

AN ANALYSIS OF TEA (*Camelliasinensis L.*) PRODUCTION AND MARKETING: PATTERN IN MEGHALAYA

Thesis

Submitted to

NAGALAND UNIVERSITY

In partial fulfilment of requirements for the degree

Of

Doctor of Philosophy

In

Agricultural Economics

By

Kynphambor Dkhar Sawian

Admn. No. Ph. 241/17.Regn. No,Ph.D/AEC/00117



Department of Agricultural Economics

School of Agricultural Sciences and Rural Development,

Nagaland University, Medziphema campus-797106

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CERTIFICATE -I

This is to certify that the thesis entitled“**An analysis of tea (*Camelliasinensisl.*) production and marketing:Pattern in Meghalaya**” submitted to Nagaland University in partial fulfilment of the requirement for the award of degree of Doctor of Philosophy in Agricultural Economics is the record of research work carried out by Mr. Kynphambor Dkhar Sawian Registration No.Ph.D/AEC/00117 under my personal supervision and guidance.

The result of the investigation reported in the thesis have not been submitted for any other degree or diploma. The assistance of all kinds received by the student has been duly acknowledged

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VIVA VOCE ON THESIS OF DOCTOR OF PHILOSOPHY IN AGRICULTURAL ECONOMICS

This is to certify that the thesis entitled “**An analysis of tea (*Camellia sinensis* L.) production and marketing: Pattern in Meghalaya**” submitted by Mr. Kynphambor Dkhar Sawian Admission No. 241/17 Registration No.Ph.D/AEC/00117 to the NAGALAND UNIVERSITY in partial fulfilment of the requirement for the award of degree of Doctor of Philosophy in Agricultural Economics has been examined by the Advisory Board and External examiner on

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DECLARATION

I, Kynphambor Dkhar Sawian, hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form the basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis had not been submitted by me for any research degree in any other university/ institute.

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Date / Nagaland

The..... 2022(Kynphambor Dkhar Sawian)

**Dedicated
To
My Beloved
Parents**

Shri.. H. SHYMBIN

And

Smt. A. J. DKHAR SAWIAN

LIST OF TABLES

TABLE NO.	TITLE	PAGES
1	Area and Production during the period 2017-2018 of India	1
2	State wise tea growers, area including BG & assted SG.	2
3	Name of the country in which exports	3
4	State wise category wise auction data	3
5	The list of several tea factories which include big and small mini factories precent in the states	7
6	District wise distribution of Area, Production of tea in Meghalaya (2017-18)	19
1.1	Socio-economic characteristics of tea growers in Meghalaya	31
1.2	Engagement of tea farmers household in study area of Meghalaya	32
1.3	Cropping pattern of tea grower in study area of Meghalaya	33
1.4	Categories of tea growers base on the area of sample farms(ha)	34
1.5	the categories of different land holding of the tea growers in Meghalaya	34
3.1	Trend of area, production and yield in Ri-Bhoi	38
3.2	Trend of area, production and yield in West Garo Hills District	40
3.3	Trend of area, production and yield in Meghalaya	41
4.1	The cost of incurred in the farmers field in establishment of the tea Plantation category-I	42
4.2	The cost of incurred in the farmers field in establishment of the tea Plantation category-II	43
4.3	The cost of incurred in the farmers field in establishment of the tea	

	Plantation category-I	44
4.4	the cost of incurred in the farmers field in establishment of the tea	
	Plantation category-II	45
4.5	Cost concept structure of Ri-Bhoi district	47
4.6	Cost concept structure of West Garo Hills district	48
4.7	Farm efficiency measures of Ri-Bhoi district	49
4.8	Farm efficiency measures West Garo Hills district	49
5.1	Estimated production function for Ri-bhoi district sample	51
5.2	Estimated production function for West Garo hill district sample	52
5.3	Allocative efficiency of tea for different categories of sample farms	54
6.1	Recommendation packages of practices in tea cultivation by tea development Center Umsning, Ri-Bhoi.	55
6.2	Recommendation packages of practices in tea cultivation by Tea development Center Rongram, west Garo hills .	56
7.1	Production of tea in Meghalaya	58
7.2	Producer's surplus of tea in Meghalaya	58
7.3	Disposal pattern of tea in Meghalaya	59
8.1	Physical Constraints	71
8.2	Biological constraints	72
8.3	Legal constraints	73
8.4	Social constraints	73
8.5	Economic and finance constraints	74
8.6	Marketing constraints	75
8.7	Constraint pertaining to the Ri-Bhoi district	76

LIST OF FIGURES

FIGURE NO.	CAPTION	PAGES
1	The geographical area of Meghalaya through satellite	20
2	The state maps of Meghalaya and the different district of Meghalaya.	21
3	Distribution of sample plan in the study area	23
4	The percentage of the education status of the respondent farmers.	32
5	The percentage of occupations from respondents.	33
6	The share percentage of various crop growth in study area	34
7	Morphology of the tea plant	38
8	Trend of area, production and yield in Ri-Bhoi	39
9	Trend of area, production and yield in west Garo Hills	40
10	Trend of area, production and yield of Meghalaya	41
11	The diagram representing the map of tea Marketing on Meghalaya	60
12	Constraints representing of Ri-Bhoi District	75
13	Constraints representing of West Garo Hills District	77

LIST OF PHOTO

FIGURE NO.	CAPTION	PAGES
1.	Meghalaya first ever Tea exhibition at UmsningTea Development Center	90
2.	The programme conducted by Tea broad and the department government of Meghalaya.	90
3.	Collection of different tea sample produces from Meghalaya	91
4.	The sample of different product which was produces from our tea garden	91
5.	During the research tour to Tocklai Tea Research Institute, Jorhat.	92
6.	Research tour in Assam Agriculture University (AAU, Jorhat) in department of Tea Husbandry.	93
7.	Research tour and visit to Areng Tea Factory Rongram, West Garo Hills.	94
8.	Meghalaya tea brand which was produced from the West Garo Hills	94
9.	Research tour to Rangram, Tea development Center, West Garo Hills.	95
10.	Research tour to Umsning, Tea development Center, Ri-Bhoi .	95
11.	Research tour and interaction with farmers.	96
12.	Research tour with progressive farmers and groups discussion.	96
13.	The older and larges tea factory in Meghalaya, Nalari, Ri-bhoi district.	97
14.	Different package of made tea produced in the factory	97
15.	Meg tea factory: mini and small factory produce only green and orthodox tea	98
16.	The Meg tea factory at Umsning, Ri-Bhoi district	98
17.	The farm manager and factory supervisor	99
18.	Final product before packaging and send to the market.	99
19.	The AH tea garden at Mawlein, Ri-Bhoi district	100

LIST OF ABBREVIATIONS AND SYMBOLS

Sl. No.	Abbreviation	Long form
1	AE	Allocative Efficiency
2	AVP	Average Value Product
3	CGR	Compound Growth Rate
4	CV	Co-efficient of Variance
5	GFI	Gross Farm Income
6	ME	Marketing efficiency
7	MM	Marketing margin
8	SP	Selling price
9	PP	Purchase price
10	MC	Marketing cost
11	ha	Hectare
12	HL	Human labour
13	Kg	Kilogram
14	MFC	Marginal Factor Cost
15	Km	kilometer
16	mm	Millimeter
17	Qty	Quantity
18	Avg	Average
19	MPP	Marginal Physical Product
20	MT	Metric Tonnes
21	MVP	Marginal Value Product
22	NFI	Net Farm Income
23	PPC	Plant Protection Chemical
24	POP	Package of practices
25	Rs.	Rupees

26	RSS	Regression Sum of Square
27	Sq. Kms.	Square Kilometers
28	TSS	Total Sum of Square
29	M kg	Million kgs
30	IRR	Internal rate of return
31	NPV	Net present value
32	BCR	Benefit cost ratio
34	NEH	North Eastern Hill
35	AAU	Assam Agricultural University
36	TRA	Tea research associate
37	NABARD	National Bank for Agriculture and Rural development
38	GoM	Government of Meghalaya
39	GOI	Government of India
40	TF	Theaflavin
41	TR	Thearubigin
42	Fig.	Figure
43	Agri. Econ.	Agricultural Economics
44	<i>et al.</i>	Co- worker
45	i.e.	That is
46	Intre.	International
47	Mktg.	Marketing
48	Sci.	Science
49	Soc.	Society
50	J.	Journal
51	STAP	Small Tea Growers Advisory Programme
52	STGs	Small Tea Grower's
53	Agric.	Agriculture

54	Agril.	Agricultural
55	Dev.	Development
56	Res.	Research
57	Rev.	Review
58	Viz.	Namely
59	Nat.	National
60	Co.	Company
61	Pvt.	Private
62	Ltd.	Limited
63	CTC	Crush, Tear,Curl
64	IBEF	India brand equality foundation
65	BLF	Bought leaf factories
66	BG	Big growers
67	SG	Small growers
68	NGo	Non-Government organization

CONTENTS

CHAPTER	TITLE	PAGE NO.
I	INTRODUCTION	1-11
II	REVIEW OF LITERATURE	12-18
	2.1 the socio-economic characteristics of tea growers	
	2.2 the trend of tea area, production and productivity	
	2.3 To estimate the economics and resource use efficiency of tea production	
	2.4 the marketing pattern and post-harvest management	
	2.5 the technological gap in adoption of package of practices	
	2.6 Constraints faced by the farmers in tea growers	
III	RESEARCH METHODOLOGY	19-30
	3.1 Objective	
	3.2 Methodology	
	3.3 sample plan	
	3.4 data collection and period	
	3.3 Limitation of the study	

IV	RESULTS AND DISCUSSION	
	4.1 Socio- Economic Characteristics	31-34
	4.2 The Nature, Types and Characteristics of tea Plantation in Meghalaya	35-37
	4.3 The Trend analysis of Meghalaya	38-41
	4.4 The Cost and Return of the established tea Garden and the cost concept	42-49
	4.5 Production Function Analysis and Resource Use efficiency	50-54
	4.6 Technological Gaps in Adoption of the Improved Package of Practices	55-56
	4.7 Marketing and Post-harvest Management	57-70
	4.8 Constraint facing by the farmers	71-77
V	SUMMARY AND CONCLUSIONS	78-81
	1. REFERENCES	82-86
	2. APPENDICES	87-91
	3 PHOTOS	90-100

An Analysis of tea (*Camellia sinensis*. L) Production and Marketing Pattern in Meghalaya

ABSTRACT

The present research work was carried out based on production cost and marketing strategy of tea estate with special reference to Meghalaya state. The studies emphasis on the potential of growing tea *Camellia sinensis* in comparison the various cost structure in the farmers field and the marketing strategy employed which was suitable in the state of Meghalaya; for example, the cost of production and the marketing pattern of tea. The data was collected from the two districts purposively selected based on the highest area, production and productivity as compare to the other districts, also a multi-stage random sampling technique was adopted to the rationality sample plan of the respondents. Even the statistical frame-work and tabulation was adopted to fulfill the specific objectives viz; the socio-economic characteristics features, the respondent were categorized into two groups based on their land holding capacity which will emphasize the production cost of an individual and overall /collective farms. Along with marketing channels, price spread and constraints faced by the respondents were the key issues.

The sample are divided into two parts to finalize the different cost factor and return. Namely on the bases of the land holding, Category-I (less than 2.5 ha) and in Category-II (more than 2.5 ha). The average farm in category- I was 2.40 ha whereas the average farm in category-II was 5.20 ha. The compound growth rate (CGR) and the trend analysis of the Meghalaya which calculated from (2000- 2018) for a total of 18 years passed, from the secondary data which include area, production and productivity was 0.69, 0.23 and 0.85 which shown a significant growth and with the C.V. percentage of 42.92, 75.99 and 38.64 respectively. In plantation of tea varieties will determine the quality of tea, district like Ri-Bhoi and the East Khasi hills with a high-altitude area the **Darjeeling varieties** are suitable and excellent for making green tea, White tea and Oolong tea. Where as in the plain belts of West Garo hills and the surrounding area which more humidity or favor condition the **Assam varieties** were suitable like CTC tea only. The cost of establishment a tea garden is divided into non-recurring and recurring cost, it can be computed into five years after transplanting. The first year will be negative or zero and it will continue till third year or four years depend on the soil and management practices. only in the five year there will be a growth with an increasing rate till at maturing stage. The NPV was computed to be Rs. 500788.31, BCR. was 18.07 and IRR was 3.65 % from the fifth years of planting in category-I of Ri-Bhoi district and the NPV was computed to be Rs. 60744.57, BCR.

was 24.51 and IRR was 4.66% from the fifth years of planting in category-II respectively. The resource use efficiency was found to be common in both the district human labour and planting material and Allocative efficiency was 0.36 and 1.72. In the technological gaps majority of the farmers were lack of Knowledge (Know how) and only few farmers follow the package of practices in the field. Among all the made tea present from the state was the CTC tea which contribute 47.84% and follow by green tea, Orthodox tea. Setting up a mini factory for small units increase the production of green tea, white tea. In the marketing parts: three channels had been identified with the highest price spread comparison. In both the district the most common constraints found to be physical constraint which consider to be the main problem the land topography and the road communication, where as in the marketing and financial constraint the main point was lack of purchasing power of the fresh leaves, storage problem, lack of processing unit and financial management.

Key word: Integrated Farming System, Production cost, Resource efficiency, Marketing margin, Processing units, constraints.

INTRODUCTION

The most popular beverages in the Indian society lease within the special aroma and flavour of tea it was name as (chai), it has been acclaimed remedy for various ailments since the initiation and the Taoists called it ‘elixir of immortality’ (Pradip Baruah). Tea is popularly called as the green gold. Asia accounts for 89% of the world tea area and of which India accounts for 18.5% of the world tea area with 26.2% of total world production (India rank 1st in the production). In 2019, India production was 1350.04 million kg (m kg) with an area covering in tea are 563.98 ha from which 254.50 M kg and earned as the valued at Rs 5506.84 crores was exported. Nation-wide and especially the north eastern part of Indian was on the mote of known as organic state and organic certification, but by default Meghalaya was well known as the organic state due to the traditional ways of farming practices. As we compare the liquoring quality of various tea made in Meghalaya, it has a unique pure aroma, flavour and taste with Darjeeling which become the most famous tea. Meghalaya produced 16721 m kg tea in 2018 in area under tea of 2755 ha which were 6069 of the productivity(directorate of horticulture, govt. of Meghalaya).

Table 1 Area and Production during the period 2017-2018

State	Area in hectares	% Of the total area	Production Million kgs	% of the production
Assam	304.40	53.971%	675.17	52.04%
West Bengal	140.44	24.90%	384.96	25.82%
Tamil Nadu	69.62	12.34%	166.90	14.45%
Kerala	35.01	6.21%	62.35	5.25%
Karnataka	2.22	0.39%	5.40	0.46%
Meghalaya	2.30	0.40%	0.47	0.06%
Other states Tripura, Uttarakhand, Bihar, Manipur, Sikkim, Arunachal, Himachal Pradesh, Nagaland, Mizoram and Orissa.	9.99	1.79%	27.43	1.92%
TOTAL (All India)	563.98	100%	1208.78	100%

Sources: **IBEF (India Brand Equality Foundation) Tea Development centre, umsning, Tea board of India**

In India's tea industry, there has been a significant rise of the small sector in recent decades. STG gardens can be found in up to 15 different states. Taking into consideration the traditional and non-traditional states. Assam, West Bengal, Tripura, and Himachal Pradesh are traditional northern states, while Tamil Nadu, Kerala, and Karnataka are traditional southern states. Meghalaya, Uttaranchal, Bihar, Sikkim, Arunachal Pradesh, Manipur, Mizoram, and Nagaland are the non-traditional states. (Abdul Hasan)

During the years 1998-99, the price of green leaf was at an all-time high, but it then began to decline. This has put the STGs in jeopardy. Small tea growers and their staff are thought to be on the receiving end of the tea industry's supply chain. They have limited influence or bargaining power over their produce (green leaf), which is monopolised by bought leaf factories (BLF). This, in turn, has an impact on the working conditions of farm labourers. (Abdul Hasan)

Small growers contribution to the total tea production is increasing year to year during the year 2018-19 small growers share of production is seen at 48.41%.

Table 2 State wise tea growers, area including BG & assted SG.

	STATE	Big growers		Small growers		Total	
		No	Area in hect.	No	Area in hect.	No	Aera in hect.
1	Assam	765	232399.35	101085	105291	101850	337690.35
2	West Bengal	451	114419.47	33711.27	37816		148121.74
3	Other north India	111	11785.09	38031.86	17624		49816.95
4	North India	1327	358594.91	155963	177034.13	157290	535629.04
5	Tamil Nadu	133	29600.56	45765	33284.57	45898	62885.13
6	Kerala	93	30303.42	8497	5567.74	8590	3587.16
7	Karnataka	16	2171.74	0	0	16	2171.74
8	South India	242	62075.72	54262	38852.31	54504	100928.03
9	All India	1569	420670.63	210225	215886.44	211794	636557.07

Source: tea board of India

Export paid a huge contribution to the national income of the country, which stated in the table iran by 9.83 million kgs follow by Bangladesh with 3.00 million kgs, along with china and Kazakhstan by 0.54 million kgs.

Table 3 Increase in exports has been native to the following countries

Sl. No.	Name of the country to whom the export was made in million kgs (%)
1	Iran by 9.83 million kgs (32%)
2	Bangladesh by 3.00 million kgs (650%)
3	China by 1.58 million kgs (18%)

4	Kazakhstan by 0.54 million kgs (6%)

When coming to the product introduced in the market and the demand with the supply of made tea assam is among the leading producer in the eastern part of India, where as Kerala was highest from the southern part. The states like Meghalaya the quantity was 139 tones kgs and average price Rs./ kg 132.82.

Table 4 State wise category wise auction data

State	CTC		Green		Orthodox		Total	
	Qty th. kgs	Avg. price Rs./kg	Qty th. kgs	Avg. price Rs./kg	Qty th. kgs	Avg. price Rs./kg	Qty th. kgs	Avg. price Rs./kg
Arunachal pradesh	3841	149.37	18	306.56	37	318.99	3896	151.71
Assam	245475	148.88	31	227.66	45295	201.32	290802	157.06
Bihar	1990	88.87	0	00	0	00	1990	88.87
Himachal pradesh	0	00	0	00	523	121.29	523	121.29
Karnataka	1453	95.42	0	00	0	00	1453	95.42
Kerala	20661	112.53	0	00	2412	140.35	23073	115.44
Meghalaya	132	127.19	3	247.38	4	232.83	139	132.82
Nagaland	1321	133.10	0	00	0	00	1321	133.10
Tamil Nadu	94207	89.66	2	120.96	7791	124.49	102000	92.32
Tripura	3986	107.80	0	00	0	00	3986	107.80
Uttarkhand	2	81.26	0	00	47	114.75	49	113.38
West Bengal	172148	133.93	6	67.17	205	188.86	174304	136.11
All India	545217	131.85	60	232.71	56314	187.30	603536	137.65

Source: tea board of India

Out of the total tea products CTC contribute 90% while the green and orthodox tea tract 10%

Origin of tea and the introduction of tea in Meghalaya

Tea originated in China and has since gained popularity as a modern beverage in European countries, particularly the United Kingdom. During the 17th and 18th centuries, the East Indian Company was one of the companies that traded in tea and also imported large quantities of tea to London for domestic consumption because it was immensely popular with the British. The East India Company had no choice but to rely solely on China (Pradip baruah)

Tea planting in Meghalaya is still in its infancy, despite its fertile, acidic soil and ample rains impressing and enthusing prospective planters over two centuries ago. The beginnings of organized tea planting in the state were highlighted by a visit by tea board of India experts in 1979. The tea board team claimed that the state's potential for tea planting was great and undeveloped, echoing the findings of an east India company prospecting group sent in the first half of the nineteenth century. (G.O.M. Horticulture Directorate)

The total land area is **22,42,900** hectares. Forest covers about **9,47,786** hectares and under Plantation crop covered about **37,012** hectares. The state as a whole is hilly, and the rivers are perennial in character, with many swift streams and rivulets connecting them. The eastern Himalayas region (zone II) affected the growth of the rural economy in terms of social, economic, political, and communication. (Statistical overview of agriculture. G.O.M.)

Tea plantation in the state is still in its nascent stage. The state of Meghalaya, located between 25°1' and 26°5' North Latitude and 85°49' and 92°52' East Longitude and with an area of 22,489 Sq Km is endowed with abundant wealth of nature. Considering the favourable Agro-climatic condition prevailing, tea appear to be a potential plantation crop of the state. In response to the tea board of India report nurseries were established from 1977 on words, and suitable varieties well adopted to the state's soils, temperatures and rainfall were brought in from neighboring assam, and also from Darjeeling. The seedling were subsequently transplanted to experimental gardens at Umsning (in Ri-Bhoi district), Tebronggre (in the west Garo hills) and also to Riango (in West Khasi hills) in 1978. Encouraged by the quality and yield of the young tea bushes, Meghalaya state government subsequently adopted a policy to incentivize commercial cultivation of tea in private farmer's field. The rest is history – since those early days, Meghalaya tea cultivation has spread to all corners and elevations of the state, and the teas it produces as superior in quality, rich and fragrant in aroma and powerful in liquor.

Planting material:

Good number of clones and bi clonal seeds released from Tocklai experimental station (TRA) are used as planting materials in the state. Besides, some industry clones have also been used as planting material. The commonly used are listed below:

- a) Clones: TV1, TV9, TV14, TV 17, TV18, TV19, TV20, TV21, Sundaram, Balasun etc
AV-2, T-78,T-253,(Concentrated in regions of altitude above 800m)
- b) Bi Clonal Seed: TS 378, TS379, (For Highland Region)

Pests and disease:

The major pests that attack the tea bushes are Red Spider Mites and tea Jassids. Other pest like the tea mosquito have also been reported in some localized areas in the lower regions of the district.

The major disease that occurs in tea garden in blister blight.

Governmental schemes:

Tea being a labour-intensive crop with the cost of cultivation very high, it is not possible for farmers to take up tea plantation on their own and therefore the state government implements a “**Package scheme on tea**” since 1988-89 which includes financial subsidy provision and free distribution of seedling to covers 1-2 hectares per family so that

Tea Processing:

Initially the small tea growers of the state face great problem in disposal of the green leaves mainly due to non-availability of proper processing unit. There were times that green tea leaves produced from the government farm as well as farmers field was marketed to mini processing factory at Umiam (Barapani) in ri bhoi district and Garo hills tea company, Rongram in west Garo hills district but this process did not continue for long as the unit closed down due to technical problems. Green tea leaves were also marketed to nearby tea factories located at assam but it was only during 1996-1998, that 2 (two) privately owned factory was established one each at Mawsyntai in ri bhoi district and at Rongram in west Garo hills district for processing of green tea leaves. The overall scenario of tea processing units in the state have improved with more number of tea processing units on the state have improved with more number of factories have come out especially in the two pre dominant tea growing area and side by side mini factories especially in the highland region of east Khasi hills district have proved better results with the trade mark to produce high quality orthodox tea with the marketing of green tea leaves available to the growers at their doorstep, large numbers of farmers are willing to take up cultivation every years. Some of the functioning tea factories are follow;

Marketing of Meghalaya tea.

Marketing of tea in done through various modes and model, the most important among them auction system which will be in bulk quantity. The Guwahati auction centre of assam established in 1970 is the largest Indian tea auction centre. Even in the state tea were distributed to various retail outlets as well as Meghalaya agriculture outlets and most importantly focusing in supplying to the tourism who visited Meghalaya and included the international market.

TEA Factories	years of establishment	Status	Type of Manufacturing	2018 Production	Process capacity	Average Price (Rs.)
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				(kgs)		
Nalari Tea	1998	Conventional	CTC	138000.00	400MT Made tea/ann.	175.00
Meghalaya Tea (Garo hills)	1997	Conventional	CTC	173206.00	250MT Made tea/ann.	250.00
Sharawn Tea	2005	Conventional	Orthodox	1200.00	2MT Made tea/ann.	1100.00
Urlong Tea	2008	Organic	Orthodox	1012.00	10MT Made tea /ann.	1100.00
Anderson Tea	2009	Conventional	CTC and Orthodox	170000.00	250MT Made tea/ann.	250.00
Durama Tea	2010	Conventional	CTC	30700.00	300MT Made tea /ann.	200.00
MEG Tea	2013	Organic	Orthodox	2000.00	5MT Made tea/ann.	922.73
Total					1217MT	

Sources: Tea Development Center umsing.

Tea quality

the state have producing such a unique quality tea mainly due to its agro-climatic factor and planting materials, field management practises and technological development, etc. are contributing to it. Generally, two leaves and a bud are plucked from a tea bush at an interval of 7-9 days continually throughout the year (plucking started in February- March and continue till December) and these plucked leaves are systematically processed in the factory to manufacture tea in consumable forms, from which the hot brew is prepared.

STATEMENT OF THE PROBLEM

The tribal population of the NE India is dependent on agriculture and allied activities. A comparison of the crop productivity of the North Eastern Region with the country showed that almost all the crops show a very poor performance as compared to the country level of productivity. This is an indicator of the production gap that may be bridged by adopting modern and scientific practices of commercial farming. Hence, such is the common understanding evolved out of interactions of the planners, policy makers, educationists and agricultural scientists. However, associated factors related to sustainability of the resources as well as economics need to be examined critically. Agro- based small-scale industries, semi-permanent farming with perennial plants, aimed based farming system, aquaculture etc. are some other alternatives that should be practiced in order to improve the socio-economic status of farming community with a wider national goal of soil persevering the national

treasurer of soil and its nutrients. Few workable suggestions are made for adoption of other economically remunerative venture for large-scale adoption in the NE region to ensure resource sustainability vis-à-vis economic well-being (Mishra et al., 2006).

According to the India statistics, Meghalaya rank no 8th in area and production of tea. Through the natural advantages of abundant rainfall, fertile soil and present of rich biodiversity surround Meghalaya is slowly catching up with Assam and Darjeeling in tea production. In Meghalaya out of 22,429 sq.km of total area, tea is grown in an area of 2,247 ha with production of 5,962 mt and productivity in 2,653 Kg/ha (Anon. 2014b). Majority of tea estate in Meghalaya have relied on organic modes and this happens to be a distinctive feature of tea in the market as pure organic that has enabled the state to earn name for it internationally.

In the case of tea production, Agriculture activities and plucking is the one of most labour intensive among the operation involved in production nearly 70.00 per cent of the labour involved in the production is used for plucking operation and approximate 40.00 per cent of the cost of production of tea goes into payment for the labour involved in production. The Capital in the important role / function to maintain tea garden and also skill labours are requires in management the tea garden, follow by other activities. Most of the problems and the constraints of small tea growers arise due to their very small size of holding. They do not have the knowledge about what should be the economic size of holding. Inadequate use of fertilizers, weedicides, fungicides, pesticides, lack of management, use of out model machinery, working finance, unconventional practices, etc. Department of Tea Husbandry and Technology, Assam Agricultural University, Jorhat and NABARD has accepted the definition given by Tea Board and STAP.

So, the present study, therefore, seeks to evaluate the socio-economic characteristics, production trend, economics, input use efficiency, technological gap, constraints faced by the small tea growers, SWOC analysis and suggest strategies to overcome in Meghalaya. a research study entitled **“AN ANALYSIS OF TEA (CAMELLIA SINENSIS L.) PRODUCTION AND MARKETING: PATTERN IN MEGHALAYA”** were taken up with the following objectives:

OBJECTIVES

1. To study the nature, types and characteristics of the plantation in Meghalaya
2. To study the trend of area, production and productivity tea in Meghalaya.
3. To estimate the economics and resource use efficiency of tea plantation.
4. To study the technological gap in adoption improved package of practices among the tea growers.
5. To analyse the marketing pattern and post-harvest management of tea

6. To determine the constraints faced by tea growers and suggest strategies to overcome.

HYPOTHESIS

For the present study following null hypothesis has been developed for the study:

Ho1: There is no trend between area, production and productivity of tea.

Ho2: There is no association between selected socio-economic variables and technological of tea among tea growers.

SCOPE AND IMPORTANCE OF THE STUDY

A attempted a compound growth rate of tea in Meghalaya in area, production and productively of tea and the resource efficiency for allocation of the resources in the farm, with minimum cost and maximum profit to achieved, economics of the farm and the constraints faced by the farmers is to by analyses with the suggestions for meaningful policy interventions of the study would helpful to the tea board, researchers, extension workers, NGO's, government to protect the interest of growers. It also, attempted to increase the price of the green tea leaf to enhance the income of the small tea growers in the coming days.

Limitation of the study:

i. The research work was undertaken using personal interview method. Even though, due care and attempts were made to acquire correct information from the respondents, the errors that might still could not be ruled out since the finding were based on responses obtained from the selective respondents

ii. The information collected was based on the recalled memories of the respondents. hence, there might be lapse in the respondents memory.

iii. The research work was carried out for the partial fulfillment of the requirements of the degree of Doctorate of Philosophy in Agricultural Economic; hence the time constraints of a single handed researcher cannot be ignored.

iv. The information collected was also based on the secondary data obtained from various sources. Hence, the results are reliable to the extent of the authenticity of the data source.

v. All the area in the state could not be covered in the present study leaving scope for further research in the field. However, since efforts have been made to make the study meaningful which may serve as reference guideline for further studies in the field.

Organization of the thesis:

The study has been presented in six chapters as indicated below:

- ☐ Chapter 1: Introduction its deals with the nature, importance, scope and specific objectives of the study.
- ☐ Chapter 2: Review of literature it describes comprehensively the review of the relevant research work done in the past related to the present study.
- ☐ Chapter 3: Research methodology its outlines the features of the study area, secondary data utilized in the study and methodologies used at different stages to arrive at the results.
- ☐ Chapter 4: Agro-Climatic Features with facts and figures of the study areas.
- ☐ Chapter 5: Result and Discussion it presents the important results obtained from the study and the constructive discussions based on them.
- ☐ Chapter 6: Summary and Conclusion it provides summary and conclusion, SWOC analysis and also supports the suggestions and policy implications based on the findings of the study.

At the end, important references have been listed relating to the present study.

REVIEW OF LITERATURES

Comprehensive review of the past studies is an essential component of any research endeavors, which helps to decide appropriate technical procedure and provides supports in interpretation of research finding. Commensurate with the proposed objectives, some relevant studies have been briefly reviewed under:

2.1 To study the socio-economic characteristics of tea growers in the study area:

(i). Sarkar and Bhowmik 1988, study on West Bengal tea plantation industry. Tea plantation industry is a labour intensive one and majority of workers are women. They found that participation of women in trade union activity is low, and the major reasons, according to them, are inequality, low literacy rate, low political consciousness and burden of the household duties. (ii). Kurian 1990, study on socio-economic background and consumption pattern of women workers in tea plantation industries in Munnar, Idukki District in Kerala, The study was focussed on the personal and family background of women workers. their economic and living conditions, income and expenditure pattern. standard of living. social status. working conditions welfare facilities and security. The tea industry is labour intensive and majority of workers are women. (iii). Kurian 1999, study on socio-economic background of tea labourers Information on households of the workers revealed the fact that women are major income earners of their family. Their educational status is very low. The workers get housing facility, electricity, day care facility, and social security benefits such as gratuity, family pension and maternity benefits. Despite all these facilities given by the companies, their socio-economic status is found to be very poor.

(iv). Sen, *et. al.* 2016. Recent survey on the weed flora of tea ecosystem of Ri-Bhoi district of Meghalaya has recorded 66 weed species belonging to 51 genera under 31 families. This was the first attempt to explore the weed flora of tea plantations of Meghalaya. Two species namely *Bidens pilosa* L. and *Clerodendrum paniculatum* L. are reported for the first time from the tea plantation of North East India. Regarding family-wise contribution Poaceae contributing highest number (14) of species followed by Asteraceae (10), Cyperaceae (5), Lamiaceae (4), Amaranthaceae (2), Caesalpiniaceae (2), Malvaceae (2), Polygonaceae (2), Solanaceae (2) & Schizaeaceae (2). Other families are having single representative. 23 weed species have been identified as ethno-biologically important. Local Khasi tribal peoples use these weeds as folk medicine against various diseases and other factors.

2.2 To study the trend of tea area, production and productivity in Meghalaya:

(i). Reddy 1991, analyses the trends of tea in the global market. He found that global production has been on the increase at a compound rate of 3.70 per cent per annum, while the domestic consumption of the producing countries has been increasing by 4.90 per cent per annum. The share of tea producing countries in consumption was 65.00 per cent in 1988. Thus the global demand for tea exceeds its global supply. India is not an exception to this trend. In India the export of tea has been increasing on annual rate of growth of 4.30 per cent per annum.

(ii). Sharma *et. al.* 2010. By building on a proud legacy of enterprise that spanned nearly two and a half centuries, India has acquired an exalted status on the global tea map. The country is the second largest tea producer in the world. Interestingly, India is also the world's largest consumer of black tea with the domestic market consuming 911 million kg of tea during 2013-14. India is ranked fourth in terms of tea exports, which reached 232.92 million kg during 2015-16 and were valued at US\$ 686.67 million.

(iii). Singh *et. al.* 2014. India has around 563.98 thousand hectares of area under tea production, as per figures for December 2013. Tea production is led by Assam (304.40 thousand hectares), West Bengal (140.44 thousand hectares), Tamil Nadu (69.62 thousand hectares) and Kerala (35.01 thousand hectares). According to estimates, the tea industry is India's second largest employer. It employs over 3.5 million people across some 1,686 estates and 157,504 small holdings; most of them women.

(iv). Sen, *et. al.* 2017. Production of tea reached 1,233.14 million kg in 2015-16. Around 1,008.56 million kg was produced in North India and 224.58 million kg was produced in South India.

2.3 To estimate the economics and resource use efficiency of tea production:

(i). Agarwal and Kumawat 1974, study reveals that the potential of increasing farm income through credit stated that introduction of technology without comparable credit facilities cannot be expected to have any significant impact on farm income. So, efforts should be made to extend credit facilities along with other input facilities.

(ii). Sarkar 1984, study an overall picture of the world tea economy focusing on the size distribution of plantations, consumption pattern of tea. demand and supply of tea, supply response, trade agreements, and on some policy suggestions. He observed that in China tea

plantations are very large in size compared to the plantations in Japan and Taiwan. His analysis on per capita consumption shows that there has not been considerable increase according to size increase.

(iii). Misra 1986, study of Indian tea industry at the national as well as at the regional level. He analyzed the trends in growth by employing a decomposition model. The study looked into the trends in area, production and productivity. The output growth was decomposed into area effect, yield effect and that of the combined effect. It was found that during 1956 to 1982 there was an increase of 252 million kg. in Production, and the increase in productivity accounted for 12.00 per cent, growth in area 18.00 per cent and combined effect 10.00 per cent.

(iv). Singh 2010. The cost of production of Darjeeling tea is high and people are ready to buy it at a high price. But it is a fact that average annual production in Darjeeling is around 10 million kg only, but about 40 million kg. of tea is marketed as Darjeeling tea in the world market other problems of Darjeeling tea are over age of plants and declining productivity.

(v). Leena (1996) has conducted a study on ginger in Wynad and Ernakulam districts of Kerala and reported that there was a difference in the cost of cultivation across these districts which vary from ₹71,245/ha to ₹80,285/ha in Wynad district and from ₹57,112.50/ha to ₹66,462.50/ha in Ernakulam district. The cost incurred on human labour was the highest and ranged from 30.03 to 33.81 per cent followed by the cost on manure and fertilizers (27.20% in Wynad and 23.34% in Ernakulam). Per ha average yield was estimated to be 17t/ha in Wynad district and 9.2t/ha in Ernakulam district. The farmers of Wynad earn a profit about ₹51,593/ha which was almost double that of the income earned by the farmers of Ernakulam district (₹25,971/ha).

(vi). Bera and Moktan (2006) worked out the economics of ginger cultivation in hill region of West Bengal and reported that per acre cost of production of ginger was ₹18238.97. Seed accounted for 70 per cent of the cost followed by human labour cost (13.80%) and farm yard manure cost (11.53%). Gross returns were ₹40480.02/acre, net returns were ₹22245.05 and benefit cost ratio was 2.21.

2.4 To work out the marketing pattern and post-harvest management of tea plantation:

(i). Kumar *et. al* 1972, organic tea has a niche market, where the produce sells at a premium price. India leads the world in organic black tea output and Sri Lanka is quite strong as well. Organic green tea is mainly exported from China. The domestic market for organic tea does

not yet exist in India and Sri Lanka. In China, the major product is high quality green tea in domestic market.

(ii). George 1980, study on the marketing system of tea in India As part of this study he also examined the nature of domestic demand and export performance. Tea is an export-oriented industry and India and Sri Lanka are the two main exporters. At the same time India is the largest tea consuming country in the world. According to George, there are two stages in tea marketing, primary and retail. The primary marketing channels are: 1) direct export or forward contract 2) ex-garden sales and 3) the auction system. Of these three channels, the auction system is the most important one because it has got some advantages such as possibility of distribution of huge quantities, high competition, and improved grading.

(iii). Raman 1991, studied the marketing channels of tea by evaluating the marketing system of AVT Premium Tea In India distribution and marketing of tea is a difficult task because tea plantation industrial units are located in remote areas. Tea is available in market in the form of loose tea and packet tea. Loose tea gives flexibility to consumer and it is cheaper than packet tea, so the business of loose tea is going up. But the advantage of packet tea is that it provides uniform taste through blending. The marketing channels may be identified at three levels. At the first level the product comes for auctions wherein the wholesalers come for bidding. In the second level, the wholesalers packet (or in loose form) tea and distribute among sub-dealers retailers. The retailers distribute tea to the consumers, at the third level. Many tea plantations companies packet their products directly and market under their brand name.

(iv). Chiranjeevi 1994, study on supply-demand analysis of Indian tea industry. Specific objectives of the study are: to examine the decision behaviour of Indian tea producer at the micro level; to compare and contrast the responses of different tea producing regions of India; to find the impact of age factors on area and yield decisions; and to study the risk of managing behaviour of the planters.

(v). Kumar 2000, the export market of Indian tea was analyzed with the specific objectives of the study were to analyse the domestic and export market for Indian tea, the Russian and CIS market for Indian tea and the future prospects of Indian tea in Russian market.

(vi). Sen *et. al.* 2017. The top export markets in volume terms for 2015-16 were Russian Federation (48.23 million kg), Iran (22.13 million kg) and Pakistan (19.37 million kg). In terms of value, the top export markets were Russian Federation (US\$ 102.48 million), Iran (US\$ 87.39 million) and UK (US\$ 62.8 million). All varieties of tea are produced by India.

While CTC accounts for around 89 per cent of the production, orthodox/green and instant tea account for the remaining 11.00 per cent.

Datta *et al.* (2003) identified three channels for the marketing and export of ginger in the Eastern Himalayan Region. These were: Channel-I: Producer→ Taluka/District market→ Siliguri market→ Terminal market (Delhi, Kolkata, Bangladesh), Channel-II: Producer→ Commission agent→ City traders→ Taluka/District market→ Siliguri market→ Terminal market (Delhi, Kolkata, Bangladesh) and Channel-III: Producers→ Village lender/Merchant→ Taluka/District market→ Siliguri market→ Terminal market (Delhi, Kolkata, Bangladesh). Channel-I was found to be most effective in terms of producer's share in consumer rupees.

Sidhu *et al.* (2009) have worked out the cost of cultivation of high value crops in Punjab and reported that per ha cost of cultivation of chilli was ₹0.87lakh. More than 73 per cent of the variable cost was incurred on labour which reveals that chilli cultivation was a labour intensive work but gross returns was ₹1.98 lakh/ha, net returns was ₹1.10lakh/ha and BC ratio was high (2.26). This shows that it was profitable for the farmers to cultivate chilli. There were three channels identified for marketing of chilli in the study area, Channel-I: Producer→ Wholesaler→ Retailer→ Consumer, Channel-II: Producer→ Retailer→ Consumer, Channel-III: Producer→ Consumer.

Tripathi *et al.* (2009) studied the impact of training on production and marketing of ginger in Ri-Bhoi district of Meghalaya and reported that before training the yield of ginger ranges between 8.6t to 8.9t/ha and after training the yield increased to 18 to 22t/ha. Production cost reduced from 6.83-7.20 kg/ha to 2.89-3.38 kg/ha. The net income increased in the range of 118-156 per cent. The marketable surplus increases in the range of 55 to 79 per cent during post training, the cost of marketing reduced from ₹100/qtl to ₹50/qtl. Producer's share in consumer rupee has increased from 35.55-38.75 per cent to 45-52 per cent, respectively.

Riku *et al.* (2015) in a study conducted on economics of ginger marketing in Ri Bhoi district of Meghalaya found that there are four major channels involved in marketing of ginger in the district *i.e.*, Channel-I: Producer → Village traders→ Wholesaler→ Retailer→ Consumer, Channel-II: Producer→ Commission agent at local market→ Wholesaler→ Retailer→ Consumer, Channel-III: Producer→ Commission agent→ Retailer→ Consumer. Channel-IV: Producer→ Small Traders→ Commission agent→ Retailer→ Consumer. The

major channel was Channel-I which disposed 48 per cent of ginger followed by Channel-II (38%). The study identified that inadequate transportation facilities and small marketable surplus were the major marketing constraints reported in the study area.

2.5 To study the technological gap in adoption of package of practices among the tea growers:

(i). Sen, *et. al.*, 2014. Recent survey on the weed flora of tea ecosystem of Ri-Bhoi district of Meghalaya has recorded 66 weed species belonging to 51 genera under 31 families. This was the first attempt to explore the weed flora of tea plantations of Meghalaya.

(ii). Singh *et. al.*, 2016. Two species namely *Bidens pilosa* L. and *Clerodendrum paniculatum* L. are reported for the first time from the tea plantation of North East India. Regarding family-wise contribution *Poaceae* contributing highest number (14) of species followed by *Asteraceae* (10), *Cyperaceae* (5), *Lamiaceae* (4), *Amaranthaceae* (2), *Caesalpiniaceae* (2), *Malvaceae* (2), *Polygonaceae* (2), *Solanaceae* (2) & *Schizaeaceae* (2). Other families are having single representative. 23 weed species have been identified as ethno-biologically important. Local Khasi tribal peoples use these weeds as folk medicine against various diseases and other factors.

2.6 Constraints faced by the farmers in tea growers, SWOC analysis and suggest strategies to overcome:

(i). Manoharan 1974, analyses the problems of Indian tea industry based on production, consumptions, export and share market. After carefully observing the evolution of tea industry, he observed that there had been considerable increase in exports of Indian tea during 1950's and India stood first in International tea export. During 1960's India lost position as the largest exporter in the world to Sri Lanka.

(ii). Goradia 1979, made a strength, weakness, opportunities and threat (SWOT) analysis of Indian tea industry. According to him the strengths of tea lies in its caffeine content which makes it a stimulating drink; it is economical; and it is a self reliant agro industry; and India is the largest consumer of tea.

(iii). Uddin 1989, Mentioned that the rural areas have multiple problems-problems of low income, saving, production, education, overpopulation etc. therefore, these areas are marked with static and dynamic backwardness.

(iv). Sukarchakia 1999, studied the problems of Darjeeling tea. The most important problem related to absence of quality control in Indian tea. Substandard teas are mixed with Darjeeling

tea and market it as Darjeeling tea; as a result people are suspicious of buying it with a high price.

(v). Sen, *et. al.* 2016. The cost of production of Darjeeling tea is high and people are ready to buy it at a high price. But it is a fact that average annual production in Darjeeling is around 10 million kg only, but about 40 million kg. of tea is marketed as Darjeeling tea in the world market. Other problems of Darjeeling tea are over age of plants and declining productivity.

Dev *et al.* (2012) in a study conducted on 60 ginger growers in Tehri Garhwal district of Uttarakhand reported that higher marketing cost was the major problem faced by producers in marketing of ginger in the study area.

Datta *et al.* (2003) has identified that the lack of price information on the part of the growers in the subsequent market chains and terminal markets; absence of coordination among the growers, high transportation cost and absence of storage facilities were some of the main problems faced for the marketing of ginger in the Eastern Himalayan Region.

Jagtape *et al.* (2012) reported that the lack of improved crop production technology, unavailability of labour, high wage rate, high transportation charges and lack of storage facilities were some of the major production and marketing constraints faced by the chilli growers in Maharashtra.

RESEARCH METHODOLOGY

Research methodology adopted to meet the objectives of the research problem and the various tools employed to obtain and interpret the results of study is described under the following section.

3.1. Description of the study area:

Meghalaya is one of the seven sister states of North Eastern Hill Region of India. It is well known as the '*abode of cloud*'. The state covers an area of 22,429 sqkm. It extends for about 300 km in length and about 100 km in width. It is bounded on the North by Goalpara, Kamrup and Naogaoan district, on the East by KarbiAnglong and North Cachar Hills District, all of Assam and on the South and West by Bangladesh. The state lies between 25°C to 32°C and 4,000mm to 11,436mm, respectively the soil is basically acidic in nature (Anonymous, 2006). According to the Census 2012 the population of the state is 29, 64007 (Anonymous, 2014b).

The state is predominantly an agrarian economy as 2/3rd of the total work force is in agriculture. Nearly 11.00 per cent from the total geographic area is under cultivation of various crops. Climatic condition of Meghalaya also permits a large no of horticulture crops including fruits, vegetables, flowers, spices and plantation crops. The important plantation crops currently grown in the state include tea, coffee, rubber, cashew nut, etc;

3.2. Sampling procedure:

Meghalaya comprises 11 districts and tea is cultivated in all the districts. Among all the districts, two districts namely; Ri-Bhoi and West Garo being the main producer of tea base on the higher area and production both the districts were selected purposively for the study purpose (Table 1).

Table 1. District wise distribution of Area, Production of tea in Meghalaya (2017-18)

S. N.	District	Area (ha)	Production (MT)
1.	East Khasi Hills	103	536
2.	WestKhasi Hills	16	80
3.	South West Khasi Hills	*	*
4.	Ri-Bhoi	1707	10132

5.	EastJantia Hills	7	21
6.	West Jantia Hills	8	8
7.	East Garo Hills	104	564
8.	North Garo Hills	8	42
9.	West Garo Hills	755	5061
10.	South West Gora Hills	24	167
11.	South Garo Hills	20	53
12.	Eastern West Khasi Hills	*	*

(Source: Directorate of Horticulture and soil conservation, Government of Meghalaya)

* Data not available

3.2.1. Sampling plan:

After selection of the 2-districts, three stage sampling technique was followed for constructing sampling plan of the study. The first stage of sampling plan will be the selection of blocks from both districts followed by selection of villages (2nd stage) from the selected blocks and ultimately selection of the respondent farmers (3rd stage) from the selected villages.

3.2.2. Selection of block:

In the first stage of sampling, 2 (two) blocks from each districts, so. it will be 4 blocks having highest acreage of tea from the selected districts will be selected in consultation with the officials of the district Horticulture Department.

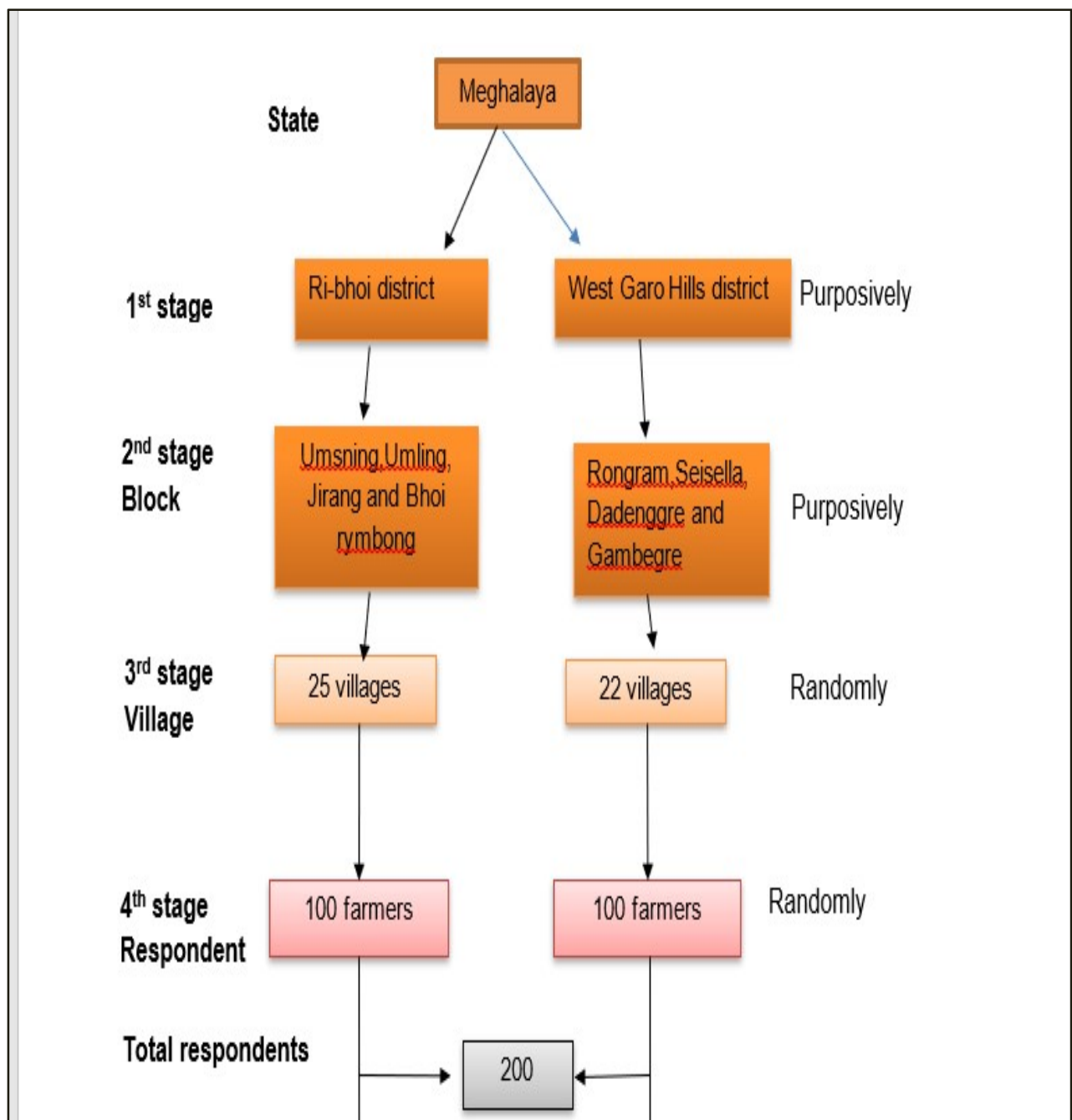
3.2.3. Selection of villages:

In the second stage of sampling plan, a list of villages under the selected blocks will be prepared with the help of block development officer or district agriculture officer. Minimum 10 villages having more area under tea cultivation will be drawn from the prepared list by using simple random sampling without replacement technique, for the selection of respondent farmers.

3.2.4. Selection of sample farm households:

In the third stage of sampling plan, a complete list of farmers along with their holding size will be prepared with the help of village council members of the respective selected villages. From the prepared farmers list, by adopting stratified random sampling and proportional allocation method, the respondent farmers were drawn for collection of information's relating to the study using pre-tested schedule. Out of this, minimum 10 per cent of the households cultivating tea from each villages will be selected based on proportionate stratified random sampling which shall consists at least 200 households.

Fig. 1.1 distribution of sample plan.



4. Collection of data:

To meet the objective of the present study, both primary as well as secondary data were collected.

4.1.1. Primary data:

The primary data using pre- tested schedule were collected by adopting personal interview method from the selected farm household. The reference period of study is the agricultural years 2017-2018. Data on demographic features (family size, age, education, etc.) and economic parameters (land inventory, farm, manure & fertilizer, human labour, etc.,) and problem faced by the sample growers in the production and marketing of green tea leaf were collected

4.1.2. Secondary data:

Pertaining to the local of the study area, secondary data were drawn from the various journals and publication of the Directorates statistics, land records, horticulture and soil conservation, Government of Meghalaya.

5. Analysis of data:

In order to fulfill the objective, set out for the research work, various statistical tools were applied. In this regard, the following analytical tools were used

5.1. Compound Growth Rate (CGR):

For evaluating the trend in production of tea in Meghalaya, an exponential form of the growth function was used as follows:

$$Y_t = AB^t$$

Whereas: Y_t = production/ area/ yield of Tea for the year 't'.

A = intercept indicating Y in the base period ($t = 0$).

B = $(1 + r)$.

r = compound growth rate.

t = time period.

The model was linearized by means of logarithmic transformation, which is given as

$$\ln Y_t = \ln A + t (\ln B)$$

The slope coefficient of B measures the relative changes in Y for a given absolute change in the value of explanatory variable in period t. Therefore, the compound growth was estimated finally by using the following equation;

$$\ln B = \ln (1 + r)$$

$$r = [\text{antilog} (\ln B) - 1]$$

$$\text{CGR} = [\text{antilog} (\ln B) - 1] * 100 \text{ or } [r * 100]$$

The t-test was apply to test the significance of B at the chosen level of probability Instability in area, production and productivity were measure through coefficient of variation (CV) analysis using de-trended data. It is given as:

$$\text{CV} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

5.2. Cost structure:

The cost concepts to be used (Rai and Baruah, 2013) in working out the cost and returns structures of tea production are as follows:

1. The study gave emphasis in one year analysis of established garden. Since the age of the garden which have been established long back more than 20th to 30th years and also established recently about 5th to 6th years ago. There were a gap between one garden to another to determine the cost of cultivation of tea in those ages garden and. Hence, the cost concept was gave emphasis in one year analysis of established garden.

2. The cost regarding seed and other preparation activities cost to be established which will generate return after five years so, cost of inputs were neglected.

5.2.1. Cost of production:

5.2.1.1. Cost A₁ Includes

1. Value manure & fertilizer,
2. Value of Plant Protection Chemical,
3. Value Hired human labour,
4. Depreciation agriculture implements,

5. Land revenue,
6. Interest on working capital,
7. Miscellaneous cost,

Cost A₂=Cost A₁ + Rent paid for leased-in land.

Cost B= Cost A₂ + Imputed rental value of owned land (less land revenue paid thereupon) + imputed interest on fixed capital (excluding land).

Cost C= Cost B + Imputed value of family labour.

5.2.1.2.1. Total Variable cost:

- 1) Human labour
 - a. Family labour
 - b. Hired labour
- 2) Fertilizers and Manures
- 3) Plant protection chemical
- 4) Tractor/Bullock power
- 5) Irrigation
- 6) Interest on working capital
- 7) Rental value for lease-in land
- 8) Miscellaneous cost

5.2.1.2. Total fixed cost:

- 1) Depreciation
- 2) Land revenue
- 3) Interest on fixed capital
- 4) Imputed rental value of owned land

5.3. Farm efficiency measures:

1. Gross farm income (GFI)=Gross value of output (kg) × price (Rs/kg)
2. Net farm income (NFI) = GFI - total cost.
3. Farm business income = GFI - Cost A₁
4. Family labour income = GFI - Cost B

5. Benefit-cost ratio over variable cost= GFI / Total variable cost

6. Benefit-cost ratio = GFI / Total cost

5.4.1. Marketing channels of Tea cultivation:

The marketing channels of tea cultivation were identified based on the intermediaries / middleman involved from the point of production to the point of ultimate consumer.

5.4.2. Marketing cost, margins and price spreads:

Marketing cost was calculated by estimating the cost incurred in the process of marketing of tea cultivation. The cost incurred after harvesting of the yield till it reaches the final consumers hand generally constitutes the marketing cost. It includes transportation cost, handling cost, storage cost, market fees, weighing charges and labour charges for packing, loading and unloading. The marketing cost at various stages of tea cultivation marketing was calculated and finally the total cost was computed.

Absolute marketing margin of its intermediaries at any stages of marketing was calculated as follows.

$$MM_i = SP_i - (PP_i - MC_i)$$

Whereas: MM_i = Marketing margin of the i -th middlemen

SP_i = Selling price of the i -th middlemen

PP_i = Purchase price of the i -th middlemen

MC_i = Marketing cost incurred by the i -th middlemen

After the calculation of the marketing margins at different stages, finally the total marketing margins were calculated.

5.4.3. Price spread:

Price spread is the difference between the price paid by the consumer and the price received by the producer. It may consist of marketing costs and margins, the price spread analysis was carried out as follows:

$$\text{Producer's share in consumer's rupee} = \frac{\text{Producer's price}}{\text{Consumer's price}} \times 100$$

Similarly, the share of the total marketing cost and the total marketing margins were also estimated to analyze the price spread.

5.4.4. Marketing efficiency:

The efficiency of various identified marketing channels was calculated through the Shepherd's formula. The formula is given below:

$$ME = V / I - 1$$

Whereas: **ME** = Index of marketing efficiency

V = Value of goods sold (consumer's price)

I = Total marketing cost.

5.5.1. Multicollinearity:

The independent variables will be test for the existence of multicollinearity using correlation analysis.

5.5.2. Test of Significance:

a) t-test: Students 't' test was used for testing significance of the parameter estimates

using the formula: $t = \frac{b_i}{SE(b_i)}$

Whereas: b_i = regression co-efficient of an i^{th} input

S.E (b_i) = standard error of an i^{th} input

$i = (1, 2, \dots, n)$

b) F-test: "F" test was used to test the overall significance of regression co-efficient.

$$F = \frac{\bar{R}^2 \times (n-K)}{(1-\bar{R}^2)(k-1)}$$

Whereas: n = no. of sample/respondent farmers

K = no. of parameters in the model

$\bar{R}^2$ = coefficient of multiple determination

5.5.3.1.Functional Analysis:

In order to establish a functional relationship of tea production with its input variables, Cobb-Douglas type production function was used for study the relationship between output and input variables to estimate the tea production elasticities in the study because of its wide acceptability, theoretical fitness to agricultural data(Koutsoyianis, 2001).

The model specified for the present study is furnished below:

$$Y = b_0 X_i^{b_i}$$

OR

$$\ln y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + U_i$$

Whereas: Y = Yield (Rs/ha)

X_1 = Area (ha)

X_2 = Plant Protection chemical (Rs)

X_3 = Fertilizer&Manure (Rs)

X_4 = Human Labour(Rs)

X_5 =Plant material (Rs)

b_0 =Constant term

b_i =Elasticity coefficient (i=1,2.....5)

e^u =error term

I. Dependent variable:

Total production (Y): Total production was expressed in terms of rupees.

II. Independent variables:

Area (X_1): The area under the crop was expressed in rupees. It includes the leased-in and excluded the leased-out land.

Plant protection chemical (X_2): these are calculated by total expenses made on plant protection chemical at prevailing price.

Fertilizer &Manure (X_3): these are calculated by total expenses made on fertilizer and manure. Farm produced manure was considered at prevailing local

price. Human labour (X_4): it is expressed in terms of the rupees taking the wages prevailing in the study area. The wages of adult male, adult women and child (family labour only) for 8 hour work per day was Rs.170, Rs.100 and Rs.60, respectively. It included the family labour, hired labour of both casual and permanent.

Plant material (X_5): plant material is expressed in terms of the rupees. It is calculated by taking the price of the planting material in given area and multiplying by the quantity used.

5.5.3.2. Resource use efficiency:

Economic rationale of resource use on different categories of farms was examined by comparing marginal value product of a given resource with its marginal factor cost (allocative efficiency).

$$AE_{xi} = \frac{MVP_{xi}}{MFC_{xi}}$$

Whereas: AE_{xi} = allocative efficiency of an i^{th} input

MVP_{xi} = marginal value productivity of an i^{th} input

MFC_{xi} = marginal factor cost of an i^{th} input

If the marginal value product of i^{th} factor is greater or less than the marginal factor cost of i^{th} factor, it is said that the resource is not use optimally.

5.6. Problem and constraint in tea production:

To meet the objective of various problems and constraints associated with production of tea, Garret's ranking technique was used to analyze the major problems faced by the farmers. The different factors that created the problems in production of tea were asked to be given ranks by the respondents. The order of merit given by the respondents was converted into ranks by using the given formula:

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

Whereas: R_{ij} = rank given for i^{th} factor by j^{th} individual

N_j = number of factors ranked by j^{th} individual

Conclusion

In the concluding parts, most of the farmer were small and marginal. At the earliest stages of the crops the cost of production was very high, which include establishment cost, maintaining cost, and transportation cost etc. there will always a cost involve and also it is an intensive human labour enterprise and return over from tea along with the gestation period for four to five years, Negative return the farmers got during the first few years but on later stage there will be constant of production till 30 years.

Since, it need an intensive labour and cost of production is even higher. A farmer should have a mindset of an entrepreneur/ entrepreneurship skill to run the farms business with the practises of Growing different crops such as turmeric, ginger with other seasonal crops with acts as an alternate income from the farms.

Resource efficiency measure was found to be human labour, planting material, manure and fertilizer, which mean with an increase of one units of input there will be increase in the output by certain amounts. In which the farmers have to employ the resources and get a maximum return from the enterprise.

The major challenges where the marketing parts in which the fresh leave the farmers are force to sell it at the low price to the tea factories. Due to lack of the processing unit present in the locality, on other side there is a high scope and the demand of green/white tea. So, setting up of mini and small-scale factory in their cluster area would have high impact in the price and market

Section 1.

Socio-economic characteristics

The socio-economic characteristics of the tea grower in Ri-Bhoi and West Garo Hills District in Meghalaya is presented in table 1.1. The average age of the tea farmer was found to be 54 years old and 80 per cent of respondent farmers were male and the average family size of the farm household was seven in number. Majority (44.00 %) of the farmer respondents were graduate, 31.00 per cent have passed the primary level of education followed by secondary level (38%) and the illiterate (7%). The average size of land holding in the study area was 3.98 ha and tea was cultivated in an average area of 2.25 ha. The tea farmers earned an income of ₹1.81 lakh per annum in the study area.

Table 1:1Socio-economic characteristics of tea growers in Meghalaya					
Particular	Unit	Value	Particular	Unit	Value
Average age	year	54	Secondary	%	38.00
Male	%	80	Higher Secondary		34.00
Size of the family	no.	6.7	Graduate		44.00
Educational status			Average land holding size	(ha)	3.98
Illiterate	%	7.00	Average tea area	(ha)	2.25
Primary		31.00	Annual income	₹ (lakh/annum)	1.81

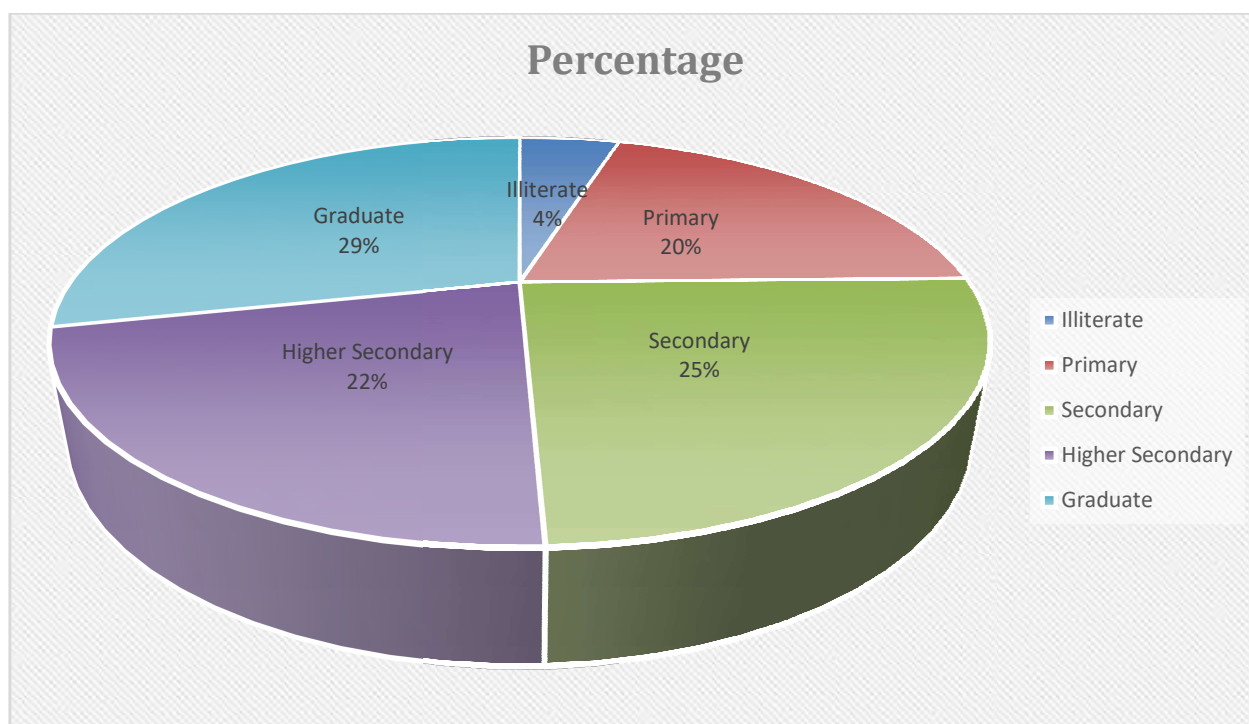


Fig.4 the figure presents the percentage of the education status of the respondent farmers.

The three stages samples plan were considered in selection farms household which was stated in the research methodology. The study was found that in all the farms household i.e., from the total 200 samples majority of the family members from both the district which showed in the Table 1.2 that on an average 49.14 per cent of the family members were engaged in agriculture as the main occupation followed by 28.51 per cent who were in school and colleges and 12.04 per cent were involved in meeting the household works and the labour constituent 1.05 per cent which work outside the farms

Table 1:2 Engagement of tea farmers household in study area of Meghalaya			
Occupation	Per cent	Occupation	Per cent
Agriculture	49.14	School/College	28.51
Service	5.54	Household	12.04
Business	3.72	Labour	1.05

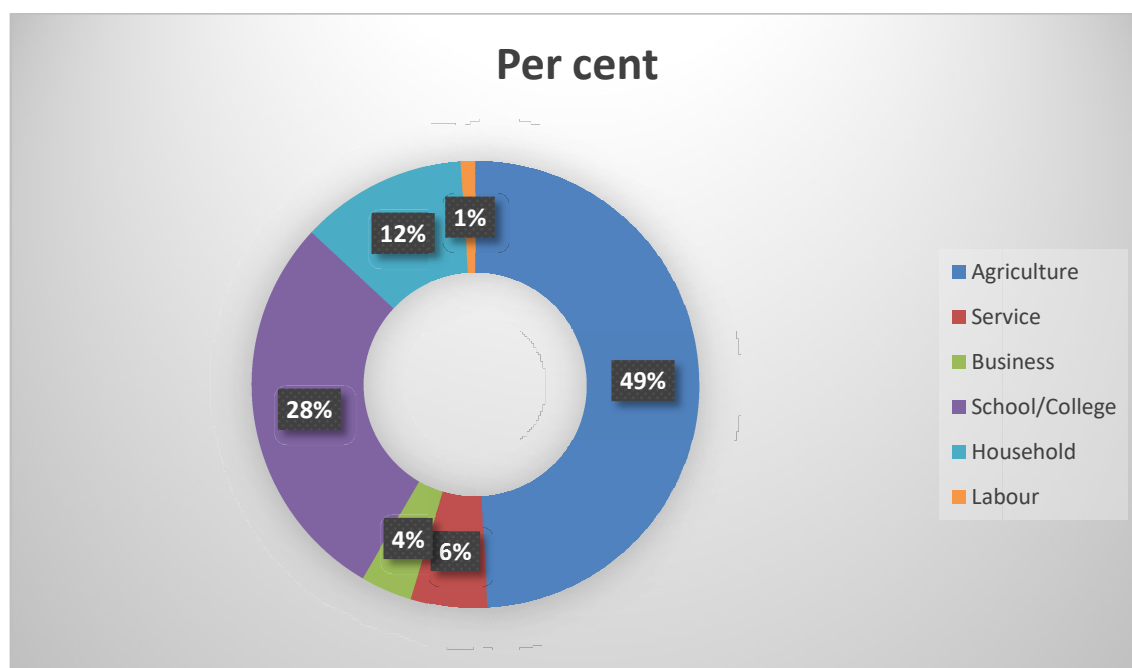


Fig.5 the figure shows the percentage of occupations from respondents...

The average cropping area in the study area was 3.98 ha and tea were the major crop cultivated in 56.53 per cent of cultivated area followed by Forest land (26.63%) and rice (7.30%). Spices like turmeric, ginger and black paper was found to be cultivated in (13.36 and 9.04) per cent area. Fruits like citrus were grown in an average area of 0.12 ha. Maize, soybean, sweet potatoes were some of the vegetables grown negligible area (Table 1.3).

Table 1:3 Cropping pattern of tea grower in study area of Meghalaya					
Crops	Area (ha)	Per cent	Crops	Area(ha)	Per cent
Tea	2.25	56.53	Black paper	0.05	1.25
Ginger	0.52	13.36	Banana	0.03	0.75
Rice	0.28	7.03	Sweet potatoes	0.03	0.75
Turmeric	0.36	9.04	Forest land	1.06	26.63
Citrus	0.12	3.01	Soybean	0.02	0.50
Broomstick	0.09	2.26	Vegetable	0.08	2.01
Maize	0.04	1.00	Arecanut	0.09	2.26
			Total	3.98	100.00

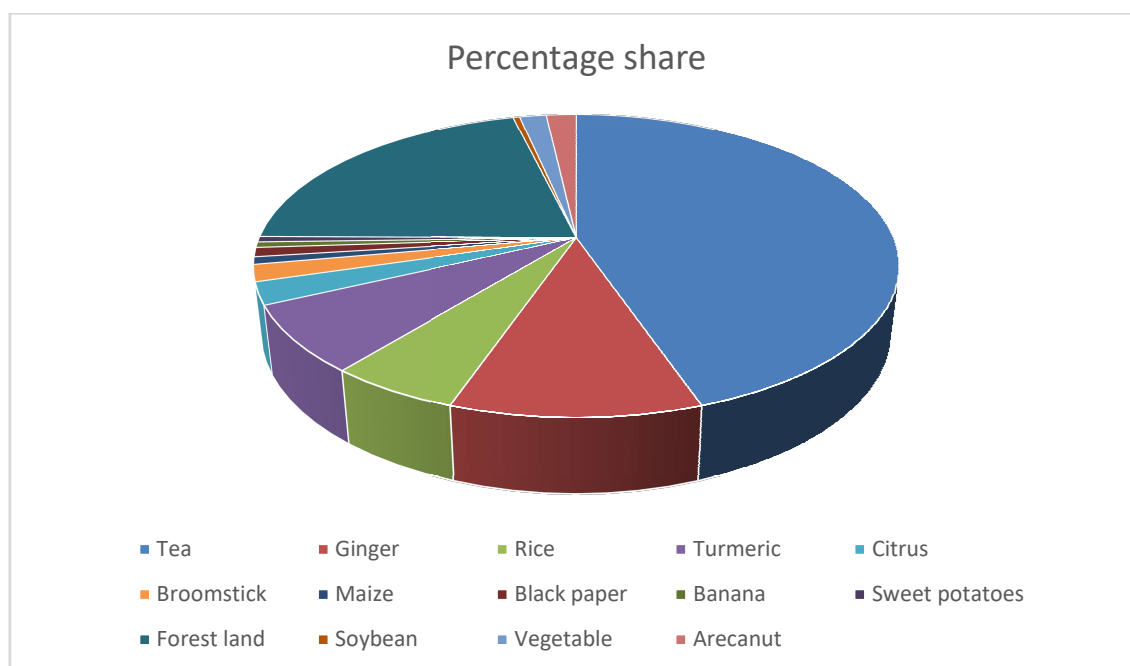


Fig. 6 the figure shows the share percentage of various crop growth in study area.

In the table 1.4. the tea growers base on the area they have been categorized into two categories viz; category I (less than 2.5 hectares) and category II (more than 2.5 hectares). As per the study, area under the category I has 128 farms with the total area of 181.8 and the average farms size was 2.4 whereas under the category II the numbers of farmers was 72 with an average of 5.2 hectares.

Table 1:4 Categories of tea growers base on the area of sample farms(ha)			
Particulars	Category I (< 2.5 ha)	Category II (>2.5 ha)	Overall
No. of farms	128	72	200
Total area coverage under tea (ha)	88.9	150.5	239.4
	92.9	120.5	213.4
Average size of farm (ha)	2.4	5.2	

From the given table 1.5 the categories of land holding of the tea growers have been classified maximum of the farmers were cultivated in the own land with and 82.78 per cent in category I and 90.10 per cent of the land in category II whereas the leased in land where negligible in the study area.

Table 1:5 The categories of different land holding of the tea growers in Meghalaya				
Sl. No.	Particular	Category I (< 2.5ha)	Category II (>2.5 ha)	Overall
1	Owned land	202.00(82.78)	167.50(90.10)	369.50
2	Leased-in land	42.00(17.21)	18.40(9.89)	60.40
3	Total land holding	244(100)	185.90(100)	429.90

Section 2.

The Nature, Types and Characteristics of tea plantation in Meghalaya

. The appropriate mix of four liquor features – colour, strength, brightness, and briskness – determines the colour, taste, and flavour of tea. Colour, brightness, taste, flavour, and the absence of hazardous compounds all contribute to quality of black tea varies with cultivar to cultivar, cultural practices, agro-climatic conditions and processing procedure.

Theaflavin (TF) and Thearubigin (TR) content of produced tea, as well as taster's organoleptic tasting, are the traditional methods of assessing tea fluid quality in the laboratory, and this is often reflected in per unit price realised in sale. Teas of good quality have a TF/TR ratio of greater than or equal to 0.1, with larger TF/TR ratios indicating higher quality. TF is produced during the production of black tea by enzymatic oxidation and condensation of catechin. Some catechin derivatives polymerize to TR either directly or through TF. Theaflavin is responsible for the tea's brightness, vigour, and quality, while thearubigins contribute to the body of the tea fluid.

Taxonomy and classification of tea.

The botanical name of tea plant is *camellia sinensis* (L) O. Kuntze. The genus *camellia* belongs to the family *theaceace* under tribe *Gordonieae* along with eight other genera, of which *camellia* is the largest. Wight (1962) gave a concise description of the China and Assam varieties of tea and Barua and others accepted and described the three races of tea as *camelia sinensis* L. or the China tea plant, *camellia assamica* (Masters) or the Assam tea plant and *Camellia assamica* sub sp. *Lasiocalyx* (Planch. M S) or the *Cambodiensis* or southern form of tea.

Climate and soil of tea growing area.

Tea grows in a diverse range of climatic conditions of tropical and sub-tropical nature like tropical rain forest, tropical savannah and summer rain areas. It grows at latitude from 27°S (Argentina) to 43°N (Georgia) and from sea level up to an altitude of 2,500 m.

The tea growing soils also vary widely from alluvial in Assam and Malawi, Podzol in Russia, Volcanic ash in Japan, andosols in Indonesia, red- yellow podzols in Taiwan, red soils in China, lateritic in south India, Sri Lanka and east Africa, peaty in Cachar and sedimentary in Darjeeling. However, tea grows best on medium or light soil which is deep, friable and rich in organic matter having pH in acid range varying between four and seven and which is free from excess water up to a depth of about 90 cm at all time of the year.

Morphological characteristics of Assam tea plant, *Camellia assamica* (Masters).

It is a small tree that grows to be 10-15 metres tall with a trunk that can reach one-third of its height and a strong branch system. Leaf dependent, thin, glossy, with apex that is more or less acuminate and a distinct marginal vein. Leaf blades are typically broadly elliptic, 8-20 cm long and 3.5-7.5 cm wide, with a cuneate base, an obscurely denticulate to bluntly wide-serrulate margin, and glabrous or persistently hairy midrib below.

Flowers are borne singly or in pairs on the Cataphyllary axils; pedicels have smooth, green scars of three caducous bracteoles. 5-6 unequal, leathery, persistent sepals Petals 7-8, white, with mild yellow colouring at the base of petals on rare occasions. Numerous stamens

Reference: barua, D.N.1989. science and practice in tea culture, 1st ed tea research association Kolkata-Jorhat: 9-10

Morphological characteristics of Darjeeling tea plant, *Camellia sinensis*

Camellia sinensis is an evergreen shrub or small tree in the theaceae family of flowering plants. Tea is made from its leaves and leaf buds. Tea plant, tea shrub, and tea tree are all common names for this species.

Darjeeling tea is manufactured from the *sinensis* var. *sinensis* plant, which is grown and processed in the West Bengal districts of Darjeeling and Kalimpong. Although the tea leaves are processed as black tea, several estates have broadened their product offering to include leaves that may be used to make green, white, and oolong teas. Origin: India, aroma: flowery, fruity, and muscatel, temperature: 90°C (194°F) to 95°C (203°F)

Bio-chemical factor of tea quality.

The fundamental natural properties of tea plants and the local growth conditions, the ecological milieu, and general biological characteristics for specific places are used to establish the quality 'parameters' of tea. The quality indicators are based on different IS (Indian) standards, and they reflect Indian tea's inherent value. The majority of chemical characteristics are influenced by plucking standard, climate, and seasonal change.

Regarding quality of tea, a minimum standard need to be followed as per specification laid down under prevention of Food Adulteration Act, 1954. Rules, 1955

Tea in Meghalaya:

Although its fertile acidic soil and abundant rainfall impressed and enthused planters almost two centuries ago, tea cultivation in Meghalaya is still in its infancy. It was a visit in 1974 by tea board of Indian scientists that marked the beginnings of organized tea cultivation in the state. Echoing the findings as far back as the first half of the 19th century, the tea board delegation reported that the potential for tea cultivation in the state was immense and untapped. In response to the tea board of India report nurseries were established from 1977 onwards, and suitable varieties well adapted to the state's soils, temperature and rainfall were brought in from neighbouring Assam and also from Darjeeling. The seedling was subsequently transplanted to experimental gardens at Umsningin Ri-Bhoi District, Tebronggre in the West Garo Hills and also to Riangdo in West Khasi Hills in 1978. Encouraged by the quality and yield of the young tea bushes, Meghalaya state government subsequently adopted a policy to incentivize commercial cultivation of tea in private farmer's fields.

Planting material:

Good number of clones and bi clonal seeds released from Tocklai experimental station (TRA) are used as planting materials in the state. Besides, some industry clones have also been used as planting material. The commonly used are listed below:

- a) Clones: TV1, TV9, TV14, TV 17, TV18, TV19, TV20, TV21, TV22, TV23, TV24, TV25, TV26, TV 29, TV30, Tin Ali, CP1, Sundaram, Balasun etc
AV-2, T-78,T-253,T-383,B-157,B-777,B-688, P-312,RR17/144,(Concentrated in regions of altitude above 800m)
- b) Bi Clonal Seed: TS 378, TS379, (For Highland Region)
TS 449, TS462, TS464, TS491, TS506 and TS 520.

Pests and disease:

The major pests that attack the tea bushes are Red Spider Mites and tea Jassids. Other pest like the tea mosquito have also been reported in some localized areas in the lower regions of the district.

The major disease that occurs in tea garden in blister blight, it is mostly occurring during the late September till November, there were not much saviour damage to the crops.

Governmental schemes:

Tea being a labour-intensive crop with the cost of cultivation very high, it is not possible for farmers to take up tea plantation on their own and therefore the state government implements a “**Package scheme on tea**” since 1988-89 which includes financial subsidy provision and free distribution of seedling to covers 1-2 hectares per family so that

Fig.7Morphology of the tea plant (*Camellia sinensis*).



Section 3.

The Trend analysis represent the Meghalaya tea:

The trend analysis has been calculated based on the third objective of the thesis, that had been classified into two District viz., Ri-Bhoi based on the highest area and West Garo Hills based on the highest production and the overall production of Meghalaya tea.

Ri-Bhoi district:

Table 3.1 Trend of area, production and yield in Ri-Bhoi			
Ri- Bhoi district	Area (ha)	Production (Metric tonnes)	Productivity (kg/ha)
	0.57	0.61	0.79
C.V.	45.38	87.32	59.60

The above table 3.1 shown that the area under Ri-Bhoi, was 0.57(ha) with an increasing rate for the past years from 2000- 2018 and there was no deflection in the area if considered the co-efficient of variant with 45.38 %. In terms of Production (Metric tonnes) there was an increasing rate in the initial but in the year 2008-09 there have been declined due to pest and disease incident which in later stages showed a constant outcome of the production if considering the co-efficient of variant with 87.32 %. The productivity of 0.79 (kg/ha) from the growth analysis with the co-efficient of variant of 59.60 % was found in the study

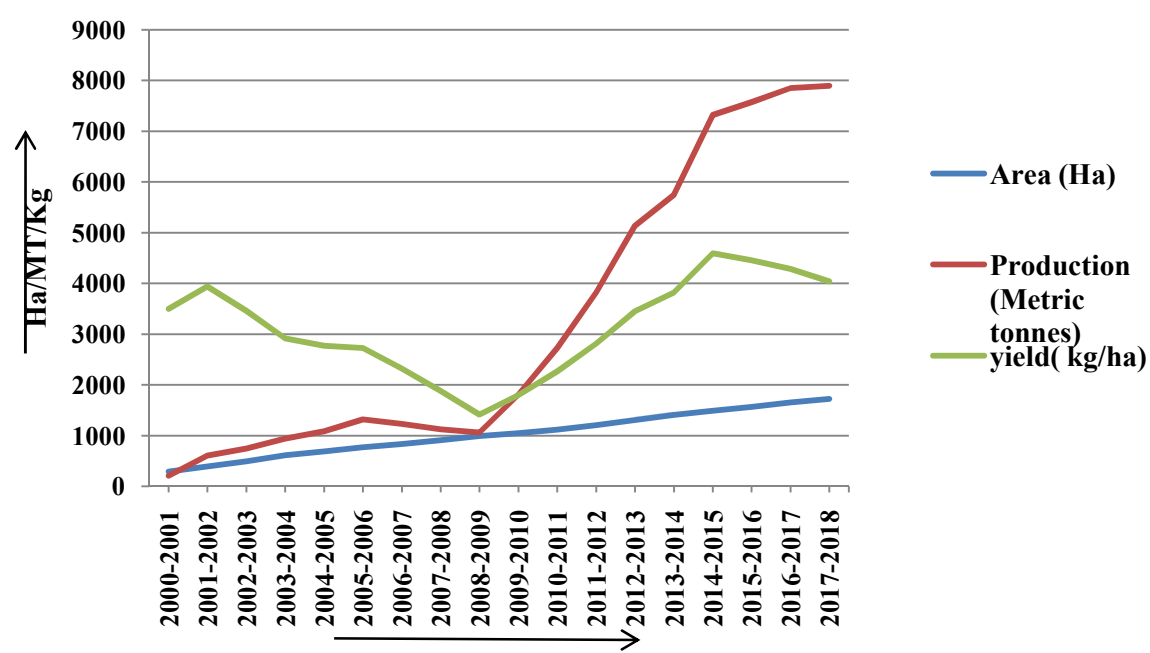


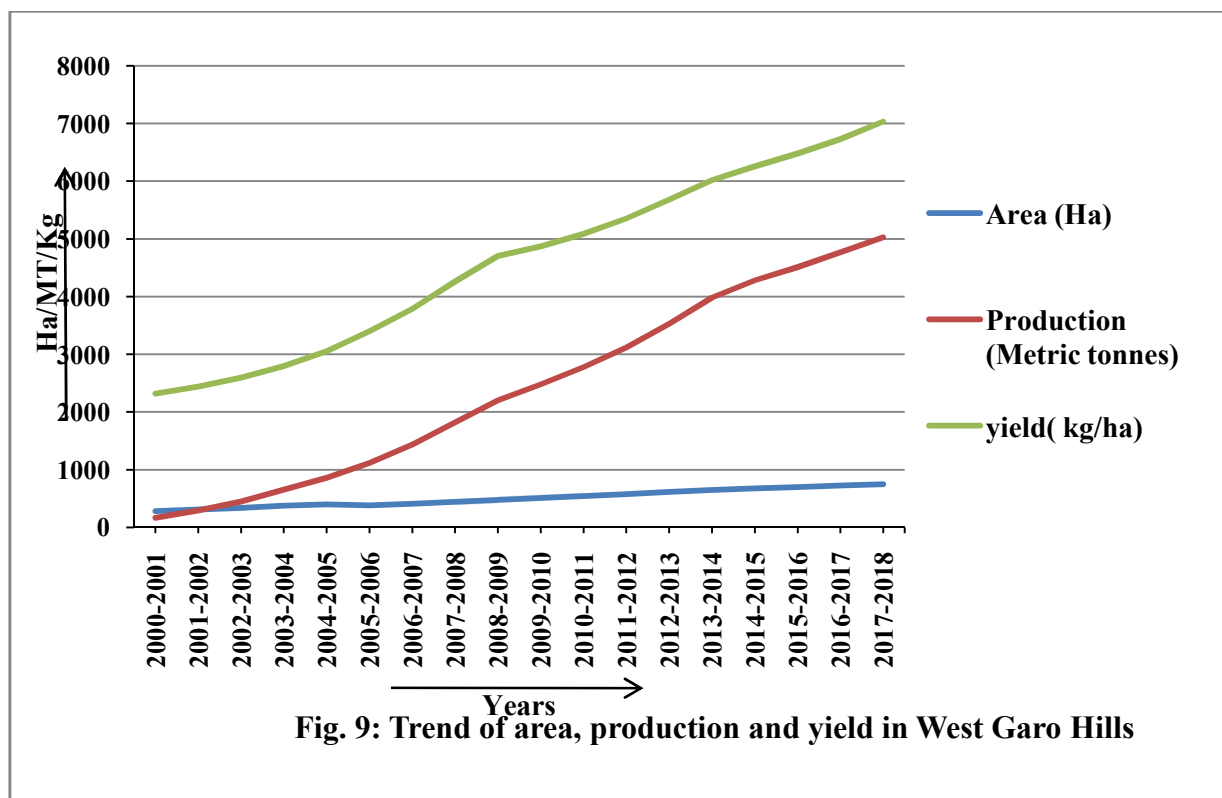
Fig. 8: Trend of area, production and yield in Ri-Bhoi

Table 3.2 Trend of area, production and yield in West Garo Hills District			
West Garo hills district	Area (ha)	Production (Metric tonnes)	Productivity (kg/ha)
	0.85	0.67	0.87
C.V.	30.75	60.99	33.19

West Garo Hills districts:

The above table 3.2 showed that trend under area of West Garo Hills of 0.85 (ha) was with an increasing rate with a constant rate for the past years for 2000- 2018 and considering the co-efficient of variant with 30.75 %, The Production in (Metric tonnes) 0.67 with an increasing rate of production especially in this district due to the variates growth at the particular area, with the co-efficient of variant of 60.99 % and the productivity (kg/ha) was found to be 0.87 with the co-efficient of variant of 33.19 % which was representing in the study area.

In the figure below its shows that clear understanding of trend analysis of the district with the graphical representation.



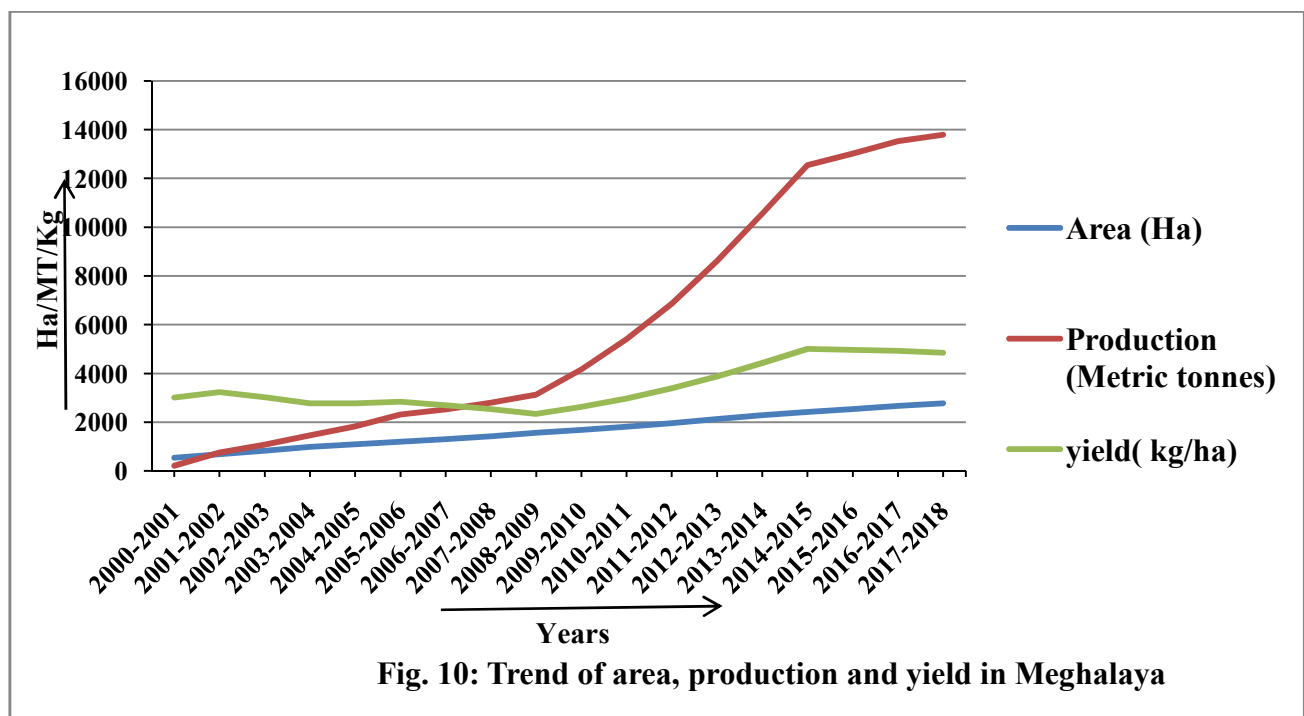
Covering the total district of Meghalaya:

Table 3.3 Trend of area, production and yield in Meghalaya			
Tea cover under Meghalaya	Area (ha)	Production (Metric tonnes)	Productivity (kg/ha)
	0.69	0.23	0.85
C.V.	42.92	75.99	38.64

The above table 3.3 showed the compound growth rate of Meghalaya tea such as the area (ha) 0.69 with an increasing rate with a constant rate for the past years for

2000- 2018 and considering the co-efficient of variant with 42.92 %, The Production in (Metric tonnes) 0.23 with an increasing rate but during 2008-09 there where a declining graph which is due to pest incident considering the co-efficient of variant of 75.99 % and the productivity (kg/ha) was found to be 0.85 with the co-efficient of variant of 38.64 % which was representing in the study area.

In the figure below its show the clear understanding of trend analysis of the district with the graphical representation



Section 4.

The cost and return of establishment the tea garden

Ri – Bhoi District Category-I

Cost of establishment of tea plantation which include from the starting point till the harvesting of tea leaves and to gestation period can be computed in the 5th years of the production as shown in the table 4:1

The cost is divided into two parts: the non-recurring and recurring cost:

- Non-recurring cost include the one-time investment like clearing of land, soil treatment, cost of planting material and so on.
- Recurring cost include the cost which the farmers spend daily at a time period where in employ in all the season of plantation. Some of the examples are human labour, chemical used, farm yard manure or organic compost, etc...

Ri – bhoi District Category-I

Table 4:1 the cost of incurred in the farmers field in establishment of the tea plantation					
Number of years	1st years	2nd years	3rd years	4th years	5th years
Non recurring cost	3753.58	0	0	0	0
Labour	4718.33	4136.79	4036.79	3989.61	3534.25
Chemical	146.66	246.66	246.66	116.66	116.66
Farm yard manure	3311	3311	2512	2612	2200
Depreciation 5%	187.67	178.29	169.38	160.91	152.86
Miscellaneous	385	385	385	385	385
Total Cost	12502.26	8257.75	7349.83	7264.18	6388.78
Gross income	0	0	233351.70	303351.70	403351.70
Assets	0	0	0	0	3057.31
Net Income	-12502.26	-8257.75	226001.80	296087.50	396962.90
NPV	500788.31				
BCR	18.07				
IRR	3.65	365%			

From the above table 4.1 The studies shown from the category-I, that the total cost incurred was Rs.12502.26, Rs.8257.75, Rs. 7349.83, Rs.7264.18 and Rs. 6388.78 for 1st, 2nd, 3rd, 4th and 5th year respectively. The non- recurring cost was Rs. 3753.58 only in the first year and the other were the recurring cost which include labour (Rs.4718.33, Rs.4136.79, Rs.4036.79, Rs.3989.61, and Rs.3534.25 respectively follow by chemical Rs. 146.66, Rs. 246.66, Rs. 246.66, Rs. 116.66, and Rs. 116.66. the farm yard manures which include Rs. 3311. Rs. 3311, Rs.2512, Rs. 2612 and Rs.2200. whereas depreciation 5 % in considering as Rs. 187.67, Rs. 178.29, Rs. 169.38, Rs. 160.91, and Rs. 152.86. and the miscellaneous was Rs. 385, Rs.385, Rs. 385, Rs.385 and Rs. 385 respectively.

Whereas the gross income amount to be Rs.233351.70 from the 3rd years of planting follow by Rs.303351.70 during the 4th years and the Rs. 403351.70 in the five years. With the asset of Rs. 3057.31. The net income was negative that mean Rs. 12502.26 follow by Rs. 8257.75, and in the 3rd years Rs.226001.80, Rs. 296087.50 and Rs.396962.90 respectively. The Net present value was 500788.31, the Benefit Cost Ratio was 18.07 and the Internal rate of return was 3.65 with the 365 percent.

1. Ri – bhoi District Category-II

Table 4:2 the cost of incurred in the farmers field in establishment of the tea plantation					
Number of years	1st years	2nd years	3rd years	4th years	5th years
Non recurring cost	4270.79				
Labour	9176.40	7170.50	7358.00	8111.00	8225.00
Chemical	266.00	266.00	200.00	200.00	200.00.
Farm yard manure	717.50	685.00	417.50	517.50	517.50
Depreciation 5%	213.53	200.50	192.71	183.08	173.92
Miscellaneous	385	385	385	385	385
Total Cost	15029.23	19970.00	8553.22	9396.58	9501.42
Gross income	0	0	495987.50	600435.00	70246.00
Asset	0	0	0	0	3478.57
Net Income	-15029.23	19970.00	487434.30	591038.40	60744.57
NPV	677634.67				
BCR	24.51				
IRR	4.66	466%			

For the above table 4:2. The studies shown from the category-II, that the total cost incurred was Rs.15029.23, Rs.19970.00, Rs. 8553.22, Rs.9396.58 and Rs. 9501.42 78 for 1st, 2nd, 3rd, 4th and 5th year respectively. In which the non- recurring cost was Rs. 4270.29 only in the first year and the other were the recurring cost which include labour (Rs.9176.40, Rs.7170.50, Rs.7358.00, Rs.8111.00, and Rs.8225.00 respectively follow by chemical Rs. 266.00, Rs. 266.00, Rs. 200.00, Rs. 200.00, and Rs. 200.00. the farm yard manures which include Rs. 717.50. Rs. 685.00, Rs.417.50, Rs. 517.50 and Rs.517.50. whereas depreciation 5 % in considering as Rs.213.53, Rs. 200.50, Rs. 192.71, Rs. 183.08, and Rs. 173.92. and the miscellaneous was Rs. 385, Rs.385, Rs. 385, Rs.385 and Rs. 385 respectively.

Whereas the gross income amount to be Rs.495987.50 from the 3rd years of planting follow by Rs.600435.00 during the 4th years and the Rs. 70246.00 in the five years. With the asset of Rs.3478.57. The net income was negative that mean Rs. 15029.23 follow by Rs. 19970.00, and in the 3rd years Rs.487434.30, Rs. 591038.40 and Rs.60744.57 respectively. The Net present value was 677634.67, the Benefit Cost Ratio was 24.51 and the Internal rate of return was 4.66 with the 466 percent.

2. West Garo Hills District Category-I

Table 4:3 the cost of incurred in the farmers field in establishment of the tea plantation					
Number of years	1st years	2nd years	3rd years	4th years	5th years
Non recurring cost	3672.04				
Labour	4400.87	25788.00	20467.00	28433.00	29312.00
Chemical	133.33	100.33	112.00	100.00	115.00
Farm yard manure	1781.22	1281.22	1100.23	1000.12	1011.00
Depreciation 5%	183.60	174.42	165.70	157.41	149.54
Miscellaneous	400	400	400	400	400
Total Cost	10571.08	27743.98	22244.93	30090.54	30987.55
Gross income	0	0	183473.70	275023.00	345570.00
Assets	0	0	0	0	2990.90
Net Income	-10571.08	-27744.00	161228.70	244932.50	314582.50
NPV	374526.89				
BCR	7.46				
IRR	2.97	297%			

From the above table 4:3. The studies shown from the category-I, that the total cost incurred was Rs.10571.08, Rs.27743.98, Rs. 22244.93, Rs.30090.54 and Rs.30987.55 respectively. In which the non- recurring cost was Rs. 3672.04 only in the first year and the other were the recurring cost which include labour (Rs.4400.87, Rs.25788.00, Rs.20467.00, Rs.28433.00, and Rs.29312.00 respectively follow by chemical Rs. 183.00, Rs. 174.42, Rs. 165.70, Rs. 157.41, and Rs. 149.54. the farm yard manures which include Rs. 1781.22. Rs. 1261.22, Rs.1100.23, Rs. 1000.12 and Rs.1011.00. whereas depreciation 5 % in considering as Rs. 183.60, Rs. 174.42, Rs. 165.70, Rs. 157.41, and Rs. 149.54. and the miscellaneous was Rs. 400, Rs.400, Rs. 400, Rs.400 and Rs. 400 respectively.

Whereas the gross income amount to be Rs.183473.70 from the 3rd years of planting follow by Rs.275023.00 during the 4th years and the Rs. 345570.00 in the five years. With an asset of 2990.90. The net income was negative that mean Rs. 10571.08 follow by Rs. 27744.00, and in the 3rd years Rs.161228.70, Rs. 244932.50 and Rs.314582.50 respectively. The Net present value was 374526.89, the Benefit Cost Ratio was 7.46 and the Internal rate of return was 2.97 with the 297 percent.

3. West Garo Hills District Category-II

Table 4:4 the cost of incurred in the farmers field in establishment of the tea plantation					
Number of years	1st years	2nd years	3rd years	4th years	5th years
Non recurring cost	6702.48				
Labour	18632.83	15512.00	14500.00	13568.00	10790.00
Chemical	287.04	250.00	250.00	300.00	200.00
Farm yard manure	3701.53	3500.00	3600.00	3400.00	3300.00
Depreciation 5%	335.12	318.36	302.44	287.32	272.96
Miscellaneous	700	700	700	700	700
Total Cost	30359.03	20280.37	19352.45	18255.33	15262.96
Gross income	0	0	549337.20	775023.00	745570.00
Assets	0	0	0	0	5186.25
Net Income	-30359.03	-20280.40	529984.80	756767.70	730307.00
NPV	1107068.73				
BCR	16.24				
IRR	3.58	358%			

For the above table 4. The studies shown from the category-I, that the total cost incurred was Rs.30359.03, Rs.20280.37, Rs. 19352.45, Rs.18255.33 and Rs. 15262.96 respectively. In which the non- recurring cost was Rs. 6702.48 only in the first year and the other were the recurring cost which include labour (Rs.18632.83, Rs.15512.00, Rs.14500.00, Rs.13568.00, and Rs.10790.00 respectively follow by chemical Rs. 287.04, Rs. 250.00, Rs. 250.00, Rs. 300.00, and Rs. 200.00. the farm yard manures which include Rs. 3701.53. Rs. 3500.00, Rs.3600.00, Rs. 3400.00 and Rs.3300.00. whereas depreciation 5 % in considering as Rs. 335.12, Rs. 318.36, Rs. 302.44, Rs. 287.32, and Rs. 272.96. and the miscellaneous was Rs. 700, Rs.700, Rs. 700, Rs.700 and Rs. 700 respectively.

Whereas the gross income amount to be Rs.549337.20 from the 3rd years of planting follow by Rs.775023.00 during the 4th years and the Rs. 745570.00 in the five years. With an asset of Rs. 5186.25 The net income was negative that mean Rs. 30359.03 follow by Rs. 20280.40, and in the 3rd years Rs.529984.80, Rs. 756767.70 and Rs.730307.00 respectively. The Net present value was 1107068.73, the Benefit Cost Ratio was 16.24 and the Internal rate of return was 3.58 with the 356 percent.

Cost concept:

in the given table below the cost structure were analysis base on the present year or only the one-year study the average total cost incurred was Rs 12139.40 from cost A1, follow by Rs.14139.39 total cost of Cost A2, Cost B was amount to be Rs.16279.39 and Cost C was Rs. 17559.55 respectively from the district of Ri-Bhoi.

Table4:5.Cost conceptstructure of Ri-Bhoi district		
l.	Cost A1	(Rs.)
1	Value Manure & fertilizer	2273.6
2	Value plant protection chemical	341.11
3	Value human labours /operational cost of tea garden	6501.56
4	Irrigation	0
5	rental value for lease- in land	2000
6	interest on working capital (@ 7%)	638.13

7	Miscellaneous cost	385
	Total	12139.40
II.	Cost A2	
1	Cost A1	12139.39
2	Rent paid for leased-in land	2000
	Total	14139.39
III.	Cost B	
1	Cost A2	14139.39
2	Imputed rental value of owned land	2000
3	imputed interest on fixed capital.	140
	Total	16279.39
IV.	Cost C	
1	Cost B	16279.39
2	Imputed value of family labour	1280.16
	Total	17559.55

The table below shown the cost structure of tea represents the district of West Garo Hills the average total cost of Cost A1 incurred Rs. 9466.06 follow by Rs. 10966.06 total cost of Cost A2, Cost B was amount to be Rs. 12714.45 and Cost C was Rs. 14514.45 respectively

Table 4:6Cost concept structure of West Garo Hills district		
I.	Cost A1	(Rs.)
1	Value Manure & fertilizer	2114.1
2	Value plant protection chemical	407.3833
3	Value human labours /operational cost of tea garden	4554.79

4	Irrigation	0
5	rental value for lease- in land	1500
6	interest on working capital (@ 7%)	600
7	Miscellaneous cost	289.79
	Total	9466.06
II.	Cost A2	
1	Cost A1	9466.06
2	Rent paid for leased-in land	1500
	Total	10966.06
III.	Cost B	
1	Cost A2	10966.06
2	Imputed rental value of owned land	1500
3	imputed interest on fixed capital.	248.39
	Total	12714.45
IV.	Cost C	
1	Cost B	12714.45
2	Imputed value of family labour	1800
	Total	14514.45

Farm Efficiency measures:

In calculating the farm efficiency, shown in table below, the average gross farm income was Rs. 20266.2, follow by net farm income Rs. 4529.54, farm business income was Rs.19052.8, the family labour income Rs. 2706.65 and the benefit cost ratio was 1.28 respectively.

Table 4:7 Farm efficiency measures of Ri-Bhoi district (Rs.)		
1	Gross farm income	20266.2

2	net farm income	4529.54
3	farm business income	19052.8
4	family labour income	2706.65
5	benefit cost ratio	1.28

In calculating the farm efficiency, in the table below the average gross farm income was Rs. 22455.3, follow by net farm income Rs. 9192.3, farm business income was Rs. 12989.24, the family labour income Rs. 7940.85 and the benefit cost ratio was 1.69 respectively.

Table 4:8 Farm efficiency measures West Garo Hills district (Rs.)		
1	Gross farm income	22455.3
2	net farm income	9192.3
3	farm business income	12989.24
4	family labour income	7940.85
5	benefit cost ratio	1.69

Section 5.

Production function analysis of Meghalaya

In order to analyze resource use efficiency of different input resources, a production function approach was used. From the result of the functional analysis, resource use efficiency for two categories has been analyzed by working out marginal value productivity to factor cost ratios has been worked out by using frontier production function. The following presents the details of this analysis.

To meet the analytical requirements of the second objectives of the study, production function were estimated for category I, category II and overall sample farms by fitting Cobb-Douglas type of production function. The following variables were used in order to determine the factors affecting the yield of the crop.

X_1 = Area (Rs.)

X_2 = Expenses on plant protection chemicals (Rs.)

X_3 = Expenses on fertilizer and manure (Rs.)

X_4 = Human labour charges (Rs.)

X_5 = Planting material (Rs.)

The estimated coefficients of the production function were used to study the effects of different input variables on output, resource use efficiency and returns to scale. The estimated regression coefficients, their standard errors and the value of adjusted coefficient of multiple determinations ($\bar{R}^2$) are given and discussed below.

The results of the production function analysis have been presented in Table 1. In the analysis of this regression equation, as pointed out earlier, five explanatory variables were included, based on the consideration of their theoretical importance. A perusal of the Table 1. shows that, the value of adjusted co-efficient of multiple determinations ($\bar{R}^2$) are 0.9462 and found statistically significant. This indicates that the explanatory variables included in the regression model. The regression co-efficient for manure & fertilizer and human labours in case of Ri-bhoi district was turned out to be positive and statistically significant (significant at 5%) and (significant at 1%). Adjusted R Square was turn up to be 0.043391 and Significance F was turned up to be 4.94E-58 from the 100 sample.

Table 5:1 Estimated production function for Ri-bhoi district sample								
	Coefficients	Standard Error	T Stat	P-value	R Square	Adjusted R Square	Significance F	Observations
Intercept	806.1257	797.5916	1.0107	0.314755	0.94625	0.043391	4.94E-58	100
Area (Ha)	1107.321	251.0956	4.409959	2.75E-05**				
Plant protection chemical (Rs)	-0.83868	0.896707	-0.93529	0.352038				
Plant material varieties (Rs)	-90.5929	59.26512	-1.5286	0.129721				
Fertilizer and manures (Rs)	-0.36098	0.11239	-3.21184	0.001806***				
Human labour (Rs)	1.724655	0.124738	13.82618	2.22E-24**				

figure in the parentheses indicates Standard Error value

*** Significant at 1%

**Significant at 5%

Table 5:2 Estimated production function for West Garo hill district sample								
	Coefficients	Standard Error	T stat	P -value	R Square	Adjusted R Square	Significance F	Observations
Intercept	-4434.92	698.6649	-6.34771	7.66E-09	0.919473	0.91519	8.46E-50	100
Area (Ha)	3589.938	453.1841	7.921587	4.66E-12				
Plant protection chemical (Rs)	0.451534	1.421998	0.317535	0.751542				
Plant material varieties (Rs)	0.173632	0.072033	2.410444	0.017879***				
Fertilizer and manures (Rs)	-48.2621	113.779	-0.42417	0.672408				
Human labour (Rs)	1.348719	0.185834	7.25767	1.12E-10**				

figure in the parentheses indicates Standard Error value

*** Significant at 1%

****Significant at 5%**

A perusal of the Table 2. shows that, the value of adjusted co-efficient of multiple determinations ($\overline{R}^2$) are 0.919473 and found statistically significant. This indicates that the explanatory variables included in the regression model. The regression co-efficient for area, planting material and human labours in case of West Garo Hills district was turned out to be positive and statistically significant (significant at 5%) and (significant at 1%). Adjusted R Square was turn up to be 0.91519 and Significance F was turned up to be 8.46E-50 from the 100 sample.

Form the above discussion it can be concluded that human labour, fertilizer, plant protection chemical was the important determination of tea production in the study area. All these inputs contributed up to 70 per cent to the total tea production.

Resource use efficiency

Resource use efficiency in production of tea was studied by comparing the marginal value productivity of a resource with the respective factor cost. The resource use efficiency was studied only for those variables, which had a statistically significant and positive effect on the dependent variable. Equality of marginal value product and marginal factor cost (i.e. MVP/MFC=1) indicates the optimum resource use efficiency for a particular input. In equality of marginal value product and marginal factor cost indicates the degree of resource use inefficiency. In case, if the ratio is less than one there is excessive use of resource and if the ratio is more than one, there is under use of the resources. The values of marginal value product of the variables included in the present study were taken as one (1) as the price of variables was already included while fitting Cobb-Douglas production function. The ratio of marginal value product and the marginal factor cost of different variables under category I, category II and on an average farm for sample farmers are presented as follow.

A perusal of the Table 5.3 found that the marginal value product and marginal factor cost ratios of human labour were 1.72, and 7.25 in both the district respectively, the ratio fertilizer and manure were 0.36 in only in Ri bhoi district, and in both the ratio of planting material were 2.41 and area were 7.92 in the west Garo hills district. In all these inputs above were found positive and more than unity which indicates under-utilization of inputs variables. This revealed that there is scope to increase the use of these inputs variables in order to obtain higher production.

Table 5:3 Allocative efficiency of tea for different categories of sample farms

Variables	MVP		MFC		AE	
	Ri bhoi	WGH	Ri-Bhoi	WGH	Ri-Bhoi	WGH
Area	7.92	----	1	-----	7.92	----
Fertilizers & Manure	0.36	---	1	----	0.36	----
Human labour	1.72	7.25	1	1	1.72	7.25
Planting material	---	2.41	---	1	-----	2.41

Section 6.

Technological gaps in adoption of the improved package of practices among the tea growers.

In the objective of the research was to find the technological gaps in the study area, a set of listed of recommendation and standard of package of practices (POP) given to the tea growers by the tea board of India and the horticulture of government of Meghalaya.

Some of the series of recommendations, demonstration and training are listed below along with the score and percentages rating by the individual farmers from the selected sample.

In the studied its was found that the Maintaining Pruning cycle, Standard of plucking the Tea leaves (two leaves and a buds) and human labour employed involve for maintaining the tea gardens majority of the farmer does not follow, which intern there were a reduction of the overall production of the green leave. And follow by Weeding practises follow in their respective tea garden, recommended varieties which are specifics to the particulars area, Plant Protection chemical as per recommendation and Fertilizers and manures as per recommendation. Apart from the recommendation Spacing as per recommended row to row and plant to plants (100x70) and Collection and Storage 70 percent and 60 percent of the farmers has adopted in the farms

Table 6:1 Recommendation packages of practices in tea cultivation by Tea Development Centre, Umsning and Tea Board of India.			
Sl.NO.	Particulars	Score	Percentage
1.	Recommended varieties which are specifics to the particulars area.	30	30.00
2.	Spacing as per recommended row to row and plant to plants (100x70)	70	70.00
3.	Weeding practises follow in their respective tea garden (3 times a year)	30	30.00
4.	Fertilizers and manures as per recommendation	50	50.00
5	Plant Protection chemical as per recommendation	40	40.00
6	Maintaining the bush size and standard	20	20.00

7	Maintaining Pruning cycle	10	10.00
8	Standard of plucking the Tea leaves (two leaves and a buds)	10	10.00
9	human labour employed involve for maintaining the tea gardens	10	10.00
10	Collection and Storage	60	60.00

In the studied, was found that the Maintaining Pruning cycle and human labour employed involve for maintaining the tea gardens, score 10 and 80 percent which state that majority of the farmer does not follow, which in turn there were a reduction of the overall production of the green leave. And follow by Plant Protection chemical as per recommendation and Fertilizers and manures as per recommendation, Maintaining the bush size and standard and Standard of plucking the Tea leaves the percentage the farmers follow was 30 percent and Apart from the recommendation Spacing as per recommended row to row and plant to plants (100x70), Weeding practises follow in their respective tea garden, Recommended varieties which are specifics to the particulars area and Collection and Storage 70 percent and 60 percent of the farmers has adopted in the farms

Table 6:2 Recommendation packages of practices in tea cultivation by Rongram, Tea Development Centre and Tea Board of India

Sl.NO.	Particulars	Score	Percentage
1.	Recommended varieties specifics to the particular area.	50	50.00
2.	Spacing as per recommended row to row and plant to plants (100x70)	60	60.00
3.	Weeding practises follow in their respective tea garden (3 times a year)	80	80.00
4.	Fertilizers and manures as per recommendation	40	40.00
5	Plant Protection chemical as per recommendation	30	30.00
6	Maintaining the bush size and standard	20	20.00

7	Maintaining Pruning cycle	10	10.00
8	Standard of plucking the Tea leaves	30	30.00
9	human labour employed involve for maintaining the tea gardens	10	10.00
10	Collection and storage	60	60.00

Section 7.

Marketing and Post-harvest management

A. Post harvesting management of tea in Meghalaya:

A part from the marketing the post-harvest management play an important role in making the final product which can be sold to the market considering to the final product some set of the technology are as follows:-

1. ***Standard of plucking:*** The equal sizes with one petiole and a buds
2. ***Collection and Storing of green tea leaf:*** it should be store in shade and airtic condition
3. ***Clearing:*** the leaf should be well clean before it processes
4. ***Weathering of leaves:*** the leave should be well cure up to the average moisture content level.
5. ***Processing:*** the mechanical part of tea to produce the fine and better tea
6. ***Drying:*** the optimum temperature and timing should be maintained to get the prefect aroma and taste of tea
7. ***Sorting:*** the removal of unwanted particle and wastage after its have been process.
8. ***Packaging:*** the eco friendly, air tight, attractive package, well labelling and unique style

B. Value Addition of tea in Meghalaya

The marketing of tea cultivation were identified based on the intermediaries / middleman involved from the point of production to the point of ultimate consumer.

Production of tea

Major producer of made tea in Meghalaya was found to be of CTC tea which contributed about 47.84 per cent from the total average production and was followed by Green tea (35.83%), White tea (7.36%), orthodox tea (7.06%), whereas, Oolong which is a new type of tea products and contributed only 1.90 per cent of the total production of tea in the state (Table 7.1).

Table 7:1 Production of tea in Meghalaya						
Type	White tea	Green tea	Orthodox	CTC	Oolong	Total
Quantity	999.21 (7.36)	4867.82 (35.83)	959.08 (7.06)	6499.40 (47.84)	259.51 (1.91)	13585.02 (100)

Producer's surplus of tea

The production of tea at the household level was found to be with an estimated yield of 13585.02 kg. Out of the total production of tea, only a small quantity of tea was retained for home consumption (0.04%) and gift as kind to relatives and friends (0.03%). The marketed surplus was estimated of kg (99.82%). Hence, the study found the tea producer was resourceful with better retention power and no distress sale of tea produce across the states (Table 7.2).

Table 7:2 Producer's surplus of tea in Meghalaya						
Particulars	White tea	Green tea	Orthodox tea	CTC tea	Oolong tea	Overall
Production (kg)	999.21	4867.82	959.08	6499.4	258.51	13585.02
a. Own consumption	1	1	1	1	1	5 (0.04)
b. Losses	3	3	3	2	3	14 (0.10)
c. Gifts	0.5	0.5	2.5	0.5	0.5	4.5 (0.03)
Total (a+b+c)	4.5	4.5	6.5	4.5	4.5	24.5 (0.18)
Marketed surplus (% of total)	994.71	4863.32	952.58	6494.9	254.01	13559.52 (99.82)

Disposal pattern of tea

Channel identified in marketing of tea

Tea from Meghalaya was mostly marketed through three major marketing channels. The major actors involve were producer, processor, wholesaler and retailer. These channels were:

Channel-I (Producer- Processor- Wholesaler- Retailer- Consumer)

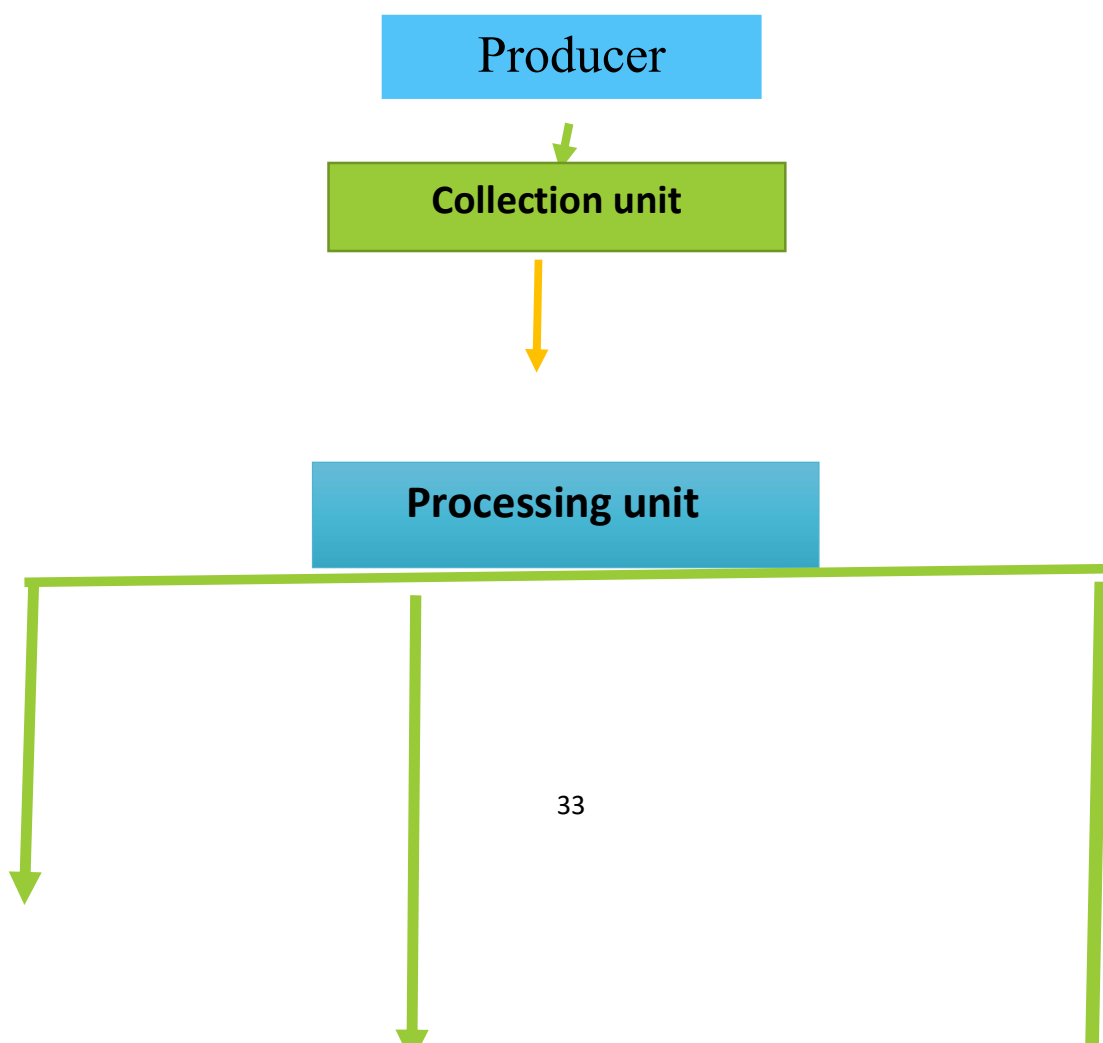
Channel-II (Producer- Processor- Retailer- Consumer)

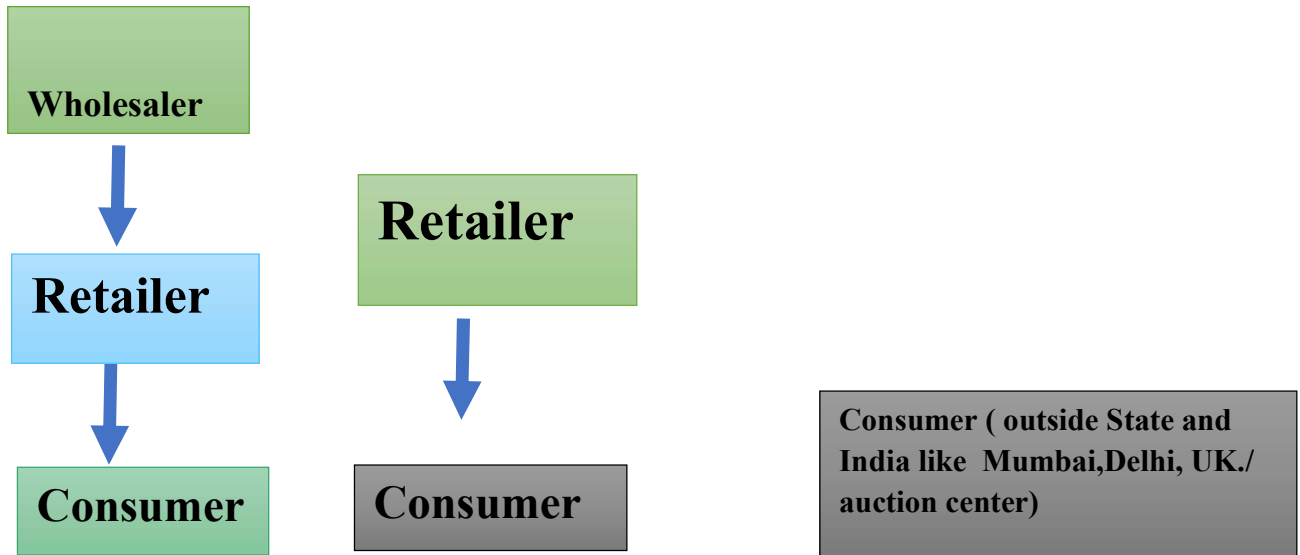
Channel-III (Producer- Processor- Consumer/ Guwahati Auction Centre)

It was found that majority of the farmers disposed-off their produce through Channel-II (63.87%) and was followed by Channel-III (23.08%) and Channel-I (13.05), respectively. (Table 7.3).

Table 7:3 Disposal pattern of tea in Meghalaya			
Particulars	Quantity (kg)		
	Channel-I	Channel-II	Channel-III
White tea	100.66 (10.12)	669.64 (67.32)	224.41 (22.56)
Green tea	608.89 (12.52)	3171.37 (65.21)	1083.06 (22.27)
Orthodox tea	126.31 (13.26)	582.50 (61.15)	243.77 (25.59)
CTC tea	924.22 (14.23)	4103.48 (63.18)	1467.20 (22.59)
Oolong tea	38.43 (15.13)	158.71 (62.48)	56.87 (22.39)
Total	1769.51 (13.05)	8660.47 (63.87)	3129.54 (23.08)

Fig. 11.The diagram representing the Map of Tea Marketing





Marketing cost, margin and price spread of tea in Meghalaya

I. White tea

II. Green tea

III. Orthodox tea

IV. CTC tea

V. Oolong tea

I. White tea

In Channel-I, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹45 per kg. The total marketing cost paid by the producer was worked out to be ₹38.62 per kg with a major cost was incurred on plucking (78.37%) it was followed by transportation (11.76%), losses during storage and processing (4.39%) and gunny bag (5.49%). The processor further processed the raw tea leaves into a branding tea called as white tea. The total cost incurred by processor was of ₹1014.14 per kg with a major cost was on deduction (98.59%), losses (0.997%) and electificity (0.13%). The processor then sold the white tea to the wholesaler at a price of ₹11000 per kg and earned a margin of ₹9940.66 per kg. The wholesaler then sold the white tea to retailer at ₹11020 per kg earned a margin of ₹18.05 per kg with transportation (56.41%), loading and unloading (25.64%) and packaging (17.95%) as the cost incurred. The retailer on the other hand by selling the white tea to the consumer at a price of ₹11050 per kg earned a margin of 28.60 per kg with transportation (61.54%) and packaging (10.26%) were the main marketing cost incurred (*Appendix I*).

In Channel-II, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹45 per kg. The total marketing cost paid by the producer was worked out to be ₹38.52 per kg with a major cost was incurred on plucking (77.16%) it was followed by transportation (11.57%), losses during storage and processing (5.86%) and gunny bag (5.40%). The processor further processed the tea leaves into a branding tea called as white tea. The total cost incurred by processor was of ₹1031.14 per kg with a major cost was on deduction (96.98%), labeling (0.97%), losses (0.78%) and electificity (1.13%). The processor which acts as wholesaler then sold the white tea to the retailer at a price of ₹17060 per kg and

earned a margin of ₹58.40 per kg. The retailer on the other hand sold the white tea to the consumer at a price of ₹17060 per kg earned a margin of 58.40 per kg with transportation (71.79%) and packaging (10.26%) were the main marketing cost incurred (*Appendix I*).

In Channel-III, the tea product was sold directly to consumer by processor either in auction Centre Guwahati or outside the state. The tea leaves produce by farmers were sold to processor in their respective village at an estimated price of ₹45 per kg. The total marketing cost paid by the producer was worked out to be ₹38.52 per kg with a major cost was incurred on plucking (77.16%) it was followed by transportation (11.57%), losses during storage and processing (5.86%) and gunny bag (5.40%). The processor further processed the tea leaves into a branding tea called as white tea. The total cost incurred by processor was of ₹1031.14 per kg with a major cost was on deduction (96.98%), labeling (0.91%), losses (0.78%) and electricity (0.13%). The processor then sold the white tea to the consumer at a price of ₹17000 per kg and earned a margin of ₹15923 per kg (*Appendix I*).

The price spread was marginally higher of ₹11961.38 per kg, ₹15961.48 per kg and ₹16961.48 per kg in Channel-I, Channel-II and Channel-III, respectively due to the fact that the farmers sold the produce at very small price (₹45/kg) and the processed product of white tea were sold at higher price. Thus, it reduces the producer share of farmers in consumer's rupee with an estimated amount of 0.32 per cent, 0.28 per cent and 0.23 percent, respectively (*Appendix I*).

II. Green tea

In Channel-I, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹30 per kg. The total marketing cost paid by the producer was worked out to be ₹8.98 per kg with a major cost was incurred on plucking (57.91%) it was followed by losses during storage and processing (28.73%) transportation (8.35%), and gunny bag (5.01%). The processor further processed the raw tea leaves into a branding tea called as green tea. The total cost incurred by processor was of ₹162.93 per kg with a major cost was on deduction (61.38%), processing (30.69%), losses (4.91%) and electricity (0.83%). The processor then sold the green tea to the wholesaler at a price of ₹1040.00 per kg and earned a margin of ₹38.05 per kg. The wholesaler then sold the green tea to retailer at ₹1150 per kg earned a margin of ₹108.60 per kg with transportation (56.41%), loading and unloading (25.64%) and packaging (17.95%) as the cost incurred. The retailer on the other hand by selling the green tea to the

consumer at a price of ₹1160 per kg earned a margin of 28.60 per kg with transportation (85.71%) and packaging (14.29%) were the main marketing cost incurred (*Appendix II*).

In Channel-II, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹30 per kg. The total marketing cost paid by the producer was worked out to be ₹8.58 per kg with a major cost was incurred on plucking (60.61%) it was followed by losses during storage and processing (26.57%) transportation (8.74%), and gunny bag (4.08%). The processor further processed the tea leaves into a branding tea called as green tea. The total cost incurred by processor was of ₹181.70 per kg with a major cost was on deduction (55.04%), processing (27.52), labeling (3.85%), losses (5.50%) and electricity (0.74%). The processor which acts as wholesaler then sold the green tea to the retailer at a price of ₹1140 per kg and earned a margin of ₹38.05 per kg. The retailer on the other hand sold the green tea to the consumer at a price of ₹1150 per kg earned a margin of 48.30 per kg with transportation (76.47%) and packaging (17.95%) were the main marketing cost incurred (*Appendix II*).

In Channel-III, the tea product was sold directly to consumer by processor either in auction Centre Guwahati or outside the state. The tea leaves produce by farmers were sold to processor in their respective village at an estimated price of ₹30 per kg. The total marketing cost paid by the producer was worked out to be ₹8.38 per kg with a major cost was incurred on plucking (59.67%) it was followed by losses during storage and processing (27.21%) transportation (8.95%), and gunny bag (4.18%). The processor further processed the tea leaves into a branding tea called as green tea. The total cost incurred by processor was of ₹181.70 per kg with a major cost was on deduction (55.04%), processing (27.52%), labeling (3.85%), losses (5.50%) and electricity (0.74%). The processor then sold the green tea to the consumer at a price of ₹1100 per kg and earned a margin of ₹888.30 per kg (*Appendix II*).

The price spread was marginally higher of ₹1138.98 per kg, ₹1138.58 per kg and ₹1078.38 per kg in Channel-I. Channel-II and Channel-III, respectively due to the fact that the farmers sold the produce at very high price (₹30/kg) and the processed product of green tea were sold at higher price. Thus, it reduces the producer share of farmers in consumer's rupee with an estimated amount of 1.81 per cent, 1.85 per cent and 1.97 percent, respectively (*Appendix II*).

III. Orthodox tea

In Channel-I, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹17 per kg. The total marketing cost paid by the producer was worked out to be ₹4.28 per kg with a major cost was incurred on losses during storage and processing (60.28%) it was followed by transportation (17.52%), plucking (11.68%) and gunny bag (10.51%). The processor further processed the raw tea leaves into a branding tea called as orthodox tea. The total cost incurred by processor was of ₹123.13 per kg with a major cost was on deduction (64.97%), processing (24.36%), losses (6.50%) and electricity (1.10%). The processor then sold the orthodox tea to the wholesaler at a price of ₹500 per kg and earned a margin of ₹359.87 per kg. The wholesaler then sold the orthodox tea to retailer at ₹520 per kg earned a margin of ₹18.05 per kg with transportation (56.41%), loading and unloading (25.64%) and packaging (17.95%) as the cost incurred. The retailer on the other hand by selling the orthodox tea to the consumer at a price of ₹530 per kg earned a margin of 8.60 per kg with transportation (85.71%) and packaging (14.29%) were the main marketing cost incurred (*Appendix III*).

In Channel-II, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹17 per kg. The total marketing cost paid by the producer was worked out to be ₹2.88 per kg with a major cost was incurred on losses during storage and processing (44.44%) it was followed by transportation (26.04%), plucking (17.36%) and gunny bag (12.15%). The processor further processed the tea leaves into a branding tea called as orthodox tea. The total cost incurred by processor was of ₹141 per kg with a major cost was on deduction (56.74%), processing (21.28), labeling (3.55%), losses (8.51%) and electricity (0.96%). The processor which acts as wholesaler then sold the orthodox tea to the retailer at a price of ₹520 per kg and earned a margin of ₹362 per kg. The retailer on the other hand sold the orthodox tea to the consumer at a price of ₹540 per kg earned a margin of 18.40 per kg with transportation (75.00%) and packaging (25.00%) were the main marketing cost incurred (*Appendix III*).

In Channel-III, the tea product was sold directly to consumer by processor either in auction Centre Guwahati or outside the state. The tea leaves produce by farmers were sold to processor in their respective village at an estimated price of ₹17 per kg. The total marketing cost paid by the producer was worked out to be ₹2.88 per kg with a major cost was incurred on losses during storage and processing (44.44%) it was followed by transportation (26.04%), plucking

(17.36%) and gunny bag (12.15%). The processor further processed the tea leaves into a branding tea called as orthodox tea. The total cost incurred by processor was of ₹141 per kg with a major cost was on deduction (56.74%), processing (21.28%), labeling (3.55%), losses (8.51%) and electricity (0.96%). The processor then sold the orthodox tea to the consumer at a price of ₹520 per kg and earned a margin of ₹362 per kg (*Appendix III*).

The price spread was marginally higher of ₹517.28 per kg, ₹515.88 per kg and ₹505.88 per kg in Channel-I, Channel-II and Channel-III, respectively due to the fact that the farmers sold the produce at very small price (₹17/kg) and the processed product of orthodox tea were sold at lower price. Thus, it reduces the producer share of farmers in consumer's rupee with an estimated amount of 2.40 per cent, 2.66 per cent and 2.72 percent, respectively (*Appendix III*).

IV. CTC. tea

In Channel-I, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹17 per kg. The total marketing cost paid by the producer was worked out to be ₹2.63 per kg with a major cost was incurred on losses during storage and processing (41.06%) it was followed by transportation (28.52%), plucking (19.01%) and gunny bag (11.41%). The processor further processed the raw tea leaves into a branding tea called as CTC tea. The total cost incurred by processor was of ₹117.83 per kg with a major cost was on deduction (72.14%), processing (16.97%), losses (16.97%) and electricity (1.15%). The processor then sold the CTC tea to the wholesaler at a price of ₹300 per kg and earned a margin of ₹165.17 per kg. The wholesaler then sold the CTC tea to retailer at ₹320 per kg earned a margin of ₹18.05 per kg with transportation (56.41%), loading and unloading (25.64%) and packaging (17.95%) as the cost incurred. The retailer on the other hand by selling the CTC tea to the consumer at a price of ₹350 per kg earned a margin of 28.60 per kg with transportation (85.71%) and packaging (14.29%) were the main marketing cost incurred (*Appendix IV*).

In Channel-II, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹17 per kg. The total marketing cost paid by the producer was worked out to be ₹2.84 per kg with a major cost was incurred on losses during storage and processing (45.07%) it was followed by transportation (28.52%), plucking (17.60%) and gunny bag (10.92%). The processor further processed the tea leaves into a branding tea called as CTC

tea. The total cost incurred by processor was of ₹134 per kg with a major cost was on deduction (63.43%), processing (14.91%), labeling (7.46%), losses (5.97%) and electificity (1.01%). The processor which acts as wholesaler then sold the CTC tea to the retailer at a price of ₹320 per kg and earned a margin of ₹169 per kg. The retailer on the other hand sold the CTC tea to the consumer at a price of ₹350 per kg earned a margin of 28.40 per kg with transportation (68.75%) and packaging (31.25%) were the main marketing cost incurred (*Appendix IV*).

In Channel-III, the tea product was sold directly to consumer by processor either in auction centre Guwahati or outside the state. The tea leaves produce by farmers were sold to processor in their respective village at an estimated price of ₹17 per kg. The total marketing cost paid by the producer was worked out to be ₹2.88 per kg with a major cost was incurred on losses during storage and processing (44.45%) it was followed by transportation (26.04%), plucking (17.36%) and gunny bag (12.15%). The processor further processed the tea leaves into a branding tea called as CTC tea. The total cost incurred by processor was of ₹134 per kg with a major cost was on deduction (63.43%), processing (14.91%), labeling (7.46%), losses (5.97%) and electificity (1.01%). The processor then sold the CTC tea to the consumer at a price of ₹330 per kg and earned a margin of ₹178.95 per kg (*Appendix IV*).

The price spread was marginally higher of ₹335.63 per kg, ₹335.84 per kg and ₹315.88 per kg in Channel-I, Channel-II and Channel-III, respectively due to the fact that the farmers sold the produce at very small price (₹17/kg) and the processed product of CTC tea were sold at higher price. Thus, it reduces the producer share of farmers in consumer's rupee with an estimated amount of 4.11 per cent, 4.05 per cent and 4.28 percent, respectively (*Appendix IV*).

V. Oolong tea

In Channel-I, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹25 per kg. The total marketing cost paid by the producer was worked out to be ₹12.50 per kg with a major cost was incurred on losses during storage and processing (55.60%) it was followed by plucking (21.22%) transportation (16.00%), and gunny bag (7.28%). The processor further processed the raw tea leaves into a branding tea called as oolong tea. The total cost incurred by processor was of ₹174.93 per kg with a major cost was on deduction (57.17%), processing (28.58%), losses (4.60%) and electificity (1.34%). The processor then sold the oolong tea to the wholesaler at a price of ₹1000 per kg and earned a margin of ₹800.07 per kg. The wholesaler then sold the oolong tea to retailer at ₹1120 per kg earned a

margin of ₹118.05 per kg with transportation (56.41%), loading and unloading (25.64%) and packaging (17.95%) as the cost incurred. The retailer on the other hand by selling the oolong tea to the consumer at a price of ₹1150 per kg earned a margin of 27.30 per kg with transportation (44.44%) and packaging (55.56%) were the main marketing cost incurred (*Appendix V*).

In Channel-II, tea leaves producer sold their raw produce to processor in their respective village at an estimated price of ₹25 per kg. The total marketing cost paid by the producer was worked out to be ₹12.50 per kg with a major cost was incurred on losses during storage and processing (55.60%) it was followed by transportation (22.00%), plucking (16.00%) and gunny bag (6.40%). The processor further processed the tea leaves into a branding tea called as oolong tea. The total cost incurred by processor was of ₹173.93 per kg with a major cost was on deduction (57.49%), processing (28.75%), labeling (2.87%), losses (4.60%) and electificity (0.78%). The processor which acts as wholesaler then sold the oolong tea to the retailer at a price of ₹1130.00 per kg and earned a margin of ₹28.05 per kg. The retailer on the other hand sold the oolong tea to the consumer at a price of ₹1150 per kg earned a margin of 48.00 per kg with transportation (55.88%) and packaging (44.12%) were the main marketing cost incurred (*Appendix V*).

In Channel-III, the tea product was sold directly to consumer by processor either in auction Centre Guwahati or outside the state. The tea leaves produce by farmers were sold to processor in their respective village at an estimated price of ₹25 per kg. The total marketing cost paid by the producer was worked out to be ₹12.50 per kg with a major cost was incurred on losses during storage and processing (54.96%) it was followed by transportation (22.64%), plucking (16.00%) and gunny bag (6.40%). The processor further processed the tea leaves into a branding tea called as oolong tea. The total cost incurred by processor was of ₹173.93 per kg with a major cost was on deduction (57.49%), processing (28.75%), labeling (2.87%), losses (4.60%) and electificity (1.34%). The processor then sold the oolong tea to the consumer at a price of ₹1100 per kg and earned a margin of ₹900.07 per kg (*Appendix V*).

The price spread was marginally higher of ₹1187.50 per kg, ₹1187.50 per kg and ₹1187.50 per kg in Channel-I. Channel-II and Channel-III, respectively due to the fact that the farmers sold the produce at very small price (₹17/kg) and the processed product of CTC tea were sold at higher price. Thus, it reduces the producer share of farmers in consumer's rupee with an estimated amount of 1.04 per cent, 1.04 per cent and 1.14 percent, respectively (*Appendix V*).

Section 8.

Constraints facing by the farmers:

An attempt was made to identify the constraint and problems faced by the farmers in the production and marketing of both the district represented in the research plan. which was presented in rank according to Garrett's ranking technique. The problem was collected and are given the degree of severity as expressed by the respondents were discussed under the following sub heads. We have collected the data from 200 tea growers of the state main from the research district and on the basis of analysis and interpretation of these data, the major problem that has been faced by the tea growers are being divided as different categories.

I. Categories of the major constraints of Meghalaya.

A. Physical constraints:

Among the constraint facing by the farmers majority was the physical constraints. in compering to the eastern part of India and consider the challenges facing in the tea cultivation. The table 1 showed the road communication score 71 from the study conducted and rank as 1st among the listed constraint and follow by non- availability of skilled labour as 2nd rank with distance from residence, climate score 64 points with percent of 75.00 and 62.50 %, topography was also the main constraints for few of farmer which cultivated in elevated area or hilly region which score 61 and ranks 5th from the list and the theft of green leaf was 0.00 % as tea is a process product.

Table 8:1 Physical Constraints				
Particulars		Score	Rank	Percent
1.	Road communication	71	1	100.00%
2.	Non availability of skilled labour	66	2	87.50%
3.	Distance from residence	64	3	75.00%
4.	Climate	64	4	62.50%
5.	Topography	61	5	50.00%
6.	Soil type	47	6	37.50%

7.	Non availability of fertilizer/ chemical	45	7	25.00%
8.	Miscellaneous	36	8	12.50%
9.	Theft of green leaf	18	9	0.00%

B. Biological Constraints

Biological constraints are also one of the important parts which determining the production of the crops namely management of pest/ diseases score 89 points from the total and ranks as the 1st ranks among the constraint from the listed constraints follow by threat to surrounding environment 50 score and ranks 2nd with the percentage of 75.00 per cent. The causing damage for domestic animals and harming the neighbouring crops are negligible.

Table8:2 Biological Constraints				
	Particulars	Score	Rank	Percent
1.	Management of pests/diseases	89	1	100.00%
2.	Is the garden a threat to surrounding environment	50	2	75.00%
3.	Avail of quality planting material	25	3	50.00%
4.	It is causing damage for domestic animals	7	4	25.00%
5.	Is its harming the neighbouring crops	2	5	0.00%

C. Legal Constraints:

A part from the other constraints the legal constraints have less impact in the over view of the states. In connection to the development obtaining benefits from government points and the tea board of India. On table 3 showed that of which 83 score from the total 100 farmer ranks 1st which does exist to any helps. Follow by selling land document and also organization set up in the states.

Table 8:3 Legal Constraints			
Particulars	Score	Rank	Percent

1.	Obtaining benefits from govt/tea board	83	1	100.00%
2.	Selling land dox in court	25	2	50.00%
3.	Organizational set up	0	3	0.00%

D. Social Constraints:

Social activities were a part of human life, so among the social constraints faced by the farmers where there enough time for socialize score 40 and ranks 1ST from the total farmers score with a percentage of 100%

Table 8:4 Social Constraints				
Particulars		Score	Rank	Percent
1.	Is there enough time for growers to socialize	40	1	100.00%
2.	Is there any disapproved from society	8	2	80.00%
3.	Is there a problem in managing the garden during festivals	7	3	60.00%
4.	Humiliation by bigger growers	6	4	40.00%
5.	Is there any disapproved by society because family members are working as labour	4	5	20.00%
6.	theft of green leaf	3	6	0.00%

E. Economic & Financial constraints:

The major part to be consider by the farmer was the economic and financial without it any business cannot run an input expensive of all the input which the farmer has to incurred score 95 points and ranks 1st from the total listed particulars with a 100 % follow by the wages given to the worker score 46 points and ranks 2nd and sufficient farm finance

Table 8:5 Economic & Financial constraints				
Particulars		Score	Rank	Percent
1.	Are inputs expensive.	95	1	100.00%
2.	Are worker satisfied with wages paid	46	2	88.80%
3.	Does the growers have sufficient farm	41	3	77.70%

	finance			
4.	Amount to be pay wages	34	4	66.60%
5.	Repayment of laons	6	5	55.50%
6.	Time of payment and	4	6	44.40%
7.	Is present rate of tax abounded	4	7	33.30%
8.	Problem in getting loans	2	8	22.20%
9.	Taxes	2	9	11.10%
10.	Amount of payment	0	10	0.00%

F. Marketing Constraints:

The most important in agriculture sector to be consider is the market of the finish products, at the same time the low purchasing power of the consumers which score 99 and ranks 1st in the list constraint given by the farmer and Follow by the lack of storage and processing unit, the road connectivity and high rate of transportation charge are among the factor which the farmer faced during the selling of the green leaves

Table 8:6Marketing Constraints:				
Particles		Score	Rank	Percent
1.	low purchasing power of the consumers	99	1	100.00%
2.	lack of storages facility	97	2	85.70%
3.	lack of processing unit	95	3	71.40%
4.	road facility	80	4	57.10%
5.	high rate of transportation charges	77	5	42.80%
6.	Lack of group/ cooperative market	62	6	28.50%
7.	no assurance of market	2	7	14.20%
8.	high fluctuation in market prices	0	8	0.00%

G. Over all view of the constraints in Ri-Bhoi districts.



Fig.12. Constraints representing of Ri-Bhoi district

In a brought way constraint are classified into various types from the figure the most important constraint as shown was physical constraint were ranks as the 1st ranks, follow by the marketing constraints, economic and finance constraints, follow with biological and legal constraint the last ranks were the social constraints.

Table 8:7. Constraint pertaining to the Ri-Bhoi district			
Particulars	Score	Rank	Percent
Physical Constraints	472	1	100.00%
Marketing constraints	512	2	80.00%
Economic and finance constraints	234	3	60.00%
Biological constraints	173	4	40.00%
Legal constraints	108	5	20.00%
Social constraints	68	6	0.00%

H. Over all view of the constraints in West Garo Hills districts.

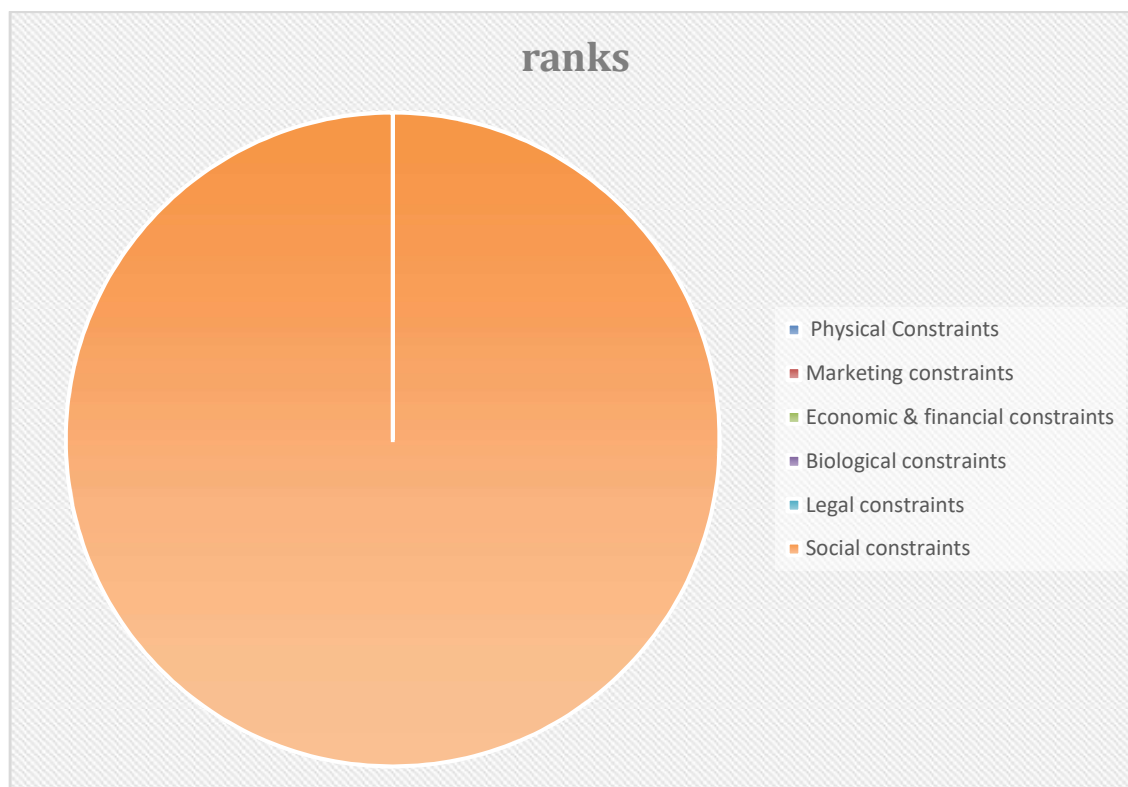


Fig.13 Constraints representing of West Garo Hills District

From the table 8.8 shown that, in the classification from the below table that physical constraint was ranks as the 1st ranks, follow by the marketing constraints, economic and finance constraints, follow with biological and legal constraint the last ranks were the social constraints. They have almost the same problem arise in both the district which are related to the tea production.

Table 8:8 Constraint pertaining to the West Garo Hills district			
Particulars	Score	Rank	Percent
Physical Constraints	944	1	100.00%
Marketing constraints	512	2	80.00%
Economic & financial constraints	468	3	60.00%

Biological constraints	346	4	40.00%
Legal constraints	216	5	20.00%
Social constraints	136	6	0.00%

Suggestion to overcome the constraints

- The cultivated varieties should be tested, certified, suitable seedling especially for green leaves and white tea production and assam is the leading producer of C.T.C. tea
- Resistance varieties
- Promoting the Mini factory at producer level will increase the share of farmer
- Promoting the organic practices and certification, which can create higher demand with better prices.
- It was an intensive labour crops only the mechanized cultivation is possible which can reduce the cost.
- Extension visit and timely training can enhance the farmer with accurate knowledge and better practices in nurturing the garden.

SUMMARY AND CONCLUSION

A research investigation entitled “**An analysis of tea (*camelliasinensis*l.) production and marketing: Pattern in Meghalaya.**” was undertaken during 2017-2022 in the Department of Agricultural Economics, School of Agricultural Sciences and Rural Development, Nagaland University, Medziphema. The main research finding of the investigation are summarised below.

- The respondent farmers were mostly male with an average age of 54 years old
- The respondent has an average 6.7 ha. farm size
- Almost the owner of the tea garden were graduate which include 44.00 percent from the total sample and the illiterate rate was 7 percent.
- The average land holding was 3.98 ha and the coverage tea area was 2.25 ha.
- Agriculture was the main occupation which constitute 49.14 percent and apart of other activities in the like services, business etc.
- Cropping pattern: tea is the main crops and along with which vegetables, field crops and plantation as well.
- In the study the sample are divided into two part which can be easily differentiate the cost and return. Namely the size of the farm, Category-I (less than 2.5 ha) and in Category-II (more than 2.5 ha)
- The average farm in category- I was 2.4 ha whereas the category-II was 5.2 ha.
- The trend analysis of the overall Meghalaya for the passed 18 years from the secondary data which include area, production and productively was 0.69,0.23 and 0.85 with the C.V. of 42.92,75.99 and 38.64 respectively.
- Coming to the respected district of Ri-Bhoi the trend of area, production and productively for the last 18 year (2000-2018) was 0.85,0.61 and 0.79 with a C.V. of 45.30,87.32 and 59.60
- And the Coming to the respected district of West Garo Hill, the trend of area, production and productively for the last 18 year (2000-2018) 0.85,0.67,and with a C.V. 30.75,60.99 and 33.19 respectively.
- The nature and types of tea in Meghalaya, there are two type introduced by the tea board 1.*Camellia assamica* known as assam tea varieties and 2. *Camellia sinensis* known as Darjeeling varieties.

- In the district Ri-bhoi and the East Khasi hills with a high altitude of longitudinal area, the Darjeeling tea varieties was suitable as this tea brush were suitable for making green tea, white tea and oolong tea.
- Where as in West Garo hills and the surrounding area with humidity the assam varieties were suitable like CTC tea.
- Tea plantation is suitable for acidic soil and according to the adoption of the climate and topography the varieties should be distributed to the farmers.
- The cost from the established tea garden was divided into non-recurring and recurring cost, it can be computed into five years after transplanting.
- The first year will be negative and it will continue till third year or four year and depend on the soil and management and in the five year there were a growth with an increasing rate till it come to its constant stage.
- The NPV was computed to be Rs. 500788.31, BCR. Was 18.07 and IRR was 3.65 % from the fifth years of planting in category-I of Ri-Bhoi district.
- The NPV was computed to be Rs. 60744.57, BCR. Was 24.51 and IRR was 4.66 % from the fifth years of planting in category-II of Ri-Bhoi district.
- The NPV was computed to be Rs. 374526.89, BCR. Was 7.44 and IRR was 2.97 % from the fifth years of planting in category-I of West Garo Hill district.
- The NPV was computed to be Rs. 1107068.78, BCR. Was 16.24 and IRR was 3.58 % from the fifth years of planting in category-II of West Garo Hill district.
- Cost concept for Ri-Bhoi district: Cost A1, the average total cost incurred was Rs. 12139.40, Cost A2 was Rs.14139.39, the Cost B was Rs. 16279.39 and the Cost C was Rs.17559.55
- Where as in West Garo Hills: Cost A1, the average total cost incurred was Rs. 9466.06, Cost A2 was Rs.10966.06, the Cost B was Rs. 12714.45 and the Cost C was Rs.14514.45
- Farm efficiency measures the gross farm income was Rs. 20266.2 in Ri-Bhoi district follow by net income Rs.4529.54, family labour income was Rs. 2706.65 and benefit cost ratio was 1.28 respectively.
- Where as in West Garo Hill the gross income was Rs. 22455.30, follow by net income Rs.9192.30, family labour income was Rs. 7940.85 and benefit cost ratio was 1.69 respectively.

- The resource use efficiency in Ri-Bhoi district was manures & fertilizer and include human labour Allocative efficiency was 0.36 and 1.72.
- Where as in West Garo Hill the resource use efficiency was found to be area, human labour and planting material with Allocative efficiency of 7.92, 7.25 and 2.41,
- In the technological gaps majority of the farmers were lack of Knowledge and only few farmers follow the package of practices in the field.
- The main produced of made tea from the state was the CTC tea which contribute 47.84 per cent and follow by green tea, orthodox tea.
- Setting up a mini factory for small units increase the production of green tea, white tea and also enhanced the price of a made tea in the market
- In the marketing parts: three channels had been identified
- There was a common problem in both the district and physical constraint was consider to be the main problem the land topography and the road communication.
- In the marketing constraint the main point was lack of purchasing power of the consumer for the fresh leave, storge problem and lack of processing unit.
- The economics and financial constraint the high cost of wages and the input cost which increase rapidly.
- Biological constraint less or minor causes of damage to the main crops only a few incidents
- Legal and social constraint are negligible in the state as compare to other part of India

HYPOTHESIS:

For the present study following null hypothesis has been developed for the study

H01: There is no trend between area, production and productivity of tea.

Due to the non-traditional practices of growing tea, which was unliked the other state of India, tea cultivation practices of Meghalaya have an un even trend in area, production and productivity. So, the hypothesis will be rejected.

H02: There is no association between selected socio-economics variables and technological of tea among tea growers.

Lack of technology “known how” the farmers are facing a huge loss in term of production and cost of production, major expensive were operation cost (human labour). There was a gap in technology between the farmers in recommended practises of POP. So, the hypothesis will be rejected.

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Appendices

Appendixiv: Marketing cost and margin of CTC tea in Meghalaya (Rs/Kg)			
Selling Price of Producer	17	17	17
Cost incurred by the farmers			
i) Plucking	0.50 (19.01)	0.50 (17.60)	0.50 (17.36)
ii) Transportation	0.75 (28.52)	0.75 (26.41)	0.75 (26.04)
iii) Gunny bag	0.30 (11.41)	0.31 (10.92)	0.35 (12.15)
iv) Loss during storage	1.08 (41.06)	1.28 (45.07)	1.28 (44.45)
Total (I to iv)	2.63 (100)	2.84 (100)	2.88
Net price receive by the Producer	14.37	14.16	14.12
Cost incurred by processor			
i) Transportation	0.7 (0.59)	0.7 (0.52)	0.7 (0.52)
ii) Loading & unloading	0.5 (0.42)	0.5 (0.37)	0.5 (0.37)
iii) Weighing	0.35 (0.30)	0.35 (0.26)	0.35 (0.26)
iv) Deduction	85 (72.14)	85 (63.43)	85 (63.43)
v) Electricity	1.35 (1.15)	1.35 (1.01)	1.35 (1.01)
vi) Weathering	0.85 (0.72)	0.85 (0.63)	0.85 (0.63)
vii) Processing	20 (16.97)	20 (14.93)	20 (14.93)
viii) Drying	0.75 (0.64)	0.75 (0.56)	0.75 (0.56)
ix) Labelling	-	10 (7.46)	10 (7.46)
x) packaging	-	6 (4.48)	6 (4.48)
xi) Gunny bags/pack	0.33 (0.28)	0.5 (0.37)	0.5 (0.37)
xii) Loss (Storage/processing)	8 (6.79)	8 (5.97)	8 (5.97)
Total (i to xii)	117.83 (100)	134 (100)	134 (100)
Selling Price of processor	300	320	330
Processor's margin	165.17	169.00	178.95
Cost incurred by wholesaler			
i) Transportation	1.1 (56.41)		
ii) Loading & unloading	0.5 (25.64)		
iii. Packaging material	0.35 (17.95)		
Total (i to iii)	1.95		
Price paid by retailer	320		
Wholesaler's margin	18.05		
Cost incurred by retailer			
i. Transportation	1.2 (85.71)	1.10 (68.75)	
ii. Packaging material	0.20 (14.29)	0.5 (31.25)	
Total (i to ii)	1.40 (100)	1.60 (100)	
Selling price of retailer	350.00	350.00	
Retailer's margin	28.60	28.40	
Price Spread	335.63	335.84	315.88
Producer's share in consumer's rupees	4.11	4.05	4.28
Note: Figure in parentheses are percentage to the total cost			

Appendices

Appendixiii: Marketing cost and margin of orthodox tea in Meghalaya (Rs/Kg)			
Selling Price of Producer	17	17	17
Cost incurred by the farmers			
i) Plucking	0.50 (11.68)	0.50 (17.36)	0.50 (17.36)
ii) Transportation	0.75 (17.52)	0.75 (26.04)	0.75 (26.04)
iii) Gunny bag	0.45 (10.51)	0.35 (12.15)	0.35 (12.15)
iv) Loss during storage	2.58 (60.28)	1.28 (44.44)	1.28 (44.44)
Total (I to iv)	4.28 (100)	2.88 (100)	2.88
Net price receive by the Producer	14.72	14.12	14.12
Cost incurred by processor			
i) Transportation	0.7 (0.57)	0.7 (0.50)	0.7 (0.50)
ii) Loading & unloading	0.8(0.65)	0.8 (0.57)	0.8 (0.57)
iii) Weighing	0.35 (0.28)	0.35 (0.25)	0.35 (0.25)
iv) Deduction	80.00 (64.97)	80.00(56.74)	80(56.74)
v) Electricity	1.35 (1.10)	1.35 (0.96)	1.35 (0.96)
vi) Weathering	0.85 (0.69)	0.85 (0.60)	0.85 (0.60)
vii) Processing	30 (24.36)	30 (21.28)	30 (21.28)
viii) Drying	0.75 (0.61)	0.75 (0.53)	0.75 (0.53)
ix) Labelling	0	5 (3.55)	5 (3.55)
x)packaging	0	9 (6.38)	9 (6.38)
xi) Gunny bags/pack	0.33 (0.27)	0.2 (0.14)	0.2 (0.14)
xii) Loss (Storage/processing)	8 (6.50)	12(8.51)	12(8.51)
Total (i to xii)	123.13 (100)	141.00 (100)	141.00 (100)
Selling Price of processor	500	520	520
Processor's margin	359.87	362.00	362.00
Cost incurred by wholesaler			
i) Transportation	1.1 (56.41)		
ii) Loading & unloading	0.5 (25.64)		
iii. Packaging material	0.35 (17.95)		
Total (i to iii)	1.95		
Price paid by retailer	520.00		
Wholesaler's margin	18.05		
Cost incurred by retailer			
i. Transportation	1.2 (85.71)	1.2 (68.75)	
ii. Packaging material	0.20 (14.29)	0.40(31.25)	
Total (i to ii)	1.40 (100)	1.60 (100)	
Selling price of retailer	530.00	530.00	
Retailer's margin	8.60	8.40	
Price Spread	517.28	515.88	505.88
Producer's share in consumer's rupees	2.40	2.66	2.77
Note: Figure in parentheses are percentage to the total cost			

Appendices

Appendixv:Marketing cost and margin of oolong tea in Meghalaya (Rs/Kg)			
Selling Price of Producer	25	25	25
Cost incurred by the farmers			
i) Plucking	0.60 (14.02)	0.60 (15.08)	0.60 (15.08)
ii) Transportation	0.75 (17.52)	0.75 (18.84)	0.75 (18.84)
iii) Gunny bag	0.35 (8.18)	0.35 (8.79)	0.35 (8.79)
iv) Loss during storage	2.58 (60.28)	2.28 (57.29)	2.28 (57.29)
Total (I to iv)	4.28 (100)	3.98 (100)	3.98 (100)
Net price receive by the Producer	20.72	21.02	21.02
Cost incurred by processor			
i) Transportation	0.7 (0.46)	0.7 (0.42)	0.7 (0.42)
ii) Loading & unloading	0.5 (0.33)	0.5 (0.30)	0.5 (0.30)
iii) Weighing	0.35 (0.23)	0.35 (0.21)	0.35 (0.21)
iv) Deduction	120 (78.52)	120 (71.45)	120 (71.45)
v) Electricity	1.35 (0.88)	1.35 (0.80)	1.35 (0.80)
vi) Weathering	0.85 (0.56)	0.85 (0.51)	0.85 (0.51)
vii) Processing	20 (13.09)	20 (11.91)	20 (11.91)
viii) Drying	0.75 (0.49)	0.75 (0.45)	0.75 (0.45)
ix) Labelling	-	5 (2.98)	5 (2.98)
x)packaging	-	10 (5.95)	10 (5.95)
xi) Gunny bags/pack	0.33 (0.22)	0.45 (0.27)	0.45 (0.27)
xii) Loss (Storage/processing)	8 (0.5.23)	8 (4.76)	8 (4.76)
Total (i to xii)	152.83 (100)	167.95 (100)	167.95(100)
Selling Price of processor	1100	1100	1100
Processor's margin	922.17	907.05	907.05
Cost incurred by wholesaler			
i) Transportation	1.1 (56.41)		
ii) Loading & unloading	0.5 (25.64)		
iii. Packaging material	0.35 (17.95)		
Total (i to iii)	1.95		
Price paid by retailer	1150.00		
Wholesaler's margin	48.05		
Cost incurred by retailer			
i. Transportation	1.2 (85.71)	0.5 (68.75)	
ii. Packaging material	1.50 (14.29)	1.50 (31.25)	
Total (i to ii)	2.70 (100)	2.00 (100)	
Selling price of retailer	1200.00	1200.00	
Retailer's margin	47.30	98.00	
Price Spread	1179.28	1178.98	1078.98
Producer's share in consumer's rupees	1.73	1.75	1.91
Note: Figure in parentheses are percentage to the total cost			

Appendices

Appendix i:Marketing cost and margin ofwhite tea in Meghalaya (Rs/Kg)			
Selling Price of Producer	45	45	45
Cost incurred by the farmers			
i) Plucking	5.00(78.37)	5.00 (77.16)	5.00 (77.16)
ii) Transportation	0.75 (11.76)	0.75 (11.57)	00.75(11.57)
iii) Gunny bag	0.35 (5.49)	0.35 (5.40)	0.35 (5.40)
iv) Loss during storage	0.28 (4.39)	0.38 (5.86)	0.38(5.86)
Total (I to iv)	6.38 (100)	6.48 (100)	6.48
Net price receive by the Producer	38.62	38.52	38.52
Cost incurred by processor			
i) Transportation	0.7 (0.07)	0.7 (0.07)	0.7 (0.07)
ii) Loading & unloading	0.5 (0.05)	0.5 (0.05)	0.5 (0.05)
iii) Weighing	0.35 (0.03)	0.35 (0.03)	0.35 (0.03)
iv) Deduction	1000.00 (98.61)	1000.00(96.98)	1000.00(96.98)
v) Electricity	1.35 (0.13)	1.35 (0.13)	1.35 (0.13)
viii) Drying	0.91 (0.09)	0.91(0.09)	0.91 (0.09)
ix) Labelling	-	10 (0.97)	10 (0.97)
x)packaging	-	9 (0.87)	9(0.87)
xi) Gunny bags/pack	0.33 (0.03)	0.33 (0.03)	0.33 (0.03)
xii) Loss (Storage/processing)	10(0.99)	8 (0.78)	8 (0.78)
Total (i to xii)	1014.14 (100)	1031.14 (100)	1031.14 (100)
Selling Price of processor	11000	17000	17000
Processor's margin	9940.86	15923.86	15923.86
Cost incurred by wholesaler			
i) Transportation	1.1 (56.41)		
ii) Loading & unloading	0.5 (25.64)		
iii. Packaging material	0.35 (17.95)		
Total (i to iii)	1.95(100)		
Price paid by retailer	11020.00		
Wholesaler's margin	18.05		
Cost incurred by retailer			
i. Transportation	1.2 (85.71)	1.10 (68.75)	
ii. Packaging material	0.20 (14.29)	0.5 (31.25)	
Total (i to ii)	1.40 (100)	1.60 (100)	
Selling price of retailer	11050.00	17060.00	
Retailer's margin	28.60	58.40	
Price Spread	11011.38	17021.48	16961.48
Producer's share in consumer's rupees	0.35	0.23	0.23
Note: Figure in parentheses are percentage to the total cost			

Appendices

Appendixii: Marketing cost and margin of green tea in Meghalaya			(Rs/Kg)
Selling Price of Producer	30	30	30
Cost incurred by the farmers			
i) Plucking	1.20 (24.10)	1.20 (15.08)	1.20 (15.08)
ii) Transportation	0.75 (15.06)	0.75 (18.84)	0.75 (18.84)
iii) Gunny bag	0.45 (9.04)	0.35 (8.79)	0.35 (8.79)
iv) Loss during storage	2.58 (51.81)	2.28 (57.29)	2.28 (57.29)
Total (I to iv)	4.98 (100)	4.58 (100)	4.58 (100)
Net price receive by the Producer	25.02	25.42	25.42
Cost incurred by processor			
i) Transportation	0.7 (0.43)	0.7 (0.39)	0.7 (0.39)
ii) Loading & unloading	0.6 (0.37)	0.5 (0.28)	0.5 (0.28)
iii) Weighing	0.35 (0.21)	0.35 (0.19)	0.35 (0.19)
iv) Deduction	100(61.38)	100 (55.04)	100 (55.04)
v) Electricity	1.35 (0.83)	1.35 (0.74)	1.35 (0.74)
vi) Weathering	0.85 (0.52)	0.85 (0.47)	0.85 (0.47)
vii) Processing	50(30.69)	50 (27.52)	50 (27.52)
viii) Drying	0.75 (0.49)	0.75 (0.41)	0.75 (0.41)
ix) Labelling	-	7 (3.85)	7 (3.85)
x) packaging	-	10 (5.50)	10 (5.50)
xi) Gunny bags/pack	0.33 (0.20)	0.2 (0.11)	0.2 (0.11)
xii) Loss (Storage/processing)	8 (4.91)	10(5.50)	10(5.50)
Total (i to xii)	162.93 (100)	181.70 (100)	181.70 (100)
Selling Price of processor	1000	1100	1100
Processor's margin	807.07	888.30	888.30
Cost incurred by wholesaler			
i) Transportation	1.1 (56.41)		
ii) Loading & unloading	0.5 (25.64)		
iii. Packaging material	0.35 (17.95)		
Total (i to iii)	1.95		
Price paid by retailer	1040.00		
Wholesaler's margin	38.05		
Cost incurred by retailer			
i. Transportation	1.2 (85.71)	1.3 (68.75)	
ii. Packaging material	0.20 (14.29)	0.40 (31.25)	
Total (i to ii)	1.40(100)	1.70 (100)	
Selling price of retailer	1140.00	1160.00	
Retailer's margin	98.60	58.30	
Price Spread	1114.98	1134.58	1074.58
Producer's share in consumer's rupees	2.19	2.19	2.31
Note: Figure in parentheses are percentage to the total cost			



1. Meghalaya first ever tea exhibition at Umsning, TDC (Tea Development Center)



2. The programme conducted by tea board and the department, government of Meghalaya.



3.Collection of different tea sample produces from Meghalaya



4.The sample of different product which was produces from our tea garden.



5. During the research tour at Tocklai Tea Research Institute, Jorhat.





6. Research tour in Assam Agriculture University (AAU, Jorhat) department of Tea Husbandry.





7. Research tour and visit to Areng Tea Factory Rongram, West Garo Hill.



8. Meghalaya tea brand CTC. which was produced from the West Garo Hills



9. Research tour to Rangram, Tea development Center, West Garo Hills.



10. Research tour to Umsning, Tea development Center, Ri-Bhoi district.



11. Research tour and interaction with farmers.



12. Research tour with progressive farmers and groups discussion.



13.The older and larges tea factory in Meghalaya, Nalari, Ri-bhoi district.



14.Different package of made tea produced in the factory



15. Meg tea factory: mini and small factory produce only green and orthodox tea.



16. The Meg tea factory at Umsning, Ri-Bhoi district.



17.The farm manager and factory supervisor.



18.Final product before packaging and send to the market.



19.The AH tea garden at Mawlein, Ri-Bhoi district.



20. Random picture of the garden



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**An Analysis of tea (*Camellia sinensis. L*) Production and Marketing: Pattern in Meghalaya.
Interview schedule**

Serial no:

Name of Enumerator		Contact no.		Date	
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1. General Information	
Name of Respondent	
Village	
Block	
District	
Age	
Sex (M=1, F=0)	
Education standard (illiterate=0, primary=1, secondary=2, higher secondary=3, University=4)	

2. Family Composition							
Family members	No	Agriculture	Service	Business	School/College	Household	Other (specify)
Adult male (≥ 18)							
Adult female (≥ 18)							
Child male (< 18)							
Child female (< 18)							
Total							
Market distance (km)		Main source of income			Contact no.		

3. Land Holdings and cropping pattern (Acre)										
	Upland/ Terrace		Lowland		Total	Type	Upland/Terrace		Lowland	Total
	Irrigated	Non-irrigated	Irrigated	Non-irrigated			Irrigated	Non-irrigated	Irrigated	Non-irrigated
Owned						Area under Rabi crops (Acre)				
Leased in						1				
Leased out						2				
Total						3				
Area under Kharif Crops (Acre)						Area under Zaid crops (Acre)				
1						1				
2						2				
3						3				

4. Annual income of the farmer (₹/annum)									
Source	Crop	Livestock	Piggery	Poultry	Service	Labour	Business	Others	
Income									

5. Annual expenditure of the farmer (₹/annum)									
Source	Food	Feed	Health	Education	Transport	Telephone	Social obligation	Others	
Expenditure									

6. Livestock Assets																
	No.	Milk (ltr)				Meet (Kg)				Egg				Inputs Consumption (kg/day)		
		Produce	Consume	Sold	(₹ /ltr)	Produce	Consume	Sold	(₹ /Kg)	Produce	Consume	Sold	(₹ /no.)	Green fodder	Dry fodder	Concentrate
Local Cattle																
Cross breed																
Buffalo																
Goat																
Mithun																
Yak																
Sheep																
Poultry																
Fish pond																
Duck																
Pig																
Rabbit																

7. Farm implements														
Particulars	No (#)	Year of purchase	Purchase value (₹)	Present Value (₹)	Expected life (years)	Annual repairing (₹)		Particulars	No (#)	Year of purchase	Purchase value (₹)	Present Value (₹)	Expected life (years)	Annual repairing (₹)
Dao								Tractor						
Sickle								Tubewell						
Spade								Pumpset						
Plough								Other						
Hoe								Cattle shed						
Weeder								Godown/store						
Cultivator								Tube-well shed						
Power tiller								Scooter						
Power spray/ other spray								Motorcycle						
Tea basket								Car						
Grafting knife								Truck						
Net bags								Telephone/mobile						
Other								Other						

8. Cost of establishment of tea plantation	1 st years	2 nd years	3 rd years	4 th years	5 th years	6 th years
Non- recurring cost						
Recurring cost						

9. Cost of production of tea plantation					
Particulars	Activity	Total	Particulars	Activity	Total
Tillage (no.)			Irrigation (no.)		
			Family labour (hrs.)	Male	
				Female	
Bullock labour (hrs.)	Owned		Hired labour (hrs.)	Male	
	Hired			Female	
Machineries (hrs.)	Owned		Irrigation (hr)		
	Hired		Pesticides application		
Seed used (kg)	Owned		Family labour (hrs.)	Male	
	Purchased			Female	
Variety used (name)			Hired labour (hrs.)	Male	
Sowing (hrs.)				Female	
Sowing date			Name of pesticides (qty.)		
Family labour (hrs.)	Male		1		
	Female		2		
Hired labour (hrs.)	Male		3		
	Female		Application of manures /FYM (kg/acre)		
Weeding			Family labour (hrs.)	Male	
Family labour (hrs.)	Male			Female	
	Female		Hired labour (hrs.)	Male	
Hired labour (hrs.)	Male			Female	
	Female		Harvesting Date		
Fertilizers (kg)	Urea		Family labour (hrs.)	Male	
	DAP			Female	
	SSP				
	MOP				
			Hired labour(hrs)	Male	
Fertilizer Application (hrs.)				Female	
Male Family labour (hrs.)	Male		Machine (hrs.)	Hired	
	Female			Owned	
Hired labour (hrs.)	Male		Yield (qtl/acre)	Harvest	
	Female				

10. Quantity sold and consumption of tea and its product					
Particulars	Orthodox tea	Green tea	CTC tea	White tea	Others
Consumption (Kg)					
Sold (Kg)					

11. Disposal pattern of tea and its product										
Intermediaries	Orthodox tea		Green tea		CTC tea		White tea		Others	
	Qty.	Price (₹/qtl)	Qty.	Price (₹/qtl)	Qty.	Price (₹/qtl)	Qty.	Price (₹/qtl)	Qty.	Price (₹/qtl)
Wholesaler/trader										
Retailer										
Consumer										
Other (Specify)										

12. Marketing cost/ post-harvest management incurred by various intermediaries				
Cost items	Intermediaries in tea marketing			
	1	2	3	4
	Producer	WT	R	C
Transportation (₹/qtl)				
Loading & unloading (₹/qtl)				
Weighing				
Gunny bags/pack				
Stitching				
Loss during marketing				
Drying				
Grinding				
Storing				

Note:, WT= Wholesaler/trader, R=Retailer, C=Consumer

13. Input Prices in the Village					Price
Human labour (₹/hrs.)	Male	Price		Bullock price (₹/hr)	
	Female			Manure price (₹/qtl)	
Interest rate (%)	Formal			Pesticide price (₹/ltr)	
	Informal			i	
Irrigation	Canal irrigation (₹/ Acre)			ii	
	Pump set (₹/hrs.)			iii	
	River (₹/hrs.)			Weedicides (₹./litre)	
Tillage (₹/Acre)	Harrow			i	
	Cultivator			ii	
	Levelling			Rental value of land (₹./ Acre)	
	Power tiller			Price of land (₹/ Acre)	
Fertilizer (₹/kg)	Urea			tea (₹/kg)	
	SSP			Other	
	MOP			Transportation charge(₹/kg)	
				Storing charge(₹/kg)	

14. Marketing channel of different products of tea										
	→		→		→		→		→	
	Kg	Price	Kg	Price	Kg	Price	Kg	Price	Kg	Price
Farmer										
Orthodox tea										
Green tea										
CTC tea										
White tea										
other										

15. Constraints faced by the farmers						
1	Physical	Biological	Social	Marketing	Economic & Financial	Legal
2						
3						
4						
5						
6						
7						
8						
9						
10						

16.	Suggestion by the farmers if any.
1	
2	
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