



**Table 4.9: Average number of plantation of grapes bushes**

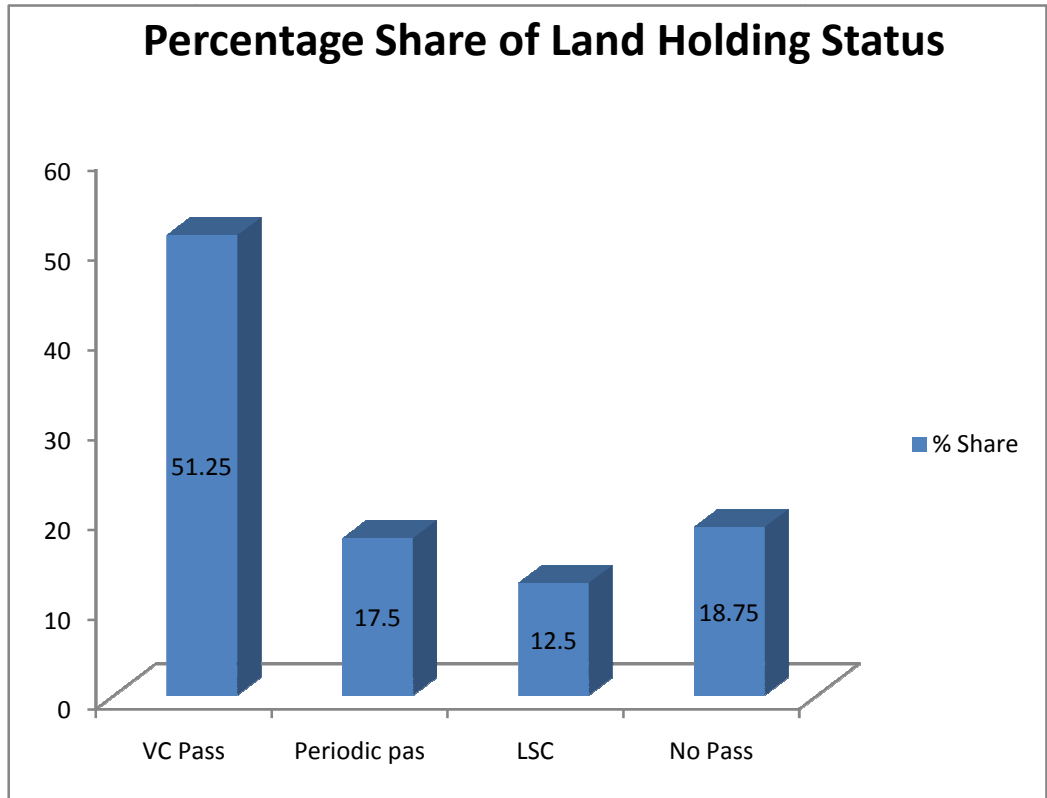
<b>Grape bushes</b>	<b>No of Family</b>	<b>Percentage share</b>
1-500	41	51.25
500-1000	27	33.75
1000-1500	7	8.75
1500-2000	2	2.5
2000-2500	3	3.75
<b>Average number of plantation per family=618.75</b>		

*Source: Field Survey, 2016*

#### **4.4.3 Land Holding Status**

Land in Mizoram is owned by the State Government. As per Rule 13 of the Mizo District (Agricultural Land) Rules, 1971, all persons having agriculture land pass/ permit could convert the same to regular Land Settlement Certificates (LSCs), which has the status of a 'Patta'. However, mostly, LSCs are issued only for residential purposes and cultivation is done on the land certificate issued by village councils, which do not have any legal status.

**Graph 4.2 Land Holding Status of Respondents**



*Source: Field Survey, 2016*

The above diagram 4.1 depicts the land holding status of sample growers. It has observed that the maximum number of respondent grape growers holds their land in the form of Village council permission which is accounted for more than half of the total respondents i.e.51.25 %, 17.5 % of respondent growers holds in the name of periodic pass while the least number of growers (12.5%) hold their land in the name of Land Settlement Certificate (LSC). Unfortunately 18.75 % of sample growers

have no land holding permission. Therefore, it is safe to conclude that most of the respondents have land holding permission from various authorities as indicated in the diagram.

## **4.5 PRODUCTION AND MARKETING**

This section presents the trends in the area under grapes cultivation in Champhai district, production and productivity and marketing pattern of grapes.

### **4.5.1 Trends in Area, Production and Productivity of Grapes in the Cluster.**

The compound growth rate in respect of area, production and productivity of grapes in Champhai cluster for the period from 2010 to 2015 have been depicted in the Table 4.10. It is seen from the table that area with respect to grape in the cluster is increasing with a growth rate of 0.143 per cent which is significant. The increase in the area under the grape cultivation in the cluster is due to the fact that more farmers are replacing other crops by grapes because of high popularization of grapes and its processed products and also an increase in the price over the years which contribute to grab the attention of the cultivators towards grapes cultivation. Government of Mizoram reduced the excise duty from Rs.10.50 per bottle in 2010-2012 to Rs.5.25 per bottle in 2013-2015. The table reveals that production has

shown negative growth rate of -0.87 per cent which not significant. However, productivity is decreasing with a negative growth rate of -0.889 per cent which is insignificant.

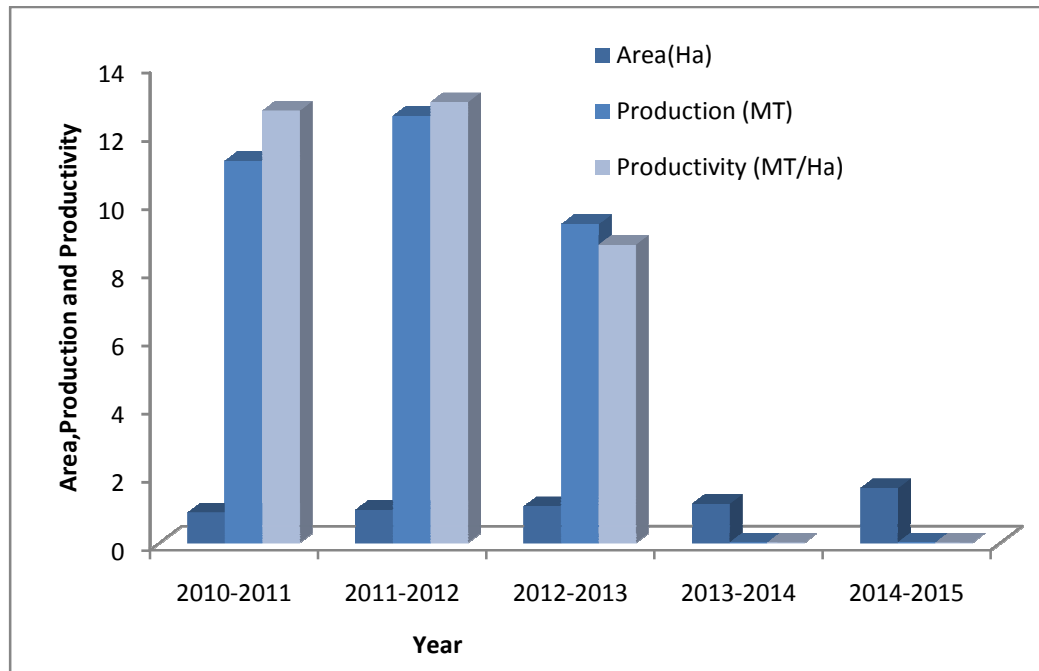
**Table 4.10 Trends in Area, Production and Productivity of Grapes.**

Area in thousand ha  
Production in Metric ton

<b>Year</b>	<b>Area(Ha)</b>	<b>Production (MT)</b>	<b>Productivity (MT/Ha)</b>
<b>2010-2011</b>	0.884	11.200	12.669
<b>2011-2012</b>	0.969	12.521	12.921
<b>2012-2013</b>	1.069	9.342	8.739
<b>2013-2014</b>	1.139	0.012	0.010
<b>2014-2015</b>	1.595	0.013	0.008
<b>Compound Annual Growth rate</b>	<b>0.143</b>	<b>-0.87</b>	<b>-0.889</b>
<b>P. Value</b>	<b>14.3</b>	<b>-87</b>	<b>-88.9</b>

*Source: Mizoram Horticulture Department database 2015.*

**Graph 4.3. Trends in Area, Production and Productivity of Grapes**



*Source: Mizoram Horticulture Department database 2015*

The above table and graph reveals that the area under grapes cultivation is increasing year by year from 0.884 hectares in 2010 to 1.069 hectares in 2013 and then to 1.595 hectares in 2014-15. Then, production and productivity fluctuated year by year i.e. rises from 11.2 metric tones (MT) in 2010-11 to 12.521 MT in 2011-2012 and 12.669 MT/Ha in 2010-2011 to 12.921 MT/Ha in 2011-12 respectively. Surprisingly, the production and productivity of grapes in Champhai cluster after 2013 shows a diminishing growth rate i.e. from 9.342 MT in 2012-13 to 0.012 MT in 2013-14 and 8.739 in 2012-13 to 0.010 MT/ha in 2013-14. Then, the production steadily rises again in 2014-15 at 0.013 MT and the productivity was continue to

decrease from 0.010 MT/ha in 2013-14 to 0.008 MT/ha in 2014-15. Thus, we may conclude that though the areas under grapes cultivation is increasing but the production and productivity of grapes fluctuated year by year. This fluctuation is mainly due to climatic change, pests' attacks and other factor such as hailstorm, outbreaks of fire etc.

#### 4.5.2 Channel of Marketing

Farmers in the study region choose different channels of markets namely village level traders, commission agents, wholesalers and direct sale to market of their product. The channels chosen by the farmers vary from season to season. Further, it also depends on their socio economic conditions of the respondents. The method of disposal of grapes by growers is presented in the Table 4.11

**Table 4.11: Channel of Marketing**

Sl. No	Type of Selling	No. of Grower	Percentage Share
1	Grape Winery	56	70
2	Commission Agent	6	7.5
3	Direct Selling	18	22.5

*Source: Field Survey, 2016*

The grape winery established by the government of Mizoram opened the easier way for the marketing pattern for grape growers. It can be seen from table 4.12 that the majority 70 percent of respondents sell their grape produce to grape winery, few families i.e. about 7 percent sell their products to commission agent and the remaining 18 sample respondent families sell themselves directly from vineyard to market. Thus, from the analysis it is safe to express that most of cultivators sell their product to wineries.

#### **4.6 PERFORMANCE OF GRAPES WINERIES IN CHAMPHAI CLUSTER**

This section highlights the performance of wineries, number of bottles produced by wineries and the contribution of wineries to Government of Mizoram. Larger production of grape fruit created marketing problem in Mizoram due to insufficient storage and lack of mechanisation and inadequate market information. By knowing that, Mizoram Grape Growers Association (MGGA) was formed on 28<sup>th</sup> November, 2006. The MGGA established winery at Champhai town and Hnahlan villages that opened the way for processing and marketing of grapes in Mizoram. Before setting up of grape winery in Mizoram, the growers themselves sell their products

directly to the market and any other convenience sources. After the establishment of wineries in Hnahlan and Champhai, the growers can sell their product directly to wineries without selling to commission agents and other modes of marketing. The following table 4.12 illustrates the production trends of a bottle of grape wine, income generated from grape wine and amount of revenue collected by the government during 2010-14.

**Table 4.12 Production of Bottles of Wine, Income and Revenue Contributed by Two Wineries**

<b>Year</b>	<b>No. of bottles</b>	<b>Income (in Rs.)</b>	<b>Excise duty collected (in Rs.)</b>
<b>2010-11</b>	151632	15,921,360	1,592,136
<b>2011-12</b>	79416	8,323,080	824,586
<b>2012-13</b>	440015	43,639,325	2,699,243
<b>2013-14</b>	59040	6,037,200	298,602
<b>Total</b>	<b>593,633</b>	<b>73,920,965</b>	<b>5,414,567</b>

*Source: Champhai and Hnahlan Wineries database*

It can be seen from table 4.12 that the number of bottle of grape wine produced by the two wineries fluctuated year by year. During 2010-11, the wineries produced 151632 bottle of grape wine which is amounted to Rs.15,921,360 at Rs. 105 per bottle and the government collected excise duty at 10.50 per bottle that is amounted to Rs. 1,592,136. In the next financial year, the production of bottle of grape wine decreases to 79416



that is Rs. 8,323,080 and excise duty amounted to Rs. 824,586. Moreover, the production of number of bottle of wine rises again to 440015 which is accounted for Rs. 43,639,325 and the excise duty collected was Rs.2,699,243. This is the peak year of production of bottle of grape wine in Champhai cluster as it has shown in the above table. Thereafter, during 2013-14, the production of bottle of wine fell to 59040 that is accounted for Rs. 6,037,200 and excise duty collected was Rs.298,602. Hence, the overall production of bottle of grape-wine by Champhai and Hnahlan during 2010-14 stood at 593,633 that are accounted for Rs. 73,920,965 and the overall contribution to government stood at Rs. 5,414,567. Thus the overall income earned by wineries after the deduction of excise duty turn out to be Rs.68,506,398.

During 2010 -2014, the average annual income from the production of grape wine bottles by the two wineries was Rs. 18,480,241.25. During the same period the average numbers of bottles produced was 1,48,408.25. The amount of excise duty contributed by the two wineries was Rs. 5,414,567 during the said period. This shows that the wineries perform quite well though it started functioning only in 2007 and regarded it as a great income contributor for growers as well as an important revenue contributor to the government.

#### **4.7 PERCEPTIONS AND PROBLEMS**

The respondents were asked their perceptions and opinions regarding their level of satisfaction in cultivation of grapes as an alternative source of livelihood. What are the various steps and measures taken by the government for the betterment of grape growers, whether grape cultivation is good enough for gearing up of Mizoram economy, whether they are practising intercropping with grapes and other crop like paddy/rice cultivation, what activity is the most expensive in grapes cultivation, do they received financial assistant from the government, which one is profitable for them to sell grapes in terms of bunch of grape or in juice, do they have a future plan to continue grape cultivation after even 10/20 years and which one is profitable and beneficial for them to cultivate grapes or rice.

It was rightly observed that more than half of the respondent families (54) that is 67.5 % out of total sample growers successfully cultivate grapes and they opined that grapes cultivation is profitable and an essential alternative method of livelihood and the rest only 26 sample families (32.5%) cultivate grapes unsuccessfully and they regarded grapes is not essential for gearing up of livelihood. With regard to the intervention of the government for the improvement of grape growers in Champhai cluster, majority of respondents (82.5%) argued that the government needs to take some

measures for grapes cultivators and assistants received from government is limited in terms of financial and other in kind like pesticides, fertilizers, machinery etc. Regarding economics development concerns, the majority of respondent growers (66.25%) opined that grape cultivation is important for gearing up of Mizoram economy and few families (33.75%) does not support grape cultivation for economic development of Mizoram. It has also found that more than half of sample families (67.5%) did not practice intercropping of grapes with rice and 32.5 % of sample families grown grape and rice.

Again, the majority of respondent growers (62.5%) expressed that grapes cultivation is profitable and beneficial for them while 22.5 % of respondents prefers rice cultivation, 2.5% of sample families think that both cultivations are equally profitable and the remaining respondents (12.5%) does not have an idea about the two cultivations. Moreover, more than half of the sample families (57.5%) have a future plan to continue grapes cultivation after 10/20 year, only few families (15%) will not continue to cultivate and the rest 27.5% does not have an idea and they mostly depends on the marketing pattern of grapes.

Grape cultivation is no doubt very expensive and it requires a lot of labour and huge amount of capital, good quality of seeds, fertilisers, pesticides, insecticides and others post harvesting requirements like cold storage and

processing factory. The sample respondents were asked in which activity is the most expensive in grape cultivation. The result is presented in the following table 4.13.

**Table 4.13 Most Expensive Activity in Grape Cultivation**

<b>Activity</b>	<b>No of Grower</b>	<b>Percent</b>
<b>Processing of Grape fruit</b>	5	6.25
<b>Weeding</b>	32	40
<b>Trench, wire and post</b>	26	32.5
<b>Fertiliser</b>	9	11.25
<b>Labour cost</b>	8	10

*Source: Field Survey, 2016*

The opinions of sample respondents are quite different with regard to most expensive activity in grape cultivation. The largest number of respondents (40%) opined that weeding is the most expensive activity in grape cultivation, 32.5 % argued that grapes trench, wire and post requires huge amount of capital, time and efforts, 9 sample families (i.e. 11.25%) argued that good quality of fertilisers, pesticides and insecticides require a lot of capital and it is difficult to purchase for them and they regarded as most expensive activity and the remaining respondents families (16.25%) opined

that processing of grape fruit and labour cost are the most expensive in grape cultivation. Then, we may say that weeding (cutting and cleaning of vineyard) is the most expensive activity in grapes cultivation followed by grape trench, wire and post also requires huge amount of capital, man power and time and hence regarded as expensive activity in grapes cultivation.

#### **4.7.1 Problems Faced by Grape Growers**

Every agriculturist faced various problems related to their own cultivation. The grapes growers in Champhai cluster also faced different problems and sample respondents were asked their most serious problems and difficulties related to farm management, post harvesting management and marketing of grapes. The result is depicted in the following table 4.14

**Table 4.14 Problems of Grape growers**

<b>Problem</b>	<b>Number</b>	<b>Percent</b>
<b>Weeding</b>	17	21.25
<b>Pesticides and insecticides</b>	9	11.25
<b>Irrigation facility</b>	11	13.75
<b>Road condition</b>	4	5
<b>Post- harvest management</b>	2	2.5
<b>Marketing</b>	37	46.25

*Source: Field Survey, 2016*

The above table reveals that majority of sample families (46.25%) faced problem related to marketing pattern of grapes. This is due to the fact that the Government of Mizoram introduced wine selling permit known as the Mizoram Liquor Prohibition and Control rule, 2014 (MLPC act) within the state which came into effect on 7<sup>th</sup> January 2015. The implementation of this Act hampers the marketing pattern of grapes wine and grapes juice and eventually leading to a decline in the income of the grapes growers. Weeding (cutting and cleaning of grapes farm) is still one of the most severe problem faced 21.25 % of growers. However, grapes production and productivity depends not only on the quality of inputs but also on the irrigation facilities. But due to hilly and mountainous terrain of Mizoram, irrigation is one of the problems faced by 13.75 % of respondent families. To prevent grapes from insects and pests, good quality pesticides and insecticides is required but the poor grapes growers cannot afford to purchase these good quality pesticides and also the supply is quite minimal in Mizoram, 11.25% of respondents faced this problem. Moreover, transportation is one of the problems faced by grapes growers in the study area, the link road condition of their vineyard must be developed to enable them to sell their product easily and on time. But poor condition of these link roads is still a problem faced by 5% of the grapes grower in Champhai cluster. Another problem faced by grapes growers is post harvesting management like packaging and storage facilities, 2.5 % of sample families

faced this kind of problem. It is therefore, suggested here that the State Government should provide godown and other storages facilities for the grape growers.

This empirical analysis clearly reveals the economics of grapes cultivation in the study area which highlighted the production, productivity, marketing patterns and the problems faced by them. Based on this analysis, suggestions for the improvement of grape cultivation are suggested in the next chapter.

## MAIN FINDINGS

1. The area per hectare under grapes cultivation is increasing from 0.884 hectares in 2010 to 1.595 hectares in 2015. Though the area is increasing the production and productivity fluctuated year by year i.e. rises from 11.2 million tonnes in 2010-11 to 12.521 MT in 2011-2012 and 12.669 MT/Ha in 2010-2011 to 12.921 MT/Ha in 2011-12 respectively. Surprisingly, the production and productivity of grapes in Champhai cluster after 2013 shows a diminishing growth rate i.e. from 9.342 MT in 2012-13 to 0.012 MT in 2013-14 and 8.739 in 2012-13 to 0.010 MT/ha in 2013-14. Then, the production steadily rises again in 2014-15 at 0.013 MT and the productivity was continue to decrease from 0.010 MT/ha in 2013-14 to 0.008 MT/ha in 2014-15. This fluctuation is mainly due to climatic change, pests' attacks and other factor such as hailstorm, outbreaks of fire etc. *(Objective no.1)*
2. The average number of grapes bushes planted was 618.75. More than half of the respondent families(41) have less than 500 bushes of grape which is 51.25 % out of total sample bushes of grapes, 27 growers have 500-1000 bushes that is 33.75 %, the number of bushes ranging from 1000-1500 belongs to 7 families which accounts for 8.75 % and the remaining 5 growers holds more than 1500 bushes of grapes. *(Objective no.1)*



3. Majority of the growers (67.5%) agreed that grapes cultivation is profitable and is an important alternative source of livelihood which can be taken up in other parts of the state as well to generate alternative source of income. Also, these growers did not practice intercropping of grapes with rice.(Objective no.2)
4. The maximum number of respondent (62.5%) argued that grapes cultivation alone is profitable and sufficient for sustaining their families whereas 22.5 % of respondents prefer to cultivate rice alone and 2.5% of families stated that both rice and grape cultivations are equally profitable. (Objective no.2)
5. Out of the total respondents 50 per cent adopted grapes cultivation as their major livelihood. 13.75 percent are engaged in shifting cultivation and the remaining 36.25 percent of the respondents families adopted others activities like business, government employees etc. as their main occupation. .(Objective no.2)
6. The largest number of respondents (40%) opined that weeding is the most expensive activity in grape cultivation, 32.5 % argued that grapes trenches, wiring and grape-post requires huge amount of capital, time and efforts and they regarded as the most expensive activity in grapes cultivation. Nine (9)

sample families (i.e. 11.25%) argued that good quality fertilisers, pesticides and insecticides requires a huge amount of capital and it is difficult to purchase for them and they regarded it as the most expensive activity. The remaining 16.25% opined that processing of grape fruit and the labour costs are the most expensive activities in grape cultivation. In the marketing aspects, the main problem faced by grape growers is the introduction of Mizoram Liquor Prohibition and Control rule, 2014 (MLPC act) which came into effect on 7<sup>th</sup> January 2015. (*Objective no.3*)

7. The average annual income of the respondent from the cultivation of grape alone is Rs.61,250 that comes to Rs.5,104.16 per month. (Research question no.1)
8. During 2010-2014, the average annual income from the production of grape wine bottles by the two wineries was Rs. 18,480,241.25 . During the same period the average numbers of bottles produced was 1,48,408.25. The amount of excise duty contributed by the two wineries was Rs. 5,414,567 during the said period. This shows that the wineries perform quite well though it started functioning only in 2007.(Research question no.1)
9. The income earned by grape growers from all sources of their income during pre grape cultivation is less than post grape cultivation. The average annual family income of respondents during pre grape cultivation stood at

Rs. 160,625 and the average monthly income is Rs. 13,385.41 and the per capita income of sample respondents stood at Rs.2,212.47. After the adoption of grapes cultivation in the study area the average annual income of the respondents families rises to Rs. 235,062.5 which comes to Rs.19588.54 per month. This is a big sum taking into consideration the average family size of 6.05 because the average per capita monthly income Rs 3237.78, which is well above the existing poverty line.(Research question no.1)

10. More than half of the growers (57.5%) have a future plan to continue grapes cultivation even after 10/20 years, only few families (15%) are not planning to continue grape cultivation mainly because of the marketing problems.(Research question no.2)

11. Majority of the respondents i.e. 70 per cent sell their grape product to grape winery, few families i.e. about 7 % sell their products to commission agents and the remaining 18 families sell directly from their vineyard to the nearby market.(Research question no.2)

12. Thirty (30) percent of the respondents are BPL families and 68.75 percent are families living Above Poverty Line (APL). But maximum numbers of the respondents are living in Kutcha houses. This reflects that though the

number of respondents below poverty line is lesser than that of families living above poverty line, their housing facility is more or less the same. Also, only 1.25% of the respondents are AAY family.

13. The average family size is approximately 6 (i.e. 6.05), of which half (3.05) of the respondent family members are counted as workers.

14. The average age of the sample farmers was 57 years. So far as literacy is concerned, it was observed that all the respondents were literates. Maximum numbers of respondents i.e. 40 % are below high school level and 26 % of the respondents completed high school level and 23.75 % are graduates and above.

15. The average land holding size of the respondents was 2.325 acres, out of which 0.61 acres was irrigated and remaining 1.71 acres was rain fed in Champhai cluster.

## **SUGGESTED MEASURES**

Based on the findings of the study and the problems identified by researcher, the followings are suggested for improvement of grapes cultivation in Mizoram

- 1) The major problems faced by grapes growers in the cluster is related to marketing problems which is due to the introduction of MLPC act introduced by Government of Mizoram. This act hampers the marketing pattern of grape in the cluster. To save the farmers from this problem, the govt should allow wineries to produce wine and take remedial steps to overcome the problems of marketing of grapes in the cluster. Also collaboration with other states will be highly beneficial.
- 2) Horticulture Department may identify and promote location specific high yielding varieties of grapes and good planting materials. The State is facing very low seed replacement rate. To get a better harvest, new and improved variety of seeds need to be introduced as well as populating the practice among the growers by line department and extension agencies.
- 3) More than half of the growers in the cluster faced the problem of irrigation facilities on their farm. Therefore, tubewells and canals should be constructed to provide better irrigation facilities which will greatly improve the production and productivity of grapes in the cluster.

- 4) Inadequate transportation is another problems faced by grape growers in the cluster. For this purpose, vineyard could be linked with sound transportation facilities that would help to raise growers' income which in turn stimulate growers interest to adopt better farm technology with sufficient income.
- 5) Line Department may ensure adequate extension services like market information and technical guidance. Lack of Intensive training in proper and modern viticulture practices and lab to land extension programmes could be made available to growers.
- 6) More number of post-harvest infrastructure in terms of cold storages for grape fruits could be established in the cluster. The existing cold storage is very limited and the government or line department should establish adequate cold storage in the cluster.
- 7) Modern equipment and training to improve juice making skills of operators was considered vital for the production of nutritious, good quality grape juice. There is also the opportunity for other value added grape products to be developed.
- 8) In Mizoram consumers prefer imported wines as locally produced grapes wine is more expensive and of inferior quality. It is strongly advised that cost effective production practices should be developed and training should be undertaken to improve the skills of winemakers. This will enable

industries to achieve the potential for growth and increase the value of the local economy. Collaboration with others states was encouraged instead of individual efforts.

- 9) Awareness is to be created among the small grapes growers about the credit facilities available for grapes and also the subsidy and other promotional schemes related to grapes cultivation. Even grapes wineries have to be cost effective in their operations and price competitive in the market place- both domestic as well as international.
- 10) Like other crops, contract farming system may be adopted for grapes. For instance, a particular commission agent may enter into a contract with the growers. This would benefit both the growers and manufacturers as the growers would get reasonable prices and the manufacturers would get better quality grapes.
- 11) Financing banks may come forward to finance grapes cultivators. The different entities should be made aware as to utilise bank funds efficiently. Effective mechanism for checking multi- financing may be developed.
- 12) As the cost of manures and pesticides and other inputs are high, distribution of these inputs at subsidised rates to small growers may be given.
- 13) Scientific training of pruning and plucking may be given to the small growers as keeping grapes continuously unpruned may lead to the formation

of large knots on the bushes. Training to be imparted to the growers about the technology, practices in fanning, etc by line department.

- 14) It was noted that despite the efforts of government to upgrade aspects of grape production, there are still many constraints hindering further development. Most of the problems appear to be common to all growers in the cluster. The researcher therefore recommended that assistance should be sought for the formulation, funding and implementation of a Project to address the existing problems.



## **CONCLUDING REMARKS**

In Mizoram, area under grapes cultivation is not expanding fast owing to the high initial cost of establishing the vineyards and high recurring cost of production. The risk of losing a crop due to unprecedented changes in weather is also very high. Grape growing, however, is a highly remunerative occupation as the crop is easily marketable. Since the highest productivity in grapes has been achieved, efforts are needed to extend grape cultivation to newer areas. Marketing and post harvest managements are the impediments in this direction, for which suitable rootstocks are to be identified. There is a need to diversify the uses of grapes. Diversification of uses as wine/juice and export of grapes can ease the marketing problems. Maintenance of the quality of table grapes by crop regulation is the priority consideration to increase exports. For the survival of the grape industry in Mizoram, the product should be quality and cost competitive. Future efforts are to be concentrated in this direction.

The wineries of grapes are not well developed and are carried out on a very small scale at present. However, the level of knowledge and skills in grape processing is still limited and cold storage facilities are currently inadequate. Continuous dispatch of specialists for training in other states with advanced skills is necessary. Financial support is also needed for

research and development projects on high quality grape production and processing. Moreover grape winery development should be supported by the Government through the cooperation of the researchers and the growers. Considering the increasing demand and the ingenuity of local grape growers, the grape winery has much potential for further expansion in the years to come in Mizoram.

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**STRUCTURED QUESTIONNAIRE**  
**ECONOMICS OF GRAPE CULTIVATION IN MIZORAM:**  
**A CASE STUDY OF CHAMPHAI CLUSTER**

**Basic Profile of Respondent**

Name of head of the family\_\_\_\_\_

Age ( )

Sex ( )Male ( ) female. Educational qualification ( )

Number of Family member ( ). Name of the Village\_\_\_\_\_

Is there any govt. employees in your family? If yes, posting place and designation\_\_\_\_\_

Date of Interview\_\_\_\_/\_\_\_\_/\_\_\_\_\_

Family Status ( )APL ( )BPL ( )AAY

Housing ( )(Kutcha ( ) Semi-Pucca ( ) Pucca

Main source of income ( ) Farming ( ) Jhum ( ) Others

Number of workforce in a family ( ) Female ( ) Male

Annual income approximately\_\_\_\_\_ Pre-Grape cultivation\_\_\_\_\_

Post-Grape cultivation



**SECTION-B: Cultivation and Its related**

Area of grape cultivated land (in Acre/Tin)\_\_\_\_\_

Do you have any agricultural land and Pass/Patta for Grape cultivation? ( )LSC ( )Periodic Patta ( )VC Pass ( ) No Pass

Do you have any land other than Grapes cultivated land? ( )Yes ( )No

If yes, main crop cultivated and area\_\_\_\_\_ / \_\_\_\_\_

Major problem on grapes cultivation? ( ) weeding ( ) insecticides and pesticides ( ) Irrigation facility and water pipe ( ) link road ( ) storage and packaging unit ( ) marketing

Whether any capacity building/training received on Grapes cultivation?( ) Received ( ) Not Received

Do you receive tools and implements from the Government or line department? ( ) Yes ( )No

Do you avail irrigation facility in your Grapes cultivated land?( ) Yes ( )No

**SECTION-C: Production and Marketing**

When did you start Grapes cultivation?\_\_\_\_\_

In which year do you start harvesting Grapes?\_\_\_\_\_

How many grapes bushes do you planted?\_\_\_\_\_

How many grapes bushes survive at present?\_\_\_\_\_

Marketing pattern of grapes? ( ) Grapes Winery ( ) Commission agents ( ) Direct Selling to market.

Annual income only from grape cultivation \_\_\_\_\_

Is there any registered growers organisations/association/society related to processing and marketing of grapes? Give name?  
\_\_\_\_\_

How much percentage did winery purchase your grapes Production?  
\_\_\_\_\_

Method of marketing other than selling to winery\_\_\_\_\_

Which one is profitable to sell grapes to Winery or direct selling to the market?\_\_\_\_\_

**SECTION-D: Perceptions**

Grapes cultivation is good enough for gearing up of Mizoram economy?

Give your opinion ( )Yes ( )No

Do you practice intercropping with other crop like paddy/rice cultivation?\_\_\_\_\_

What activity do you think is the most expensive in grape cultivation?\_\_\_\_\_

Do you receive any financial support from government for grape cultivation? Assistance received for what activity?\_\_\_\_\_

Which one is profitable to sell grape in terms of juice or fruit bunch?\_\_\_\_\_

Do you purchase any household furniture from your income generated from grape cultivation? What type of furniture?\_\_\_\_\_

Do you have any future plan to continue grape cultivation even after 10/20 years? ( ) Yes ( ) No ( ) Don't Know

Which one is preferable to cultivate for improvement of livelihood, grape or paddy/rice cultivation?\_\_\_\_\_

What is your opinion regarding the implementation of MLPC act in Mizoram?\_\_\_\_\_

What is your suggestions for improvement of marketing of grapes?  
\_\_\_\_\_

Grapes cultivation is an alternative source livelihood? Give your opinion\_\_\_\_\_

Are you satisfying with the steps taken by government for grapes grower/cultivator?( )Yes ( )No

Any suggestions or measures for improvement of grape cultivation in Mizoram?\_\_\_\_\_

# **ABSTRACT**

## **ECONOMICS OF GRAPE CULTIVATION IN MIZORAM: A CASE STUDY OF CHAMPHAI CLUSTER**

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

**BY**

**LALENGKIMA**

**TO**

**THE DEPARTMENT OF ECONOMICS  
SCHOOL OF ECONOMICS, MANAGEMENT  
&  
INFORMATION SCIENCES**

**MIZORAM UNIVERSITY**



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## INTRODUCTION

Agriculture plays a vital role in India's economy. Over 58 per cent of India's population depends on agriculture as their principal means of livelihood. Agriculture, along with fisheries and forestry, is one of the largest contributors to the Gross Domestic Product (GDP). But the contribution of agriculture in NI is still decreasing. As per estimates by the Central Statistics Office (CSO), composition of Agriculture & allied activities was 51.81 per cent in 1950-51 which has declined to 18.26 per cent in 2013-14 and then to 15.35 per cent of the Gross Value Added (GVA) during 2015-16 at 2011-12 prices. The decrease in the share of Agricultural and allied Sectors in GDP of the country in comparison to other sectors is on account of structural changes due to a shift from a traditional agrarian economy to industry and service dominated one.

In Mizoram, Primary Sector comprising agriculture & allied activities contributed 16.26% (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.

Grape (*Vitisvinifera L.*) is basically a sub-tropical crop belonging to the Vitaceae family, originated in Western Asia and Europe. An independent and recent origin of grapes is also traced to North America. From Armenia, grapes spread

westwards to Europe and Eastwards to Iran and Afghanistan. Grape cultivation flourished in Baluchistan and North-West Frontier Province during the 16th century. China, Italy, United States of America, Spain, France, Turkey, Chile, Argentina, India and Iran are major producer of grape in the world. Grape was introduced into India in 1300 AD by the Moghul invaders. Now, Grape cultivation in India covers an area of 118 thousand hectares occupying 1.70% of the total area. According to UN's Food and Agricultural Organization India ranks 9<sup>th</sup>, accounting for 4.51 percent of the global share with its production of 2.48 million metric tons in 2013. Major producing states in India are Maharashtra, Karnataka, Punjab, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Mizoram, Punjab, Haryana and Rajasthan.

## **REVIEW OF LITERATURE**

The aim of this chapter is to review and present some of the relevant information and findings from publications that are related to the focus of this study. It also serves to contextualize and frame the study within an existing body of literature as a contribution thereof.

Shah (2005) examined Economics of Grape Cultivation in Maharashtra. He obtained that annual maintenance cost and returns for various categories of grape orchardists are in conformity with the financial analysis. The gross returns from grape orchards during various stages of production are noticed to be twice the cost of production for various categories of orchardists. The results of financial

analysis also show a B-C ratio in grape cultivation in the range of 1.86 and 2.15 for various categories of orchardists with an average of 2.07. Among various categories, the medium and large categories of orchardists not only show quicker payback period but they also show higher NPV and B-C ratio as compared to marginal and small categories of orchardists. The large and medium categories of orchardists are, therefore, noticed to manage their grape gardens more efficiently as compared to small and marginal categories of orchardists. However, in general, the cultivation of grapes is noticed to be a lucrative proposition for all the categories of orchardists because of substantially high element of profit involved in the cultivation of this high value crop.

Muniyandi et.al (2008) said that grape production of the Theni district in Tamil Nadu, leads with 85.01% share of total production of grape in the year 2008-2009. In a season, the production of small farmers per acre is 6,500 kg, which is relatively higher than the medium and large farmers. Further, it is evident that wholesalers, commission agents and retailers are involved in the purchase of grapes from the farmers. In this study, the farmers report that they are facing the problems like lack of remunerative price for their product and protecting the grape vineyard from the diseases; whereas the traders complain that there are no adequate infrastructural facilities such as road, transportation, cold storage, etc. Therefore, the study suggest certain measures such as opening agricultural clinics for the effective pest management and productivity of the vineyard, provision of



cold storages, support prices for grapes, procurement centers to purchase grapes from the farmers for export. Furthermore, training for the proper post harvest handling of grapes, establishment of information board by the traders to avoid price differentials, provision of bank loans to the cultivators and traders, etc., are some steps in this direction.

Babybowna et.al (2012) examined Cost of Production of Grape in Dindigul District, Tamil Nadu and they found out that grape cultivation in India has reached to the extent of 50000 ha, with an annual production of 10-12 lakhs metric tons. Out of the total production, 87% of the produce is consumed as table grape while 10% is dried and produced for raisin, two percent for juice and one percent for wine. Dindigul is one of the most important grape producing districts in Tamil Nadu. The district's soil and climatic conditions are highly suitable for grape cultivation. Hence, grape cultivation has increased spontaneously with an area of 1195 hectares in 1996-97 to 1709 hectares in 2003-04 and 2684 hectares in 2009-2010. Therefore, this paper attempts to analyse determinants of grape production, factors affecting the grape cultivation and also suggests how to improve the productivity of grape in the study areas. The study found that in the case of farmers cultivating High Yielding Varieties, r value indicated 78.41 percent of variation in yield caused by five explanatory variables. Labour cost, fertilizer, pesticides and capital flows were found to be statistically significant at 5 per cent

level. The capital flows had a greater influence on the determination of yield, by the variables such as labour cost, fertilizer and pesticides.

Tasevska (2012) conducted an empirical analysis on the efficiency of commercial grape-producing family farms in the Republic of Macedonia in order to examine how farm performance is influenced by selected aspects of the current Rural Development Programme (RDP) (2007-2013). The emphasis was on Macedonian grape production on family farms and on instruments for more efficient use of resources, production modernization, vine revitalization, and the knowledge and managerial capacity of Macedonian grape growers. A two-stage analysis was carried out on farm-level data for the period 2006- 2008. The estimated efficiency scores indicated that substantial efficiency improvements are possible on Macedonian grape-producing farms, with potential for a cost decrease of 29% (20% and 36% with parametric and bootstrapping applied) if farmers manage inputs more efficiently. Farm revenue can be improved by 47% (61% when bootstrapping applied) if farmers manage to increase the value of outputs. More efficient farms used a smaller area, irrigated a smaller proportion of total area, used less hired labour, used and paid less for inputs, but produced a larger quantity, with higher value per hectare. The technically more efficient farmers were: younger farmers, farmers with profit maximisation objectives; farmers with lower expectations of a better future for farming; farmers making choices with other family members; farmers monitoring production on the farm and

maintaining bookkeeping records; those attending seminars, and those interested in competence-based knowledge such as plant protection, credit/investments. Interventions in production assortment and quality have potential to influence farm performance. Rural development policies can help improve farm efficiency. RDP measures targeted at achieving stable yield, yield improvement and modernization of equipment, improving farmers' managerial performance and strengthening the capacity of sources providing non-formal education should be a high priority.

Kamble et.al (2014) examined Economics of grape production in Marathwada region of Maharashtra that they found out that the popular varieties of grape cultivated by sample growers were Thompson seedless, Tas-A-Ganesh, Sonaka, Manik chaman, Sharad seedless and Cheemashebi, out of which share of Thompson seedless variety was 60 per cent. The per hectare establishment cost of grape orchard was Rs. 3,55,520 out of which maximum expenditure was made on plantation. Regarding the profitability, grape cultivation was profitable at all cost levels. Benefit-cost ratio at cost A, cost B and cost C were 2.45, 1.46 and 1.31, respectively. Financial feasibility analysis showed that, NPW of the project was 2558845, BCR was 2.37 and IRR 149.37 per cent, which indicated investment made in grape production was financially highly feasible. The problem faced by sample cultivators in grape production were non-availability of labour in time, followed by non-availability of fertilizers, credit and pesticides reported by 100, 94, 90, 74 per cent growers, respectively.

Deshetti et.al (2014) selected a sample size of 30 (IPM) and 30 (Non-IPM) farmers were selected using grape sampling method and data was elicited for the agriculture year 2013-14. Through survey method, estimated the per hectare cost of cultivation in IPM farmers category at cost A, B and C as Rs 2, 94,743.03, Rs 2, 53,664 and Rs 5, 48,407 respectively. In case of non-IPM farmers, it was estimated to be, Rs 2, 80,962.84, Rs 2, 50,892 and Rs 5, 33,855 respectively. The Net Return per hectare of grape in IPM farmers was Rs 68,378.73 as against non-IPM farmers Rs 55,545.50 and net additional benefits from IPM was Rs 12,833.24 per hectare. The B: C ratio in IPM farmers was higher 1.81 as compared to non-IPM farmers 1.75. The financial feasibility analysis on investment in IPM and Non IPM farming practice of Grape Orchard had indicated that the investment on Grape cultivation is financially feasible and economically viable, as the NPV for IPM and Non -IPM farmers of Grape was Rs 9, 90,871.65 and Rs 9, 33,238.74 at 12 per cent rate of interest. Benefit-cost ratio was found to be 1.81 and 1.75 in case of IPM and Non IPM farmers of grape. The internal rate of returns was 51% in IPM farmers and 54% in Non-IPM farmers of grape.

## **STATEMENT OF THE PROBLEM**

More than half of the households in Mizoram are still dependent on traditional method of agriculture known as Jhum cultivation. Shifting cultivation has frequently been attacked in principle because it causes soil erosion, deforestation,

soil degradation and environmental pollution etc. In Mizoram, the cultivation of crops under jhuming is evident to be both Primitive and uneconomical which result in an extremely low production of agriculture output. Hence, it tends to provide only for the subsistence of the farmers. By knowing this, the Government of Mizoram introduced various schemes to replace shifting cultivation into settled cultivation for economic development of the state and in order to avoid land degradation and other problems. Grape cultivation is one of the settled cultivation. In Mizoram, grape cultivation is concentrated only in Champhai district and about 800 families in the district heavily depend on Grape cultivation as their only source of their income. But in 2015, Government of Mizoram implemented MLPC act that allows sale and purchase of wine within Mizoram. The MLPC act greatly reduces the sale and purchase of indigenous wine product called 'Zawlaidi' and 'Zo' wine which affect the income of grape growers and further reduces the contribution of wineries to government. Therefore, no empirical studies or research has been conducted so far regarding the condition of grape cultivation, problems faced by growers, contribution of wineries to GSDP of Mizoram and whether grape cultivation alone is sufficient as an alternative source of livelihood for the cultivators. Therefore, this study is necessary to fill in the gap of this unavailable source and to further suggest measures for policy implications for the policy makers of the state.

## **AREA OF STUDY**

Champhai District is the third largest of the 8 (eight) districts in Mizoram in terms of size and population following Aizawl and Lunglei Districts. The district lies in the eastern part of Mizoram between 93.21°E longitude and 23.26°N latitude. It has 80 kms long international boundary with Myanmar in the east and Myanmar border is about 8 kms from the District headquarters Champhai. The district is bounded by Manipur state in the north, Serchhip District in the west and Aizawl District in the north-west.

According to 2011 census Champhai District has a population of 1,25,370 out of which 6,32,99 males and 6,20,71 females. The district has a population density of 39 per square kilometre. Champhai district has a sex ratio of 981 females for every 1000 males and literacy rate of 93.51 .

The District comprises of 4 (four) R.D.Blocks viz. Champhai, Ngopa, Khawzawl and Khawbung. There are eleven villages in Champhai RD Block Viz. Champhai, Hnahlan, Khuangphah, Lungphunlian, Murlen, N.E.Diltlang N.Khawbung, Ngur, Tualcheng, Vaikhawtlang, Vapar, out of which Hnahlan village and Champhai town are selected based on highest area and production under rapes cultivation among districts of Mizoram and no empirical studies or research has been conducted on this area in respect of condition and economics of grapes cultivation.

## **OBJECTIVES:**

The specific objectives of the study are as follows:-

1. To analyse the trend and potential of grape production in the study area.
2. To examine how far grapes cultivation is suitable as an alternative source of livelihood.
3. To analyse the problems on the production and productivity of grape cultivation.
4. To suggest suitable measures to promote grapes production and marketing.

## **RESEARCH QUESTIONS**

1. What is the income behaviour of the grapes growers after cultivation of grapes?
2. What is the marketing pattern and problems of the grapes growers in the study area?

## **METHODOLOGY**

The study was undertaken in Champhai district, where grapes cultivation is concentrated in Mizoram. The study was mainly based on primary data which has been collected through a well-designed questionnaire and also from secondary sources.

Primary data have been collected from 80 number of grapes growers (80 samples Size) through a well-designed questionnaire. Also personal interview with the board member of Champhai and Hnahlan wineries. The primary data on the socio-economic characters of the farmers, land holding, family size, annual income etc. are collected.

Secondary data have been collected from annual reports of NABARD, National Horticulture Board (NHB), published and unpublished sources, magazines, journals, website and other online resources etc, newspaper, reference books and the official records made by Grape Growers Association in Hnahlan and Champhai. Besides, data related to area under grape cultivation, production and productivity of grapes was collected from Horticulture department, government of Mizoram. The data so collected were analysed using suitable and appropriate statistical tools.

Following Model was used to estimate compound annual growth rate (CAGR) of Area, Production and Productivity of Grapes.

$$Y_t = Y_o (1+r)^t$$

Or

$$\log (Y_t) = b_1 + b_2 t$$



Where

$$b_1 = \log (Y_o)$$

$$b_2 = \log (1+t)$$

$$r = e^{b_2} - 1, \text{ is the compound growth rate.}$$

Again, the following formula was used to estimate percentage growth rate of area, production and productivity of grapes.

$$\text{Gr} = \frac{V2 - V1}{V1} \times 100$$

Where,

Gr = Percentage Growth Rate

V1= Previous Year

V2= Current Year

There is no available empirical data on grapes cultivation in the study area, though there are few secondary data generated by government of Mizoram. This study will try to fill in the gap in order to have a clear picture of grapes cultivation in Mizoram.

## MAIN FINDINGS

1. The area per hectare under grapes cultivation is increasing from 0.884 hectares in 2010 to 1.595 hectares in 2015. Though the area is increasing the production and productivity fluctuated year by year i.e. rises from 11.2 million tonnes in 2010-11 to 12.521 Mt in 2011-2012 and 12.669 MT/Ha in 2010-2011 to 12.921 MT/Ha in 2011-12 respectively. Surprisingly, the production and productivity of grapes in Champhai cluster after 2013 shows a diminishing growth rate i.e. from 9.342 MT in 2012-13 to 0.012 MT in 2013-14 and 8.739 in 2012-13 to 0.010 MT/ha in 2013-14. Then, the production steadily rises again in 2014-15 at 0.013 MT and the productivity was continue to decrease from 0.010 MT/ha in 2013-14 to 0.008 MT/ha in 2014-15. This fluctuation is mainly due to climatic change, pests' attacks and other factor such as hailstorm, outbreaks of fire etc. (*Objective no.1*)
2. The average number of grapes bushes planted was 618.75. More than half of the respondent families(41) have less than 500 bushes of grape which is 51.25 % out of total sample bushes of grapes, 27 growers have 500-1000 bushes that is 33.75 %, the number of bushes ranging from 1000-1500 belongs to 7 families which accounts for 8.75 % and the remaining 5 growers holds more than 1500 bushes of grapes. (*Objective no.1*)
3. Majority of the growers (67.5%) agreed that grapes cultivation is profitable and is an important alternative source of livelihood which can be taken up in other parts

of the state as well to generate alternative source of income. Also, these growers did not practice intercropping of grapes with rice.(Objective no.2)

4. The maximum number of respondent (62.5%) argued that grapes cultivation alone is profitable and sufficient for sustaining their families whereas 22.5 % of respondents prefer to cultivate rice alone and 2.5% of families stated that both rice and grape cultivations are equally profitable. (*Objective no.2*)
5. Out of the total respondents 50 per cent adopted grapes cultivation as their major livelihood. 13.75 percent are engaged in shifting cultivation and the remaining 36.25 percent of the respondents families adopted others activities like business, government employees etc. as their main occupation. .(*Objective no.2*)
6. The largest number of respondents (40%) opined that weeding is the most expensive activity in grape cultivation, 32.5 % argued that grapes trenches, wiring and grape-post requires huge amount of money, time and efforts. 9 sample families (i.e. 11.25%) argued that good quality fertilisers, pesticides and insecticides requires a huge amount of capital and it is difficult to purchase for them and they regarded it as the most expensive activity. The remaining 16.25% opined that processing of grape fruit and the labour costs are the most expensive activities in grape cultivation. In the marketing aspects, the main problem faced by grape growers is the introduction of Mizoram Liquor Prohibition and Control rule, 2014 (MLPC act) which came into effect on 7<sup>th</sup> January 2015. (*Objective no.3*)
7. The average annual income of the respondent from the cultivation of grape alone is Rs.61,250 that comes to Rs.5,104.16 per month. (Research question no.1)

8. During 2010 -2014, the average annual income from the production of grape wine bottles by the two wineries was Rs. 18,480,241.25 . During the same period the average numbers of bottles produced was 1,48,408.25. The amount of excise duty contributed by the two wineries was Rs. 5,414,567 during the said period. This shows that the wineries perform quite well though it started functioning only in 2007.(Research question no.1)
9. The income earned by grape growers from all sources of their income during pre grape cultivation is less than post grape cultivation. The average annual family income of respondents during pre grape cultivation stood at Rs. 160,625 and the average monthly income is Rs. 13,385.41 and the per capita income of sample respondents stood at Rs.2,212.47. After the adoption of grapes cultivation in the study area the average annual income of the respondents families rises to Rs. 235,062.5 which comes to Rs.19588.54 per month. This is a big sum taking into consideration the average family size of 6.05 because the average per capita monthly income Rs 3237.78, which is well above the existing poverty line.(Research question no.1)
10. More than half of the growers (57.5%) have a future plan to continue grapes cultivation even after 10/20 years, only few families (15%) are not planning to continue grape cultivation mainly because of the marketing problems.(Research question no.2)
11. Majority of the respondents i.e. 70 per cent sell their grape product to grape winery, few families i.e. about 7 % sell their products to commission agents and

the remaining 18 families sell directly from their vineyard to the nearby market.(Research question no.2)

12.30 percent of the respondents are BPL families and 68.75 percent are families living Above Poverty Line (APL). But maximum numbers of the respondents are living in Kutcha houses. This reflects that though the number of respondents below poverty line is lesser than that of families living above poverty line, their housing facility is more or less the same. Also, only 1.25% of the respondents are AAY family.

13. The average family size is approximately 6 (i.e.6.05), of which half (3.05) of the respondent family members are counted as workers.

14. The average age of the sample farmers was 57 years. So far as literacy is concerned, it was observed that all the respondents were literates. Maximum numbers of respondents i.e. 40 % are below high school level and 26 % of the respondents completed high school level and 23.75 % are graduates and above.

15. The average land holding size of the respondents was 2.325 acres, out of which 0.61 acres was irrigated and remaining 1.71 acres was rain fed in Champhai cluster.

## **SUGGESTED MEASURES**

Based on the findings of the study and the problems identified by researcher, the followings are suggested for improvement of grapes cultivation in Mizoram.

- 1) The major problems faced by grapes growers in the cluster is related to marketing problems which was due to the introduction of MLPC act introduced by government of Mizoram. This act hampers the marketing pattern of grape in the cluster. To save the farmers from this problem, the govt should allow wineries to produce wine and take remedial steps to overcome the problems of marketing of grapes in the cluster. Also collaboration with other states will be highly beneficial.
- 2) Horticulture Department may identify and promote location specific high yielding varieties of grapes and good planting materials. The State is facing very low seed replacement rate. To get a better harvest, new and improved variety of seeds need to be introduced as well as populating the practice among the growers by line department and extension agencies.
- 3) More than half of the growers in the cluster faced the problem of irrigation facilities on their farm. Therefore, tube-wells and canals should be constructed to provide better irrigation facilities which will greatly improve the production and productivity of grapes in the cluster.
- 4) Inadequate transportation is another problems faced by grape growers in the cluster. For this purpose, vineyard could be linked with sound transportation

facilities that would help to raise growers' income which in turn stimulate growers interest to adopt better farm technology with sufficient income.

- 5) Line Department may ensure adequate extension services like market information and technical guidance. Lack of Intensive training in proper and modern viticulture practices and lab to land extension programmes could be made available to growers.
- 6) More number of post-harvest infrastructure in terms of cold storages for grape fruits could be established in the cluster. The existing cold storage is very limited and the government or line department should establish adequate cold storage in the cluster.
- 7) Modern equipment and training to improve juice making skills of operators was considered vital for the production of nutritious, good quality grape juice. There is also the opportunity for other value added grape products to be developed.
- 8) In Mizoram consumers prefer imported wines as locally produced grapes wine is more expensive and of inferior quality. It is strongly advised that cost effective production practices should be developed and training should be undertaken to improve the skills of winemakers. This will enable industries to achieve the potential for growth and increase the value of the local economy. Collaboration with others states was encouraged instead of individual efforts.
- 9) Awareness is to be created among the small grapes growers about the credit facilities available for grapes and also the subsidy and other promotional schemes related to grapes cultivation. Even grapes wineries have to be cost effective in their

operations and price competitive in the market place- both domestic as well as international.

- 10) Like other crops, contract farming system may be adopted for grapes. For instance, a particular commission agent may enter into a contract with the growers. This would benefit both the growers and manufacturers as the growers would get reasonable prices and the manufacturers would get better quality grapes.
- 11) Financing banks may come forward to finance grapes cultivators. The different entities should be made aware as to utilise bank funds efficiently. Effective mechanism for checking multi- financing may be developed.
- 12) As the cost of manures and pesticides and other inputs are high, distribution of these inputs at subsidised rates to small growers may be given.
- 13) Scientific training of pruning and plucking may be given to the small growers as keeping grapes continuously unpruned may lead to the formation of large knots on the bushes. Training to be imparted to the growers about the technology, practices in fanning, etc by line department.
- 14) It was noted that despite the efforts of government to upgrade aspects of grape production, there are still many constraints hindering further development. Most of the problems appear to be common to all growers in the cluster. The researcher therefore recommended that assistance should be sought for the formulation, funding and implementation of a Project to address the existing problems.



## **CONCLUDING REMARKS**

In Mizoram, area under grapes cultivation is not expanding fast owing to the high initial cost of establishing the vineyards and high recurring cost of production. The risk of losing a crop due to unprecedented changes in weather is also very high. Grape growing, however, is a highly remunerative occupation as the crop is easily marketable. Since the highest productivity in grapes has been achieved, efforts are needed to extend grape cultivation to newer areas. Marketing and post harvest managements are the impediments in this direction, for which suitable rootstocks are to be identified. There is a need to diversify the uses of grapes. Diversification of uses as wine/juice and export of grapes can ease the marketing problems. Maintenance of the quality of table grapes by crop regulation is the priority consideration to increase exports. For the survival of the grape industry in Mizoram, the product should be quality and cost competitive. Future efforts are to be concentrated in this direction.

The wineries of grapes are not well developed and are carried out on a very small scale at present. However, the level of knowledge and skills in grape processing is still limited and cold storage facilities are currently inadequate. Continuous dispatch of specialists for training in other states with advanced skills is necessary. Financial support is also needed for research and development projects on high quality grape production and processing. Moreover grape winery development

should be supported by the Government through the cooperation of the researchers and the growers. Considering the increasing demand and the ingenuity of local grape growers, the grape winery has much potential for further expansion in the years to come in Mizoram.

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