Study No -152

Jhuming to Mainstream Farming as an Alternative Way of Livelihood amongst the Tribal Farmers of Tripura

Study Sponsored by
the Ministry of Agriculture and Farmers' Welfare
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Dr. Anup Kumar Das
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Agro- Economic Research Centre for North-East India
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PREFACE

The study entitled, "***Jhuming* to Mainstream Farming as an Alternative way of Livelihood amongst the Tribal Farmers of Tripura"** was undertaken by the AERC for North East India as an individual study approved by the CCOS.

As per the accepted design, the study was conducted on the basis of primary and secondary level data. Tripura is the smallest State of the North Eastern region and about 70 per cent of its land is covered with the hills and forests. There are 8 administrative districts in Tripura and for the present study, only 2 *Jhum*-dominated districts, namely, Dhalai and Gomati districts (Ref. Basic Statistics of Tripura-2014, Government of Tripura) were selected purposively. In the next stage, two Blocks from each of the districts were selected on random basis, which included Ambassa and Salema Blocks in Dhalai district and Matabari and Killa Blocks in Gomati district. From each block, 20 samples of *Jhum* and piggery, 20 samples of settled agriculture and horticulture and 20 samples of piggery and settled agriculture were drawn randomly. With this sampling design, altogether 240 samples were drawn from 2 sample districts, *i.e.* 120 samples from each of the districts.

The net return from settled cultivation was found to be 1.56 times more than that of *Jhum* cultivation. Piggery, in general, is a profitable venture in the study area. The Cross-bred (CB) pig rearing in the study area was 4.90 times more profitable than Non-Descript (ND) pig rearing. In overall analysis, the total net returns from settled farming with CB pig rearing was found to be 3.51 times more profitable than that of *Jhum* cultivation with ND pig rearing.

The findings of the study clearly indicate that the adoption of settled crop cultivation with CB pig rearing played an important role in empowering the tribal women folk of the sample area, sensitizing them to take part in the decision-making process as that of their male counterparts.

For obvious reasons, the findings of the study are to be highlighted and constant efforts should be made to educate the *Jhum* farmers to go for settled cultivation together with pig farming, particularly CB piggeries in order to attain better livelihood options.

The present study is a joint output of the AERC, Jorhat. Special mention may be made of Dr. A. K. Ray, Dean (Academics & Research, ICFAI University, Tripura, Agartala) who offered valued contribution in accomplishing the study. The names of other research staff associated with this study have been mentioned elsewhere in the report.

I hope that the findings of the study will be useful to the researchers and to those who are involved in planning and policy formulations in the field of hills agriculture.

(Anup Kr. Das)
Honorary Director
AERC for N-E India, Jorhat

CONTENTS

*****

LIST OF TABLES

*****

LIST OF FIGURES

*****

EXECUTIVE SUMMARY

Introduction

Traditionally, most of the indigenous hill tribes in the North Eastern region practice *Jhum* or shifting, a method of slash-and-burn cultivation. This practice is mainly followed by the hill tribes as they do not possess much of plain lands for extensive cultivation. They do consider it as their traditional custom, for which they continue the practice over the years in spite of a number of formidable constraints.

In Tripura, over 16,511 ha (about 1.57 % of the total geographical area of the State) of land are under the *Jhum* cultivation. Due to erosion of top soil on account of rain and wind, *Jhum* cultivation, over time has become un-remunerative. With ever-rising population, the *Jhum* cycle in most of the areas of Tripura has come down to 2-3 years only. As a result, the output- input ratio of *Jhum* cultivation has become very low, for which *Jhumias* of the state are still living a sub-standard life.

It has been observed that in recent time, a large number of tribal farmers have come forward successfully to adopt piggery as an alternative way of livelihood in Tripura. Besides, the state has much potential for growing horticultural crops, as substantiated by the available literature and data base. Records indicate that the economic status of the settled farmers is much better than that of the *Jhumias*.

Under the circumstances, it was felt necessary to highlight some of the success stories from the state itself in order to motivate the farmers (*Jhumias*) to go for replacing *Jhum* cultivation and also for adoption of modern technology in their own farming system as an alternative way of livelihood.

In this backdrop, the present study was designed with the following objectives:

Objectives

1. To study the trend of development of major agriculture & allied sectors *viz*., agriculture, horticulture and piggery.
2. To identify the success stories in the field of agriculture & allied activities in the selected districts as an alternative livelihood option among the *Jhumias*.
3. To study the comparative economics of *Jhum* and settled cultivation with piggery in terms of costs and returns.
4. To see the status of empowerment of tribal women.
5. To examine the problems of replacement of the existing production patterns.

Methodology and Coverage of the study

The study is based on both primary and secondary level data. The information on successful farmers of Agriculture, Horticulture and Animal Husbandry (Piggery) sectors in Tripura, were collected from various Annual Reports of the Line Departments, internet pages, newspaper clips, journals, various reports and working papers. Primary data were collected from three different groups of samples, *viz.*, the *Jhumias* practicing agriculture & piggery, the settled farmers practicing agriculture and horticulture and the farmers practicing agriculture and piggery. The study relates to the year 2016-17.

The present study covers 2 *Jhum*-dominated districts, namely, Dhalai and Gomati in Tripura. From each district, two blocks were selected on random basis, which included Ambassa and Salema blocks in Dhalai district and Matabari and Killa blocks in Gomati district.

Thereafter, from a cluster of 2 to 3 villages under each of the blocks, 20 sample farmers having *Jhum* & piggery, 20 settled farmers raising agriculture & horticultural crops and 20 sample farmers having piggery & agriculture were drawn randomly. With this sampling design, altogether 240 samples were drawn from 2 sample districts. Detailed sample distribution is presented in Table-1.

Table - 1
District and block-wise Distribution of Sample Farmers

Particulars of sample	Dhalai district		Gomati district		Total
	Salema Block	Ambassa Block	Matabari Block	Killa Block	
Jhum and piggery	20	20	20	20	80
Agric. and horticulture	20	20	20	20	80
Piggery and agric.	20	20	20	20	80
Total	**60**	**60**	**60**	**60**	**240**

Source: Based on primary data source

An attempt has also been made to draw statistical inference on the trend of development of agricultural sector in the state. The trend of agriculture and allied sectors was calculated by using the following linear growth model

$Y = a + bt$

Here, Y= Yield /ha

t= Time *i.e.* Year.

Applying OLS method, the following two normal equations were obtained:

$$EY = na + bE\ t$$

$$EtY = aEt + bEt^2$$

To work out the CAGR in area, production and productivity, the following equation was used

$$Y = a\ b^{t}\ e \ldots\ldots (1)$$

Where, Y= Dependent variable for which growth to be estimated

a= Intercept

b= regression coefficient

t= time variable

e= error–term

The compound growth was obtained by taking log of the equation (1)

$$\text{In } Y = \text{In } a + t \text{ In } b + \text{In } e \ldots\ldots (2)$$

The percent of growth rate was derived by using the relationship (3)

$$CAGR = (\text{Anti log of } b-1) * 100 \ldots\ldots (3)$$

To test the significance of CAGR (r), standard error was estimated with the formula given in equation (4) as-

$$\frac{100\ b}{Log_{10}e} \sqrt{\frac{\left[\sum(\log y)^2 - \frac{(\sum \log y)^2}{n}\right] - \left[\sum x^2 - \frac{(\sum x)^2}{n}\right](\log b)^2}{(n-2)\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]}} \ldots\ldots (4)$$

Where,

$Log_{10}e = 0.43429$

And, the 't' value was estimated as-

$$t = \frac{r}{S.E.(r)} \ldots\ldots (5)$$

Trend of development of agriculture & allied sectors

It is observed from the secondary level data that the area under food grains in Tripura had increased from 2.62 lakh hectares in 2005-06 to 3.03 lakh hectares in 2015-16 with a compound annual growth rate (CAGR) of 1.19 per cent. Similarly, there had been an increase of about 1.95 lakhs MT of food grains during last 10 years,

registering a CAGR of 2.63 per cent, while yield rate had increased from 2400 kg /ha in 2005-06 to 2720 kg/ha in 2015-16 with a CAGR of 1.52 per cent (all these three CAGRs were found significant in 1% probability level).

The area under rice had increased by 2.24 lakh hectares during 2005-06 to 2015-16 with a CAGR of 0.38 per cent (found insignificant) while the production of rice had increased to the tune of 1.89 lakh MT with a CAGR of 2.50 per cent during the reference period. The yield rate had increased from 2,172 kg/ha in 2005-06 to 2,937 kg/ha in 2015-16 with a CAGR of 2.40 per cent (both production and productivity were found significant at 1% probability level).

Horticulture

Among the important horticultural crops, pineapple grown in Tripura is widely acclaimed as the best in the country. The State continues to be the largest producer of True Potato Seed in the country and is surplus in several other vegetable crops.

The area under major fruits increased from 33.18 thousand hectares in 2005-06 to 75.69 thousand hectares in 2015-16 with a CAGR of 9.61 per cent. The production was found to increase from 5.23 lakh MT in 2005-06 to 8.58 lakh MT in 2015-16 and in case of productivity; it was found to decline from 15.76 MT/ha to 11.33 MT/ha during the same period (all these three CAGRs were found significant at 1% level). In the hilly terrain, erosion of fertile top soil is a common problem. Therefore, application of external soil nutrients is a must to increase the productivity. But the poor farmers cannot afford to apply required doses of nutrients in their crop field, for which, the productivity of fruit crops might have declined.

The trend of production of pine apple was found to increase along with increase in area. The CAGR was recorded at 14.54 per cent and 8.26 per cent in case of area and production, respectively (both CAGRs were found significant at 1% level). But the productivity of pineapple had shown a declining trend from 17.44 MT/ha in 2005-06 to 14.30 MT/ha in 2015-16 with a negative CAGR of 5.55 per cent and found insignificant. This may be due to washing away of natural soil nutrients through erosion in hilly tracts or non-application of soil nutrients externally.

The State is surplus in vegetable production. The area under vegetables has gone up substantially with the increase in consumption per capita (<500 gms). The area under vegetable had shown an increasing trend from 26.09 thousand hectares in 2005-06 to 40.30 thousand hectares in 2015-16 with a CAGR of 6.09 per cent during

the reference period while the production increased from 2.89 lakh MT in 2005-06 to 6.69 lakh MT in 2015-16 with a CAGR of 11.08 per cent. The productivity of vegetables had also shown an increasing trend from 11.08 MT/ha to 16.47 MT/ha during the reference period with a CAGR of 4.66 per cent (all were significant at 1% level).

Piggery Development

Pig rearing is the most popular economic activity in Tripura. The number of CB pigs was 2.14 lakh in 2012-13 which increased to 2.44 lakh by the end of 2016-17 with a CAGR of 3.38 per cent. Although the number Non-descript (ND) pigs were less than that of CB pigs in the reference years, it showed an increasing trend with a CAGR of 2.10 per cent. The CAGRs of CB pigs & ND pigs were found significant at 1 % level, so was found in case of total pigs as well.

***Jhum* Cultivation**

In Tripura, area under *Jhum* cultivation was recorded at 16,843 hectares in the year 2016-17 (provisional) against an average production of 18,190 MT. The average yield per hectare was found at 1,080 kg. Evidently, the productivity of paddy under *Jhum* was much lower than that of the settled paddy cultivation. The area under *Jhum* cultivation had shown an increasing trend with a CAGR of 1.75 per cent (significant at 10% level), and production was found to increase with a CAGR 2.60 per cent (significant at 5% level) while the productivity recorded a marginal growth of 0.85 per cent (significant at 1% level).

Table - 2

Development of Agriculture and Allied Sectors in Tripura (2005-06-2015-16)

(In Percentage)

Particulars	Area	Production	Yield
Jhum	1.88	2.53**	0.86
Total Food Grains	1.06	3.03**	1.78
Paddy	0.38	1.97	3.85**
Fruits	8.35*	4.17*	8.38*
Vegetables	8.63*	20.95*	-0.36

Source: Economic Survey of Tripura

Note: * Significant at 1 per cent, ** significant at 5 per cent, *** significant at 10 per cent

As per report of the Economic Survey of Tripura, it is evident (Table -2) that the growth of area under *Jhum*, total food-grains and paddy did not show any significant growth but the growth of area under fruits and vegetables had shown significant growth at 5 per cent and 10 per cent level, respectively. On the other hand, the growth of production under *Jhum*, total food-grains, fruits and vegetables were found significant at 5 per cent and 1 per cent level, respectively. In case of growth of productivity, paddy and fruits had shown significant growth at 5 per cent and 1 per cent level of significance, respectively. However, all the crops grown by the sample farmers had shown increasing trend in area, production and productivity except for vegetable crops. As the number families are on the rise due to increase in family size of *Jhumias* and non-*Jhumia*s, the demand for food is increasing and for this reason, they have no option in hand but to increase the area under cultivation.

Pig Rearing Pattern with Production, Productivity and Price

Pig rearing is a traditional practice for almost all the farm households. Most of the settled cultivators reared cross bred (CB) pigs and *Jhumias* reared non-descript (ND) pigs. The average number of pigs and piglets per household for both types of pig & piglets (CB & ND) across the blocks stood at 5 each. The overall production of meat per pig was recorded at 101.35 kg in case of CB pigs while it was only 30.22 kg for ND pigs. The growth in terms of size of CB pigs was also found to be at much higher side as compared to ND pigs. As far as price was concerned, it was little higher (Rs.283/kg) for ND pigs as compared to CB pigs (Rs.262/kg).

Block-wise per farm Area, Production, Productivity and Price of the Crops

The highest productivity of *Aman* paddy with 5,219 kg per hectare was recorded against the Ambassa block followed by Salema block (5,155 kg/ha), Matabari block (4,030 kg/ha.) and Killa block (3,892 kg/ha). The cultivation of *Boro* paddy was found in Killa block of Gomati District only, with a productivity of 5,255 kg /ha. The productivity of pineapple ranged between 28,840 to 18,872 nos. per hectare across three blocks, namely, Salema, Ambassa and Matabari. The highest productivity of brinjal was recorded at 4,210 kg/ha in Killa block followed by Ambassa block with 3,903 kg/ha and Salema block with 1,938 kg/ha. Potato cultivation was found in Killa block only with a productivity of 25,375 kg /ha. Chilli (raw) was grown in Salema and Matabari blocks only, registering a productivity of 2,491 kg/ha and 3,257 kg/ha, respectively. Cultivation of pumpkin was found only in Matabari block with 5,030 kg/ha productivity. As against this, *Jhum* cultivation is a

traditional practice for all the hill tribes of Tripura and is basically community cultivation. The per hectare yield of *Jhum* paddy was found to be much lower than that of the settled area paddy. The highest yield of *Jhum* paddy with 2,874 kg/ha was recorded in Ambassa block followed by 2,832 kg./ha in Killa block, 2,615 kg/ha in Salema block and 1,645 kg/ha in Matabari block. The estimated yield of pulses in *Jhum* area were in between 243 kg/ha and 351 kg/ha across all the blocks. The estimated yield of pulses in *Jhum* area were in between 181 kg/ha and 151 kg/ha while that of mixed vegetables ranged between 360 kg/ha and 254 kg/ha across the blocks.

Block-wise benefits from settled farming, *Jhum* cultivation and pig rearing

During the field survey, it was observed that all the settled crops *viz.*, *Aman* paddy, *Boro* paddy, pine apple, brinjal, potato, chilli and pumpkin were profitable, but crops under *Jhum viz.*, paddy, maize, pulses and mixed vegetables did not reflect due returns. It might be due to low productivity of crops under *Jhum* cultivation. The average per hectare cost of cultivation, gross returns and net returns from all settled crops and *Jhum* crops across the selected blocks of Dhalai and Gomati districts, were also worked out to see the economics of settled crops and *Jhum* crops in terms of BCR.

For all settled crops, at aggregate level, the BCR was recorded at 1.35:1 under Salema block and at 1.74:1 under Ambassa block of Dhalai District and the corresponding figures for Matabari block and Killa block of Gomati district were found at 1.46:1 and 1.66:1, respectively.

In case of overall *Jhum* cultivation, the BCR stood at 1.02:1 under Salema block and 1.09:1 under Ambassa block of Dhalai District while the BCR was recorded at 1.05:1 in Matabari block and 1.03:1 in Killa block of Gomati district.

The overall BCR of settled cultivation was 1.35:1 against Salema block, 1.74 :1 for Ambassa block, 1.46 :1 for Matabari block and 1.66 :1 for Killa block. Thus, it can readily be concluded that the settled cultivation yielded better productivity and better profit as compared to *Jhum* cultivation.

In case of pig rearing, the BCR stood at 1.09:1 against CB pig and 1.31:1 against ND pigs in Salema block, while in Ambassa block, it was recorded at 1.38:1 against the CB pig and 1.16:1 against ND pigs. In Matabari block, the BCR stood at 1.44:1 against CB pigs and 1.15:1 against ND pigs while in Killa block, the BCR were recorded at 1.85:1 against CB pig and 1.23:1 against ND pigs. Thus, the selected

blocks under both the districts indicated higher BCR for CB pigs as compared to ND pigs.

Block-wise Employment Generation in Dhalai and Gomati District

The employment pattern usually depended on the average size of operational holding per household and size of pig and piglets farms. Combining both the blocks of Dhalai district, the number of man-days per household was worked out at 78 days for settled cultivation and 107 man-days for *Jhum* cultivation while combining both the blocks of Gomati districts, per household man-days stood at 90 days for settled cultivation and 95 man-days for *Jhum* cultivation. Similarly, in case of CB pigs reared by the settled cultivators, the overall block total man-days stood at 63 days per farm household and 40 man-days for ND pigs reared by the *Jhumias* in Dhalai district while the overall block total man-days stood at 59 for CB pigs reared by the settled cultivators and 39 man-days for ND pigs reared by the *Jhumias* in Gomati district.

Finally, per farm net returns from settled cultivation *vis-à-vis Jhum* cultivation and also from pig rearing for all the sample farmers across the selected blocks were computed, compiled and presented. In case of settled farmers of Dhalai district, the percentage contribution of settled farming to the total net returns was estimated at 56.29 per cent and the remaining 43.71 per cent was contributed by CB Pig rearing. But in Gomati district, of the total net returns, 86.59 per cent was contributed by CB pig rearing and the rest 13.41 per cent was from crop cultivation. Combining both the districts, the overall net returns from CB pig rearing stood at 76.28 per cent of the total net returns. In case of *Jhum* farmers, combining both the districts, the overall per farm net returns from ND pig rearing stood at 58.26, while the contribution of *Jhum* cultivation was estimated at 41.74 per cent.

Further, the net return from settled cultivation was 1.56 times more than that of *Jhum* cultivation. The CB pig rearing in the study area was 4.90 times more profitable than ND pig rearing. In overall analysis, the total net returns from settled farming with CB pig rearing was found to be 3.51 times more profitable than that of *Jhum* farming with ND pig rearing. Thus, piggery, in general, is a profitable venture in the study area.

Table - 3
Overall per farm Net Returns from Settled *vis a vis Jhum* Cultivation and per farm Net Returns from (CB & ND) Pig Rearing

Particulars	Net Return (in Rs.)					
	Settled Farmers			*Jhum* farmers		
	Settle Cultivation	CB Pig	Settled + CB Pig	*Jhum* Cultivation	ND Pig	*Jhum* + ND Pig
Salema Block	3,238	6,384	9,622	1,288	3,316	4,604
Ambassa Block	6,723	1,350	8,073	3,134	2,100	5,234
Dhalai Ditrict (per cent to total NR)	**4,980 (56.29)**	**3,867 (43.71)**	**8,847 (100.00)**	**2,211 (44.95)**	**2,708 (55.05)**	**4,919 (100.00)**
Matabari Block	4,030	17,257	21,287	1,545	2,600	4,145
Killa Block	3,467	31,157	34,624	848	1,497	2,345
Gomati District (per cent to total NR)	**3,749 (13.41)**	**24,207 (86.59)**	**27,956 (100.00)**	**1,197 (36.87)**	**2,049 (63.13)**	**3,245 (100.00)**
Over all Net Returns (per cent to total NR)	**4,365 (23.72)**	**14,037 (76.28)**	**18,402 (100.00)**	**1,704 (41.74)**	**2,378 (58.26)**	**4,082 (100.00)**
Overall proportion of increase in net returns of Settled farmers over the *Jhum* farmers	**1.56**	**4.90**	**3.51**	-	-	-

Source: Primary Data

From the analysis, it can be concluded that the average net returns per farm for settled farmers was significantly higher than that of *Jhum* farmers of Tripura. Therefore, the findings of the study are to be highlighted and constant efforts should be made by the Government and other agencies to educate the *Jhum* farmers to go for settled cultivation together with pig farming, particularly CB piggeries in order to attain better livelihood options.

Empowerment of women

It has been observed that in the event of adoption of settled cultivation/CB piggeries, the level of education among the womenfolk had improved substantially, as reported by 87 and 66 per cent of the respondents in Salema and Ambassa block, respectively while it was 93 per cent in Matabari block and 87 per cent in Killa block.

Further, it has been observed that 20 per cent of the women in Salema block, 13 per cent of the women in Ambassa block, 26 per cent of the women in Matabari block and 27 per cent of the women in Killa block had political affiliation/membership. About 66 per cent of the womenfolk in the study area were registered with some NGO or SHG in both the blocks of Dhalai district and about 87 per cent of women in Matabari block and 66 per cent in Killa block of Gomati district were registered with the NGOs or SHGs. About 80 per cent of the women in Salema block, 40 per cent in Ambassa block, 66 per cent in Matabari block and 80 per cent of the women in Killa block had undergone some kind of training programmes organized by various Govt. Departments of the State.

Nearly, 53 per cent of the respondents in Salema block, 87 per cent in Ambassa block, 60 per cent in Matabari block and 53 per cent of the respondents in Killa block reported that both men and women participated in the decision making process.

The day-to-day household works were performed by both man and woman in all the blocks, as reported by 28 per cent of the respondents in Salema block, 20 per cent in Ambassa block, 13 per cent in Matabari block and 20 per cent of the respondents in Killa block. As against this, as high as 73 per cent of the respondents in Salema block, 80 per cent in Ambassa block, 87 per cent in Matabari block and 80 per cent of the respondents in Killa block independently handled the day-to-day household works. This indicates that a larger percentage of women in the study area had to manage the household jobs, with prolonged work pressure on them.

An improved level of education among the women had resulted in getting Government employment to the extent of 27 and 20 per cent in Matabari and Killa blocks, respectively. Twenty six per cent women in Matabari block and 40 per cent women in Killa block were reported to be engaged in Government organizations. Another 34 per cent of women in Salema block, 30 per cent in Ambassa block, 26 per cent in Matabari block and 34 per cent of women in Killa block were engaged in private organizations.

Further, 53 per cent of the women in Salema block, 87 per cent in Ambassa block, 60 per cent of the women in Matabari block and 53 per cent the womenfolk in Killa block, took active part in decision-making together with their male counterparts particularly on family matters.

Thus, the above observations clearly indicate that with the replacement of *Jhum* cultivation by that of settled one, the tribal women of the study area became really empowered socially, politically and economically.

Observations on farmers' problem areas

The problems confronted by the *Jhum* cultivators as well as settled farmers were ascertained by asking specific questions at the time of interview. The Garrett Ranking Technique (Garrett, 1969) was used for ranking of the problems faced by the farmers:

Problem areas and viewpoints of the *Jhumias*

On the basis of the opinion of the *Jhum* farmers, the following observations were made

- Eighty seven to 100 per cent farmers opined that shrinkage of *Jhum* cycle had led to low productivity of crops under *Jhuming.*
- Only a small segment of the *Jhum* cultivators *i.e*., 7 to 27 per cent were not aware of the harmful effect of *Jhum* cultivation on the flora and fauna of the locality.
- Thirteen per cent of the farmers in the district of Dhalai were of the opinion that they were continuing with the *Jhum* cultivation due to non-availability of plain land.

The Garrett rankings for the problems of *Jhumias*

The Garrett ranking for the problems confronted by the *Jhum* cultivators were worked out to draw inference on the magnitude of the problems.

It is clear from the **Garrett Ranking** that -

- *Jhumias* were not at all using HYV seeds and hence it was ranked 1, in the problem list.
- The *Jhumias* also considered the practice to be the least risky method of cultivation for which they wanted to continue with the *Jhum* cultivation. This attitude was considered to be the 2nd severe problem.
- Shrinkage of *Jhum* cycle led to low productivity of crops grown under *Jhuming* was ranked third severe problem.
- Shrinkage of *Jhum* cycle was due to increase in *Jhumia* population was yet another problem, ranked fourth.

- The next problem with the *Jhumias* was that they were not ready to leave the practice of *Jhum* cultivation as majority of them considered *Jhuming* as their identity or tradition.
- Non-availability of plain land to go ahead with settled cultivation was identified as yet another problem with rank 6.
- The seventh important problem faced by the *Jhumias* was that they did not even realize the fact that this method of cultivation could destroy the flora and fauna of the State.

Problem areas and viewpoints of the settled cultivators

- About 20 to 27 per cent of the settled farmers in both the districts considered shortage of family laborers to be a problem of high intensity; nearly 53 to 80 per cent considered it to be a moderate problem and about 7 to 27 per cent of the farmers deemed it to be a problem with low intensity.
- The prevailing wage rate in both the districts was found to be high, as pointed out by 87 to 100 per cent of the sample farmers; only 7 to 13 per cent found it to be a moderate problem,
- High input cost was another problem to reckon with, as expressed by 73 to 100 per cent of the sample farmers across the blocks. Another 20 to 27 per cent respondents considered input cost to be moderate.
- Pests and diseases attack was high, as reported by 40 (Salema Block) to 47 (Ambassa Block) per cent of the sample farmers of Dhalai district. This attack was reported to be moderate in both the blocks according to 53 per cent of the respondents. In case of Gomati district, pest and disease attack was reported to be high as pointed out by 13 to 47 per cent of the respondents in Matabari and Killa blocks, respectively.
- The irrigation facility was found to be inadequate in all the blocks under study and was considered to be a severe problem, as reported by 58 to 93 per cent of the sample farmers.

The Garrett rankings for the problems of settled cultivators

The Garrett Rankings for the problems of settled cultivators were worked out and it is clear from the **Garrett Rankings** that

- Higher wage rate stood as the most severe problem of the settled cultivators with rank 1
- High input cost occupied rank 2
- The third rank was secured by shortage of quality seeds
- Shortage of hired laborers in peak period of agricultural operations was yet another difficult problem with rank 4
- Inadequate irrigation facilities occupied rank 5 across the blocks
- Low price of produces as compared to its cost of cultivation was ranked 6
- Attack of pests and diseases during the plant growth period was ranked 7
- Shortage of inputs at the time of requirement secured rank 8 and
- Shortage of family worker was ranked 9

Problems of raising horticultural crops

- About 60 to 93 per cent of the horticultural farmers in both the districts noted the existence of wide gap between demand and supply of crops during peak harvesting season across the blocks.
- Almost all the sample farmers (87 to100 per cent) from both the districts identified post-harvest losses to be the most serious problem of growing horticultural crops.
- In Dhalai district, nearly 57 to 87 per cent sample farmers assigned high priority on acute shortage of cold storage facilities while in Gomati district, 87 to 100 per cent farmers opined likewise.

The Garrett rankings on the problems of farmers growing horticultural crops

- Shortage of processing facilities for fruits and vegetables was the most serious problem of Tripura with rank 1
- Post-harvest losses of fruits and vegetables were very high and was ranked 2nd.
- The acute shortage of cold storage facilities was identified as the third most serious problem of the farmers growing horticultural crops in the State.
- Ever widening gap between of demand and supply of output in peak harvesting season compelled the producers to sell their produces at lower prices and hence was identified as the fourth most important problem of the farmers.

- Intervention of the State and private traders for marketing of surplus products in the study area was far from satisfactory level and was therefore identified as yet another problem with rank 5.

Major problems faced by the sample farmers involved in rearing of CB pigs

The problems encountered by the sample farmers involved in CB pig rearing, as reported, were in the following order, in terms of intensity, from high to low:

- Price of product was low
- Wage rate of laborer was very high
- Price of medicine for treatment of CB pig was high
- Shortage of own capital
- Low subsidy
- Poor quality feeds and high price of feed
- Shortage of cold storage facilities

Major problems faced by the sample farmers involved in rearing of ND pigs

The major problems encountered by this category of farmers, in descending order included

- Shortage and high price of piglets
- Price of matured pig was determined by the middle-man
- High price of feed
- Shortage of cash capital to increase the numbers of piglets
- Non-availability of cross bred piglets and difficulty in obtaining semen for artificial insemination.

Observation on *Jhum* cultivation

Replacement of *Jhum* cultivation is possible only when *Jhumias* realize the comparative benefits of settled cultivation with improved packages over the shifting cultivation. Also, there is a need for policy changes under a different perspective to address the biases against shifting cultivation. Results of the investigation clearly indicated that adoption of settled cultivation could fetch handsome profits to the *Jhumias* per hectare along with CB pig rearing.

Suggestions for improvement of pig farms

The tribal farmers of the state are well experienced in rearing of pigs by tradition and if supported by the Government appropriately, it would definitely change the livelihood status of the farmers involved in settled and *Jhum* cultivation as

well. The following suggestions can be put forwarded for improvement of pig farming on the basis of interaction with the farmers.

- The production of meat per CB pig was much higher than that of ND pigs
- Labour cost for rearing CB pig is also on higher side than that of ND pig
- Price of medicine for treatment of pigs may be subsidized or may be distributed free of cost.
- Visits of veterinary doctors at regular interval may be ensured in order to improve the health and growth of pigs/ piglets..
- Slaughtering of animal should be made more scientific and hygienic.
- Cold storage facilities may be created nearby the market yard.
- Market place need to be hygienic.
- Extension machinery needs to be strengthened for creating awareness about scientific pig farming.
- Scientific interventions for utilization of non-conventional feed resources, capacity building in health care services, adoption of scientific breeding, use of artificial insemination and generation of trained manpower (entrepreneur) for medium to large scale production and proper use of pig by-products could transform the traditional subsistence pig farming to a healthy enterprise.
- The non-availability of cross bred piglets and difficulty in obtaining semen for artificial insemination may be mitigated by establishing more number of breeding farms to supply upgraded piglets in the remote areas.

Suggestions for improvement of agriculture/horticulture

Following few suggestions were drawn from the interactions with the sample farmers for overall improvement of agriculture/horticulture in the study area

- Transport costs of the agricultural produce may be subsidized by the Government.
- Private parties need to be encouraged for establishment of more cold storage and fruit processing units in the tribal areas.
- Small sheds for selling of agricultural produce in the roadside and market areas may be constructed. Also, private entrepreneurs may be supported to make mobile fruit stalls in selective areas.
- Participatory soil and water conservation measures need to be adopted.
- The drip and sprinkler irrigation need to be introduced in *tilla* areas particularly, for horticultural crops,

- Permanent “Tong Houses” in the vicinity of *Jhum* field may be constructed for settlement of the *Jhumias* in selected locations.
- Front line demonstration need to be arranged for the *Jhumias* for introducing newly developed varieties.
- Capacity building through massive awareness programme and training
- The rubber cultivation is profitable but not environment friendly. Moreover, gestation period for production of rubber is 6-7 years. Therefore, Government should encourage seasonal crops, horticulture crops and piggery farming in lieu of rubber plantation.

Conclusions

Shifting cultivation is interwoven into the culture and tradition of near about 19 tribes inhabiting in the hilly terrain of Tripura. However, it is not going to be tenable for a longer period of time in view of a number of limitations. Lack of settled agricultural land and irrigation facilities, remoteness, high cost of labour, energy and inputs and in the absence of other viable alternatives, the tribal population of the state still continue to practice *Jhum* cultivation for their livelihood. There is an urgent need to encourage and inspire this chunk of population to get involved in settled cultivation without hurting their cultural ethos. And for this to happen, the Government should come forward with innovative technology package together with the institutional and policy support to address the twin challenges of poverty eradication (of *Jhumia*s) and environmental protection.

***

CHAPTER- 1

INTRODUCTION

1.1 Background of the study

Traditionally, most of the indigenous hill tribes in the North Eastern region practice *Jhum*, a method of slash-and-burn cultivation. *Jhum* cultivation is also known as shifting cultivation. This practice is mainly followed by the hill tribes as they do not possess much of plain lands for extensive cultivation. They do consider it as their traditional custom, for which they continue the practice over the years in spite of a number of formidable constraints. Generally, in *Jhum* land, multiple cropping patterns are followed, at least 4 to 5 crops are grown in a plot of land and the *Jhumias* supplement their *Jhum* land with animal dung or plant extracts.

Due to erosion of top soil on account of rain and wind, *Jhum* cultivation, over time has become un-remunerative. The problems with the practice have further aggravated with unchecked soil degradation and reckless deforestation. Further, *Jhum* cultivation is a labour intensive cultivation practice and has very low output- input ratio, as reported by the agricultural scientists.

In Tripura, mostly the Reang tribe practices *Jhum* at large. The number of people dependent on *Jhum* has declined over the years. With ever-rising population, the *Jhum* cycle in most of the areas of Tripura has come down to 2-3 years only. It might be due to rehabilitation programmes launched by the Government with introduction of tea and rubber plantations together with perennial horticultural crops in *Jhum* areas. Also, a large number of tribal farmers have come forward to adopt piggery as an alternative way of livelihood in recent time in Tripura.

Continuous decline in soil fertility on account of ever reducing *Jhum* cycle resulting in low productivity of crops, high cost of land preparation, non use of fertilizers and scanty or no rainfall at proper time are identified to be the major constraints of *Jhum* cultivation.

The ongoing development programmes launched by the Governments are yet mitigate the plights of the tribal folk of the State. Geographical isolation, social taboos, un-economic traditional agricultural practices, inefficient marketing system, distress migration and unemployment are the major issues of concern. In this context, the Union Minister, Anant G. Geete on June 18, 2016 indicated that 67 per cent of the total population of Tripura is below poverty line.

1.2 State at a Glance

Economy of Tripura is basically agrarian as more than 44 per cent (including agricultural labourer) of its population directly depends on agriculture. However, due to hilly terrain and forest cover, only 24.34 per cent of the total geographical area is available for cultivation (Net cropped area is 2,55,360 ha as per DES, Govt. of Tripura, 2014-15).

As per provisional data (2015-16), Rice, the major crop of the State, is cultivated in 54.54 per cent of the total cropped area (5,04,579 ha) followed by *Kharif* pulses (2.58 per cent) *Rabi* pulses (1.84 per cent), Maize (1.71 per cent), *Rabi* oilseeds (1.45 per cent), *Kharif* oilseeds (0.88 per cent), Wheat (0.36 per cent), Cotton (0.18 per cent), Sugarcane (0.16 per cent), Jute (0.13 per cent), Mesta (0.12 per cent) and Foxtail/*Kaon* (0.02 per cent).

Jackfruit and pineapple top the list of horticultural products. The favorable agro-climatic condition coupled with availability of uplands in plenty, offers immense potential for cultivation of various tropical and subtropical fruits. In fact, oranges, pineapples and jack fruits grown in Tripura are already well known for their excellent quality. The area under fruits in the State is about 15.00 per cent of the total cropped area.

In addition to these, other horticultural crops like vegetables, spices and potato are also grown in the State. The area under vegetables is about 7.99 per cent (summer vegetable area 3.90 per cent and winter vegetable area 4.09 per cent) while area under potato and spice crops are 1.79 per cent and 1.14 per cent of the total cropped area, respectively.

Rubber and tea are the important cash crops of the state occupying 3.04 per cent of the total cropped area. Tripura ranks second to Kerala in the production of natural rubber in the country.

Moreover, the State is known for its handicraft, particularly hand-woven cotton fabric, wood carvings, and bamboo products.

Livestock is also an important component of agricultural systems in Tripura. However, like food grains, the State is deficient in milk, meat and eggs production and there lies a wide gap between the demand and supply of these items. In recent years, a large number of tribal farmers have started adopting piggery as an alternative livelihood option in addition to agricultural and horticultural crop cultivation. The total estimated pig population in the State, combining both Cross-bred (CB) and Non-

descript (ND), stands at 3,99,565 (Government of Tripura, 2015-16). Tripura produced about 112.26 lakh kg of pig meat in 2015-16, indicating that pig farming is contributing the economy of the State substantially.

As per 2011 Census, the total population of Tripura was recorded at 36,73,919 numbers of which the proportion of Schedule Tribe (ST) was about 31.8 per cent. Male and Female population under the ST-category were recorded at 50.42 per cent and 49.58 per cent respectively and gender ratio was 983, *i.e*. there were 983 females per 1000 males. In the ST-dominated area, women play a pivotal role in the family and usually undertake all sorts of activities, from household work to agriculture & allied activities. The status of tribal women inside and outside the family in performing the agricultural and other socio-political activities deserves to be studied to know the level of empowerment of tribal woman in the State.

1.3 Need and Scope of the Study

In Tripura over 16,511 ha (about 1.57 per cent of the total geographical area of the State) of land are under the *Jhum* cultivation. Although some successful tribal and non-tribal farmers are reaping yield as high as the farmers of Punjab and Haryana, but most of the farmers, particularly from tribal communities, are lagging far behind in terms of crop production and crop productivity, primarily because of continuing *Jhum* cultivation or lack of their knowledge of modern technologies. The production and productivity of horticultural crops are also much lower as compared to the potential capacity of the State. As a result, a large section of the tribal farmers of the State are still living a sub standard life.

Under the circumstances, it was felt necessary to highlight some of the success stories from the State itself in order to motivate the farmers (*Jhumias*) to go for replacing *Jhum* cultivation and also for adoption of modern technology in their own farming system as an alternative way of livelihood.

It is expected that with the replication of success stories amongst the tribal families across the tribal areas, it will definitely raise their level of income, education, employment and health status substantially. Further, this will reduce the severity of poverty of the tribal population with a positive impact on empowering the women folk. In this backdrop, the present study has been designed with the following objectives.

1.4 Objectives:

1. To study the trend of development of major agriculture & allied sectors *viz*., agriculture, horticulture and piggery.
2. To identify the success stories in the field of agriculture & allied activities in the selected districts as an alternative livelihood option among the *Jhumias*.
3. To study the comparative economics of *Jhum* and settled cultivation with piggery in terms of costs and returns.
4. To see the status of empowerment of tribal women.
5. To examine the problems of replacement of the existing production patterns.

1.5 Methodology and Coverage of the study

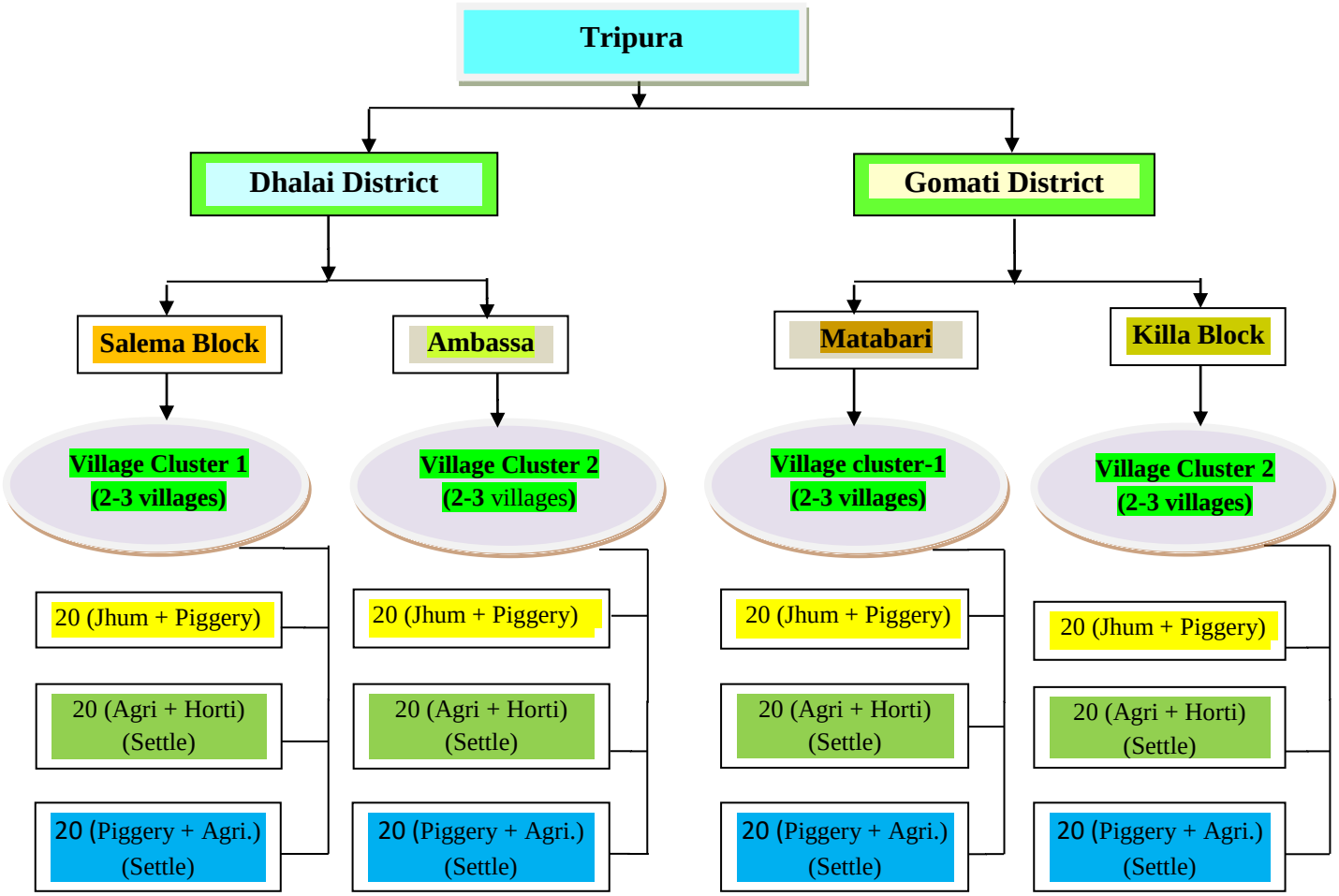
The study is based on both primary and secondary level data. The secondary data on agriculture & allied sectors were collected from various published and unpublished sources to study the trend of development. The information on successful farmers of Agriculture, Horticulture and Animal Husbandry (Piggery) sectors in Tripura, were also collected from various Annual Reports of the Line Departments, internet pages, newspaper clips, journals, various reports and working papers available with different State and national level institutions. Primary data were collected with the help of a well-structured questionnaire from three different groups of samples, *viz* the *Jhumias* practicing agriculture & piggery, the settled farmers practicing agriculture and horticulture and the farmers practicing agriculture and piggery. The study relates to the year 2016-17.

Tripura is the smallest State of the North-Eastern region and about 70 per cent of its land is covered with the hills and forests. There are 8 administrative districts in Tripura and for the present study, only 2 *Jhum*-dominated districts, namely, Dhalai and Gomati districts (Ref. Basic Statistics of Tripura-2014, Government of Tripura) were selected purposively. In the next stage, two Blocks from each of the districts were selected on random basis, which included Ambassa and Salema Blocks in Dhalai district and Matabari and Killa Blocks in Gomati district.

Thereafter, taking into account the successfulness of the ventures, 20 samples each from three different groups of farmers (Already defined) from a cluster of 2 to 3 villages under each of the Blocks were drawn randomly. With this sampling design, altogether 240 samples were drawn from 2 sample districts: 120 samples from each of the districts and 60 samples from each of the selected Blocks. Necessary statistical tools were used as and where required.

The flow chart of the sampling design has been presented below:

Figure - 1.1
Flow Chart of the Sampling Design



An attempt has also been made to draw statistical inference on the development trend of agricultural sector in the state. The trend of agriculture and allied sectors has been worked out by using the following linear growth model-

$Y = a + bt$

Here, Y= Yield /ha

t= Time i.e. Year.

Applying OLS method, the following two normal equations were obtained:

$$EY = na + bE\,t$$

$$EtY = aEt + bEt^2$$

The results of the analysis have been incorporated in the relevant chapter of the study report.

To work out the CAGR in area, production and productivity, the following equation is used

$$Y= a\, b^{t}\, e \ldots\ldots\ldots\ldots (1)$$

Where, Y= Dependent variable for which growth to be estimated

a= intercept

b= regression coefficient

t= time variable

e= error –term

The compound growth was obtained by taking log of the equation (1)

$$\ln Y=\ln a+ t \ln b +\ln e \ldots\ldots\ldots (2)$$

The percent of growth rate was derived by using the relationship (3)

CGAR= (Anti log of b-1) *100…………. .(3)

To test the significance of CAGR (r), standard error was estimated with the formula given in equation (4) as-

$$\frac{100\, b}{\text{Log}_{10} e} \sqrt{\frac{\left[\sum(\log y)^2 - \frac{(\sum \log y)^2}{n}\right] - \left[\sum x^2 - \frac{(\sum x)^2}{n}\right] (\log b)^2}{(n-2)\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]}} \ldots\ldots (4)$$

Where,

$\text{Log}_{10}e = 0.43429$

And, the ‘t’ value is estimated as-

$$t = \frac{r}{S.E.(r)} \ldots\ldots\ldots\ldots (5)$$

1.6 Organization of the Study

In consideration of the stated objectives, the study is divided into seven major chapters. Each chapter is further divided into some sub sections. As a whole, the organization of the study is framed as follows:

Chapter-1 Introduction.

It includes the background, need and scope of the study, objectives, coverage of the study and methodology and a few review of literature

Chapter-2 Socio-economic profile of the sample areas under study

Chapter-3 Trend of development of agriculture and allied sectors in the State.

Chapter-4 Cropping pattern, income and employment status of the sample farmers.

Chapter -5 Empowerment of women for adoption of settled agriculture, horticulture and CB piggeries by the *Jhum* farmers.

Chapter- 6 Problems faced by the farmers engaged in different economic activities

Chapter -7 Suggestions, policy implication and conclusion

1.7 Review of Literatures

1.7.1 *Jhum* Cultivation

A brief review of studies on different aspect of shifting cultivation, Piggery, Agriculture and Horticultural crops undertaken in different parts of the country and elsewhere in the World are presented in this section.

Ray, A. K. *et. al*. (2017) observed that almost all the *Jhum* cultivators of Tripura live below poverty line.

Vikas (2012) in his paper on 'Sustainable Livelihood Enhancement of Remote Tribal People in India' found that majority of the indigenous tribals were landless and daily labourers. Among the daily labourers, more than 80 per cent were below the poverty line and 98 per cent of them belonged to *Adivasi* communities. The *Adivasi* communities used to undertake shifting cultivation and responsible were for reduction of forest coverage, resulting in global warming like situation.

Das *et al*. (2012) in their work on 'Success Story of Rehabilitation of *Jhumias* in Tripura- A Study on Baramura -Deutamura Range' examined the status and change in shifting cultivation in one of the hill ranges of Tripura, called Baramura-Deutamura hill range, using GIS and remote sensing technique. The recent strategy adopted for *Jhumia* rehabilitation in Tripura was to increase the area coverage of rubber plantation in the state. The rubber plantation project was conceived to provide a lucrative alternative to *Jhum* cultivation. During the Ninth Five-Year Plan, the increasing trend of rubber plantation had become one of the main strategies for rehabilitation of *Jhumias* through the World Bank Aided India Rubber Project.

Shanely *et al*. (2011) in their paper on 'Brazil's Social Movement, Women and Forests: A Case Study from the National Council of Rubber Tappers' discussed the evolution of the roles of Brazilian women within one of the most prominent organizations of the Amazonian social movement *i.e*. the National Council of Extractives' Populations (CNS). Their work across sectors, cultivation of ties with the State, capacity building and acknowledgement of women's cultural connections to

forests, provide a strong foundation for an increasing role of Amazonian women to promote sustainable forest management and conservation.

Sarkar (2010) in his paper on Revolution of *Jhumias* through rubber plantation concluded that rubber plantation had changed the life style of *Jhumia* people of Tripura. Both economic and social conditions of tribals were better off after adoption of rubber plantation and they became able to maintain a good standard of living.

Rajasenan (2010) in his project report entitled, 'Livelihood and Employment of Workers in Rubber and Spices Plantations' examined the employment opportunity in rubber plantation. He observed that the institutional role played by the Government was very significant during the early days. The settlement of workers also resulted in the participation of women in large numbers. The report also discussed the livelihood assets of plantation workers according to the components identified by the USAID and UNDP for sustainable livelihood and poverty alleviation.

Karthik *et al*. (2009) in their paper on 'Forest Recovery Following Shifting Cultivation: An Overview of Existing Research' concluded that shifting cultivation was a predominant practice in the majority of tropical hilly tracts. Relatively few studies had examined the forest recovery following shifting cultivation. Most studies reported that, although pioneer tree species recover relatively faster, woody biomass of mature forest trees recover several decades after suspension of cultivation.

Ananthanarayanan (2008) in her paper on 'Northeast India's *Jhum* cultivation under Stress' found that unlike many other parts of India, people in rural hills of North-East India mostly engage in pre-capitalistic activities with surplus produce sold in nearby bazaars. Women often played a dominant role especially in deciding the distribution of the produce and selling of the surplus.

Murtem *et al*. (2008) conducted a study on '*Jhumias*' View on Shifting Cultivation in Arunachal Pradesh' to know the problems of *Jhumias* who were involved in *Jhum* cultivation. They attempted to highlight the views of the *Jhumias*, policy and legal framework of shifting cultivation and solution to the shifting cultivation in Arunachal Pradesh

Kumar *et al*. (2006) in their paper on 'Spatial patterns and processes for shifting cultivation landscape in Garo hills-India' discussed a few spatial patterns and processes of shifting cultivation landscape in the Garo Hills of Meghalaya state wherein nearly 85 per cent of the land belonged to the native communities.

Mishra (2005) in his paper titled ‘Growing Discontent of *Adivasi*s in Assam’ had examined the problems of tribals in Assam. He found that the local factors pushing the *Adivasi*s of Assam into poverty were manifold. Alcoholism was a major drain on income which forced the women and children's mobility outside their village in search of work, resulting in high dropout rate among the school going children. The community had poor access to anti-poverty, social security and scholarship schemes launched by the Government and were deprived of agricultural extension services. The *Adivasi*s of Assam were also reported to be affected more severely by natural disasters.

Jyotishi (2004) in his project on ‘Ecological, economic and institutional aspects of shifting agriculture: A study in Orissa’ had found that the colonial forest policies were intended for commercial exploitation of forest. There was a decline in the forest area over last three decades which stood at 11,000 square km. Population involved in shifting cultivation negated the fact that the area under shifting cultivation was very high and shifting cultivation was practiced usually in the high slopes.

Cameron, R.J. (1964) in his paper entitled ‘Destruction of the indigenous forests for Maori agriculture during the nineteenth century’ had observed that the introduction of potato to New Zealand at the end of the eighteenth century caused considerable changes in Maori agriculture. There was a great expansion in shifting cultivation over forest land and there were records of Maori fires having destroyed very large areas of forest. It was reported that European settlement in New Zealand did not check the rate of forest destruction but allowed to continue it on the same scale.

1.7.2 Piggery

Singh *et al*. (2016) in their study found that in spite of having excellent opportunities for development of piggery at an industrial scale, the North-Eastern India was not self sufficient in pork production and had to depend on imports from outside the region to meet the ever increasing demand. Therefore, there was an urgent need to make the tribal farmers aware of the scientific piggery farming to uplift their socio-economic status.

According to Patra *et al*. (2014), scientific interventions in utilization of non-conventional feed resources, capacity building in health care services, adoption of scientific breeding, use of artificial insemination and developing suitable entrepreneur

for medium to large scale production and proper use of pig byproducts could transform the traditional subsistence pig farming to a profitable enterprise.

Tochhawng & Rewani (2013) in their study found that the constraints namely, non availability of cross bred piglets and difficulty in obtaining semen for artificial insemination as perceived by the farmers could be overcome by establishing more breeding farms to supply upgraded piglets in the remote areas. Establishment of feed mill unit and a fully functional system of identifying non-conventional feed resources were considered to be imperative for cost effective pig husbandry production in the area under reference. A system for strengthening veterinary infrastructure for stock and supply of veterinary medicines and vaccines from dispensaries should be promoted to encounter the difficulties faced by the farmers.

Sarkar (2011) in his paper made an attempt to assess the way for tribal empowerment through pig farming, particularly in terms of income and social status. The results indicated that pig farming may be one of the important enterprises for tribal empowerment. It was evident from the study that the socio-economic status of the tribal people had improved after adoption of pig farming. The tribal people were basically ignorant section of the society and they depended on *Jhum* cultivation in the hilly areas for a living. Thus, the paper suggested that the Government may promote pig farming as an instrument for fighting against poverty and unemployment problems particularly among the tribal population.

Meganathan *et al*. (2010) in their study concluded that lack of sufficient pasture land, lack of marketing facilities, lack of adequate credit facilities, unremunerative price for the livestock products and lack of scientific knowledge on livestock farming were observed to be the major constraints perceived by the tribal farmers. Establishment of more milk co-operative societies, enhancing fodder cultivation, provision of loans to needy tribal livestock farmers at reasonable interest rate and conducting awareness programmes on various scientific livestock management practices would lessen the prevailing constraints in livestock farming, which in turn could improve the livestock production.

1.7.3 Agriculture:

Makdoh *et al*. (2016) observed that *Jhum* cultivation in Arunachal Pradesh was accompanied by low crop yield and land degradation, loss of forest wealth and soil fertility.

Suklabaidya *et al* (2015) observed that the crop diversification was highly successful in Tripura.

Acharjee, Milton *et al* (2013) observed that Indian Agriculture was an economic symbiosis of crop production and animal rearing. In India, 70 per cent population and their livelihood depended upon agriculture. Same scenario was applicable for Tripura as well as the North East India. Agriculture was an important sector in the economy of the North Eastern Region, with its share in state domestic product ranging from 19 per cent to 37 per cent in different states. In Tripura, 70 per cent of the total population drew their livelihood from agriculture. The paper emphasized upon the need for effective research for continued development of agriculture in Tripura.

Biwas (2010) stated a success story of Iduluru, a village in Nalgonda district of Andhra Pradesh where the farmers suffered from crop failure because of weather aberration. Mr Narayan Reddy of this village, however, created a history in farm production through the adoption of farming system approach and this paper made an attempt to highlight the secrets of his success.

Lightfoot *et al*. (1996) reported potentials and success of the integrated farming technology for transforming the existing traditional farming systems to more sustainable one in Ghana.

1.7.4 Horticulture:

. Das (2016) in his study observed that Tuber crops were very much popular in Tripura among the tribal and non tribal communities. However, no specific technology had been developed to increase the production of these vegetable crops.

Chakraborty *et al*. (2015) in their report proved that Pusa 372 followed by JG 11 were the two most important vegetable crop varieties for Tripura under late sown condition.

Anonymous (2011) in his report discussed the success story of flower cultivators and stated that three years before, Laxmibil village in west Tripura district was like any other ordinary village, wallowing in poverty and absence of gainful work till the Horticulture Department and Technology Mission stepped in and motivated the people to start floriculture. The village, as it stands now, not only supplies flowers to the home market, but also exports them abroad.

Biswas (2010) in his report also highlighted a success story of efficient use of water and plant nutrient through cultivation of the quick growing vegetable crops like

cabbage and cauliflower and their efficient marketing can result in poverty alleviation of the poor farmers. Further, integration of different farming systems can result in better utilization of all the resources at the command of the farmers. In India, small and marginal farmers were in the majority, and more so in some eastern states particularly.

From the above references, it was found that not many studies have been conducted in Tripura to see the fate of shifting cultivation and farmers' livelihood patterns. Hence the present study has been conceived and conducted by the Agro Economic Research Centre for North East India, Jorhat, Assam with the stated objectives.

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CHAPTER 2

TREND OF DEVELOPMENT OF AGRICULTURE AND ALLIED SECTORS

Trend analysis is important in business and farm sectors as well. Trend analysis is often used to make projection and assessment of economic health. Trend analysts examine the past performance of the company, along with current production and financial conditions (Gittinger, 1982) to determine how their activity will perform in the future.

The general idea is that, all factors remaining the same, future trends will follow past performance. Trend analysts of a farm will typically project future earnings and growth based on the trends we see emerging in the data we analyze. Therefore, it is necessary to analyze the past performance so that future planning can be improved by removing the weaknesses and at the same time, repeating the success stories in the plan.

2.1 Trend of Area, Production and Productivity

2.1.1 Food grains & Rice

In this study, trend analysis has been undertaken to see the trends of agricultural productivity within the farm economy. Having identified such areas, in-depth analysis can be taken up to determine whether long-term changes in agricultural productivity are mainly a function of physical or social or some other factors. The trends (Changes) observed cannot solely be explained by one or two factors and there seems to be a significant correlation with land cover, land use and many other factors.

Table 2.1
Area, Production and Productivity of Food grains in Tripura

Year	Area in Ha	Production in MT	Yield in Kg/Ha
2005-06	2,62,495	6,30,037	2,400
2006-07	2,62,495	6,30,037	2,400
2007-08	251000	639000	2480
2008-09	254000	639000	2480
2009-10	253642	648311	2556
2010-11	273720	712348	2602
2011-12	273000	725000	2656
2012-13	267464	725183	2711
2013-14	271143	726690	2680
2014-15	273678	761712	2783
2015-16	303448	825384	2720
CAGR	1.19*	2.63*	1.52*

Source: Department of Agriculture, Govt. of Tripura.
Note: * indicates significant at 1% level

It is observed from Table-2.1 and figures 2.1 & 2.2 and 2.3 that the area under food grains in Tripura had increased from 2.62 lakh hectares in 2005-06 to 3.03 lakh hectares in 2015-16 with a compound annual growth rate (CAGR) of 1.19 per cent. Similarly, there had been an increase of about 1.95 lakhs MT of food grains during last 10 years, registering a CAGR of 2.50 per cent while yield rate had increased from 2400 kg /ha in 2005-06 to 2720 kg/ha in 2015-16 with a CAGR of 1.52 per cent.

Figure - 2.1
Trend of growth of Area (in Lakh ha.) under Food grains in Tripura

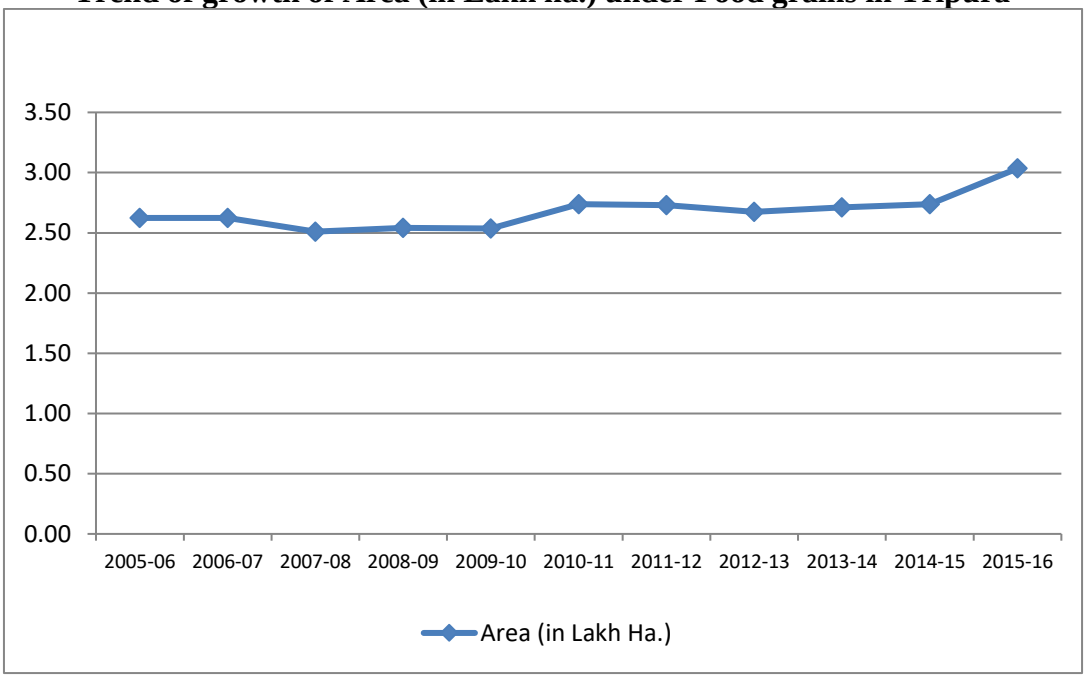


Figure - 2.2
Trend of growth of Production of Food grains in Tripura

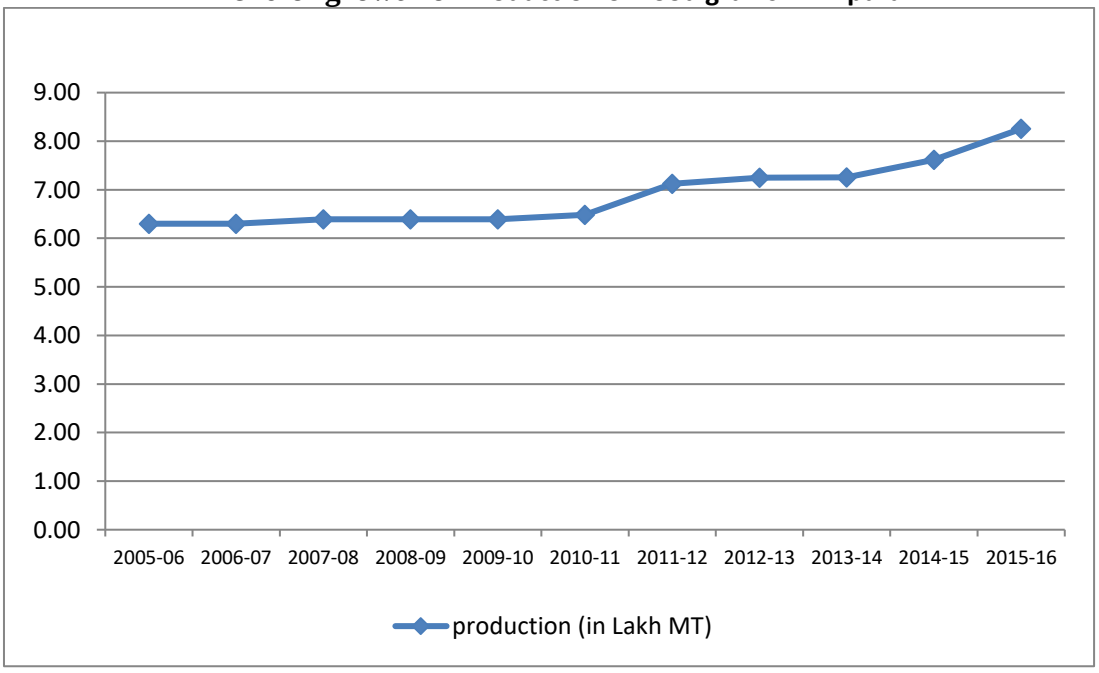
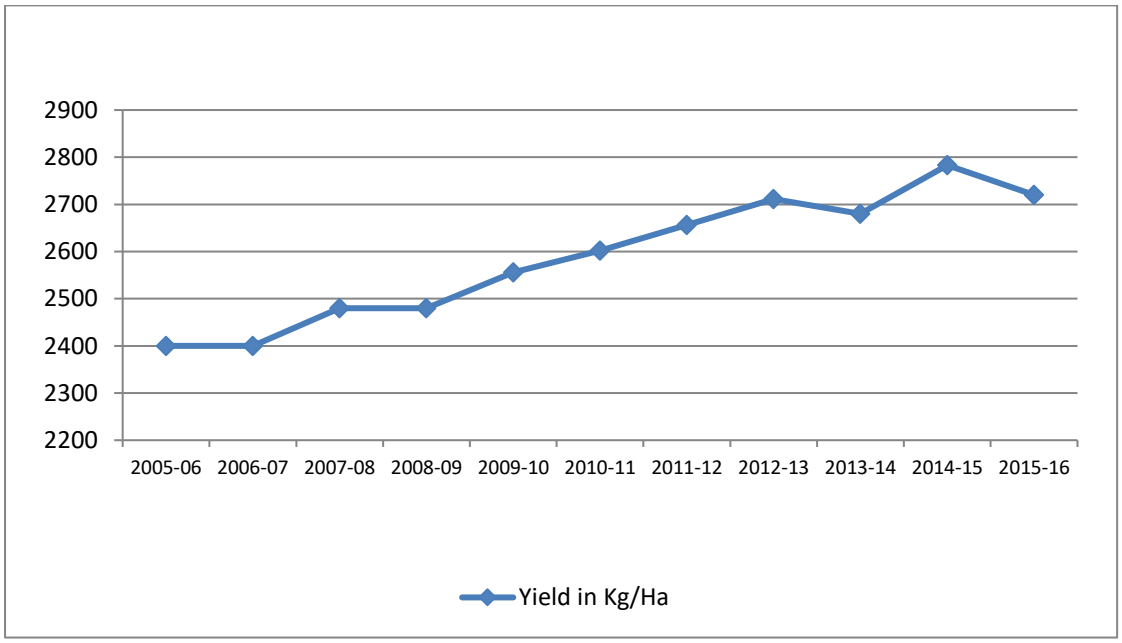


Figure - 2.3

Trend of growth of Productivity of Food-grains in Tripura



Rice is the principal staple food in many parts of Tripura. It is grown in plain and hilly terrain (as *Jhum*) of the state. The area, production and yield of rice in Tripura is given in Table-2.2 and figures 2.4, 2.5 and 2.6.

Table 2.2
Area, Production &Yield of Rice in Tripura

Year	Area in Ha	Production in MT	Yield in Kg/Ha
2005-06	250980	610500	2172
2006-07	270980	620500	2472
2007-08	253000	640000	2532
2008-09	243337	641086	2635
2009-10	244853	640948	2618
2010-11	262320	701562	2674
2011-12	259000	707000	2737
2012-13	254740	713222	2800
2013-14	254254	711831	2800
2014-15	257273	746954	2903
2015-16	275193	799437	2937
CAGR	0.38	2.50*	2.40*

Source: Department of Agriculture, Govt. of Tripura
Note: * indicates significant at 1% level

The area under rice had increased by 2.24 lakh hectares during 2005-06 to 2015-16 with a CAGR of 0.38 per cent while the production of rice had increased to

the tune of 1.89 lakh MT with a CAGR of 2.50 per cent during the reference period. The yield rate had increased from 2172 kg/ha in 2005-06 to 2937 kg/ha in 2015-16 with a CAGR of 2.40 per cent. The area under rice included both hill and valley regions of the state. The hill area rice *i.e.*, the area under *Jhum* rice in each year entirely depended on the amount of rainfall in the reference year. With the decline of rainfall in some years, there was a decline in *Jhum* area as well for which the instability of total area under rice was marked.

Figure - 2.4
Trend of growth of Area under Rice in Tripura

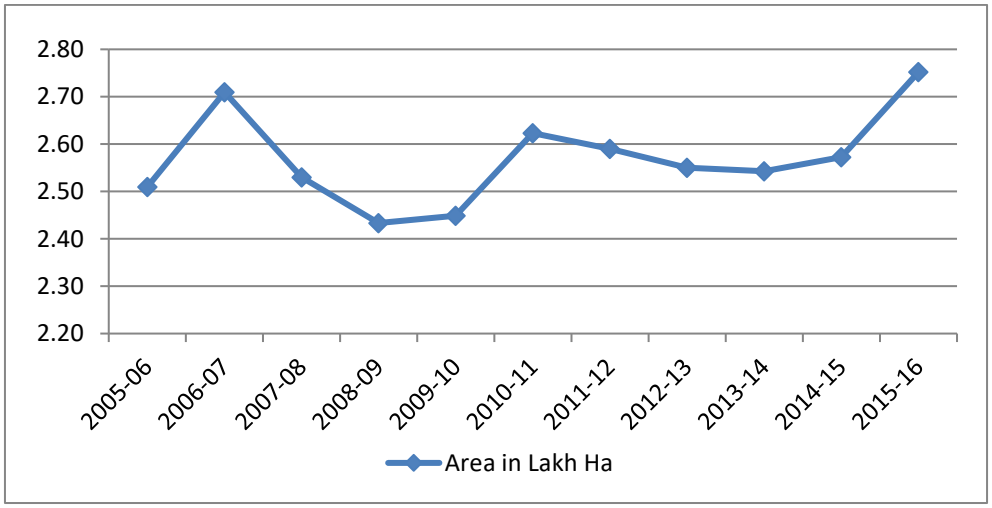


Figure - 2.5
Trend of growth of Production of Rice in Tripura

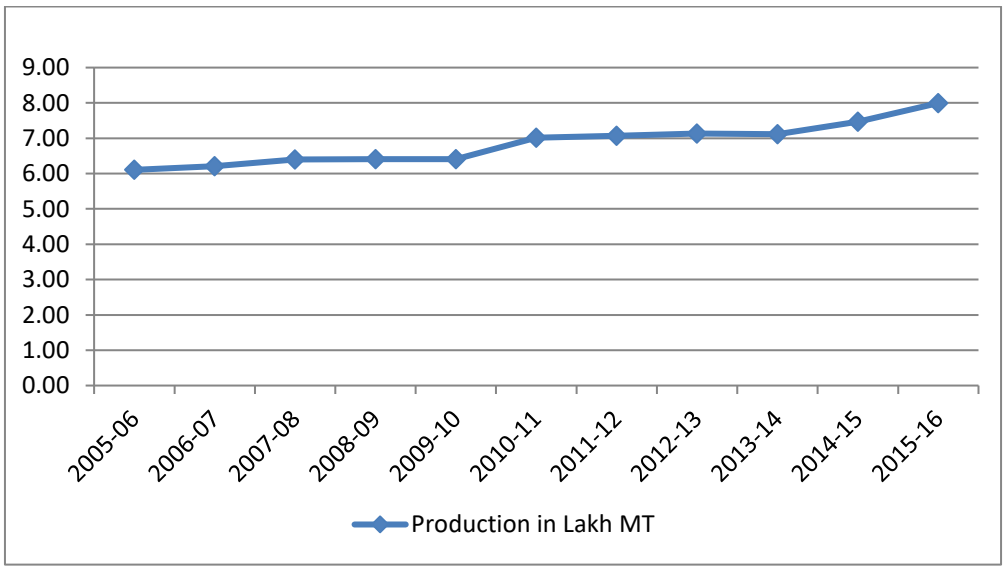
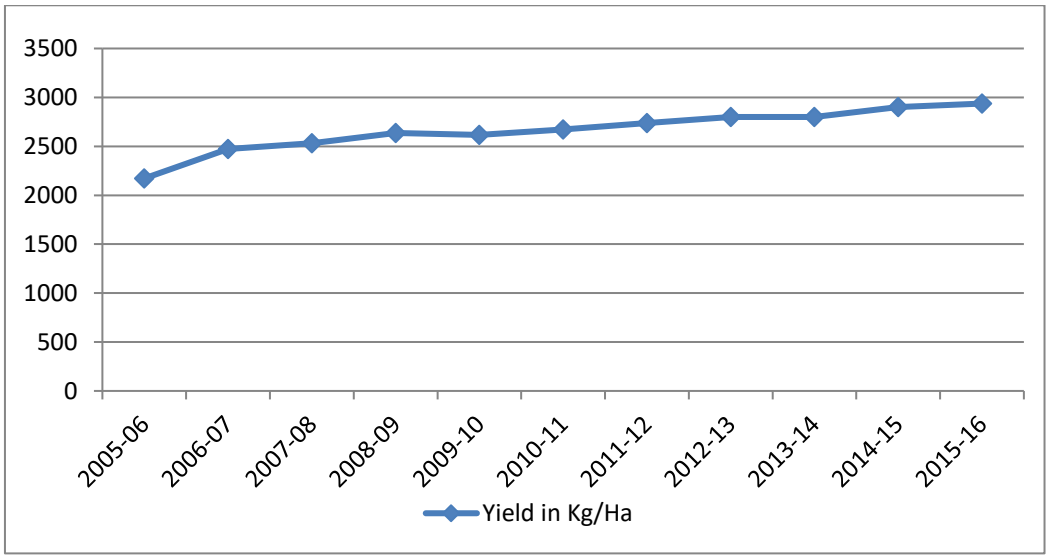


Figure - 2.6

Trend of growth of Yield of Rice in Tripura



2.1.2 Horticulture (Fruits & Vegetables)

Good agro-climatic conditions, deep fertile soils, sub-tropical humid climate with abundance of rainfall offer tremendous scope for development of horticulture in the State. Among the important horticultural crops, pineapple grown in Tripura is widely acclaimed as the best in the country. The State continues to be the largest producer of True Potato Seed in the country and is surplus in several vegetable crops including brinjal, cabbage, cauliflower, tomato and different *cucurbitaceous* crops. There is huge potential of growing fruits and plantation crops like jackfruit, orange, *mousambi*, mango and areca nut commercially, which may cater to the needs of other North Eastern States and neighboring country like Bangladesh as well. Recent development in Indo-Bangla relationship has also opened up new avenues of export possibilities.

The production and productivity primarily depend on use of good quality planting materials/seeds. Effort has therefore, been initiated to produce good quality planting materials in Government orchards/private nurseries to cater to the growing demand. Creation of plantation in cluster manner has been given the priority to give horticulture a commercial touch**.** Area, production and productivity of major fruits in Tripura are presented in Table-2.3 and figures 2.7, 2.8 and 2.9. The area under major fruits increased from 33.18 thousand hectares in 2005-06 to 75.69 thousand hectares in 2015-16. The CAGR grew @ 9.61 per cent during the reference period while

production did not match with the increase in area. The production was found to increase from 5.23 lakh MT in 2005-06 to 8.58 lakh MT in 2015-16 with a CAGR of 5.87 per cent during the reference period. In case of productivity, it was found to decline from 15.76 MT/ha in 2005-06 to 11.33 MT/ha in 2015-16 with a negative CAGR of 3.41 per cent. In the hilly terrain, erosion of fertile top soil is a common problem. Therefore, application of external soil nutrients was a must to increase the productivity. But the poor farmers could not afford to apply required doses of nutrients in their crop field for which, the productivity of fruit crops might have declined.

Table - 2.3
Area, Production and Productivity of total Major Fruits in Tripura

(Area in '000 ha & production in lakh MT)

Year	Area ('000 ha)	Production (Lakh MT)	Productivity (MT/ha)
2005-06	33.18	5.23	15.76
2006-07	33.26	4.82	14.5
2007-08	35.44	5.21	14.7
2008-09	36.13	5.47	15.15
2009-10	36.59	5.73	15.68
2010-11	39.89	6.44	16.14
2011-12	34.2	5.53	16.17
2012-13	60.14	6.97	11.58
2013-14	68.38	7.86	11.50
2014-15	71.18	8.19	11.52
2015-16	75.69	8.58	11.33
CAGR	9.61*	5.87*	(-) 3.41*

Source: - Directorate of Horticulture, Government of Tripura
Note: * indicates significant at 1% level

Figure - 2.7
Trend of growth of Area under major fruit crops in Tripura

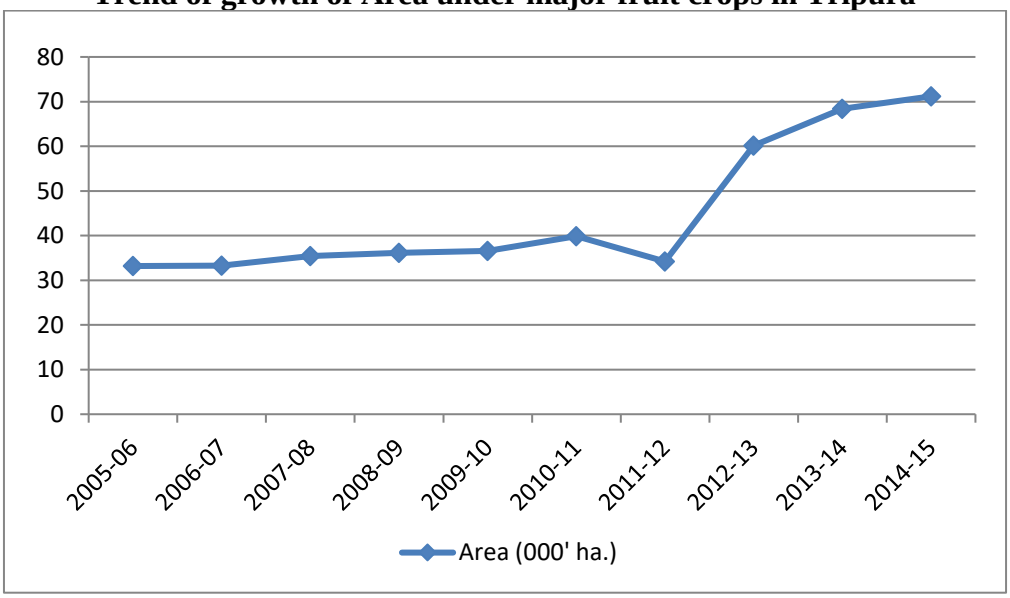


Figure - 2.8
Trend of growth of Production of major fruit crops in Tripura

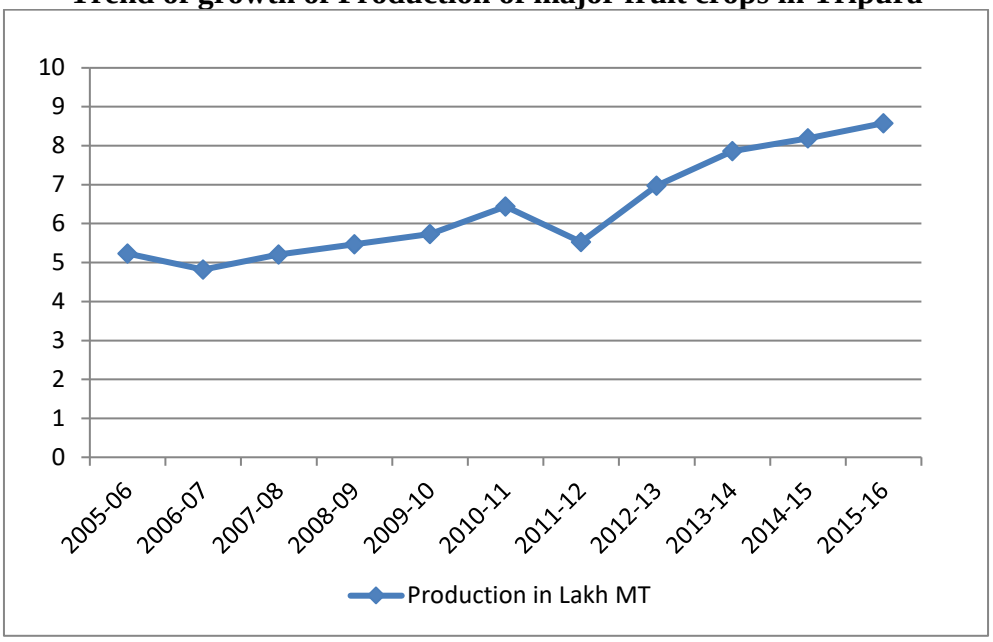
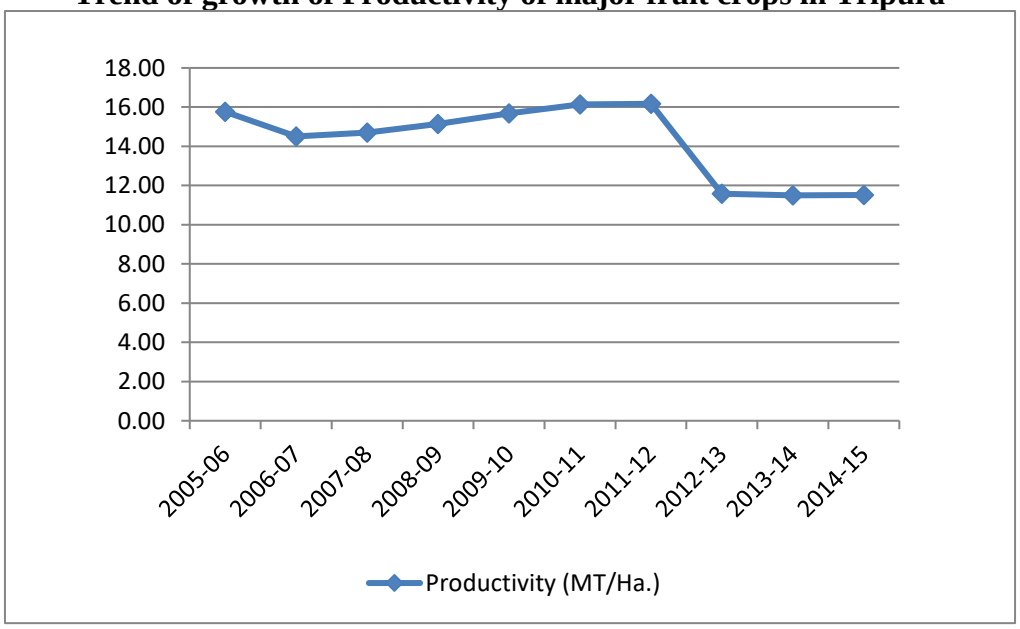


Figure - 2.9
Trend of growth of Productivity of major fruit crops in Tripura



Pineapple is a tropical plant with an edible multiple fruit consisting of coalesced berries, also called pineapples, and the most economically significant plant under the *Bromeliaceae* family. Pineapple may be cultivated from a crown cutting of the fruit, normally flowering in 5–10 months and fruiting in the following six months. It is an herbaceous perennial, which usually grows to 1.0 to 1.5 m (3.3 to 4.9 ft.) tall. In commercial farming, flowering can be induced artificially and the early harvesting

of the main fruit can encourage the development of a second crop of smaller fruits. Once removed during cleaning, the top of the pineapple can be planted in soil, which may grow into a new plant subsequently. Slips and suckers are planted commercially. The area, production and productivity of pineapple in Tripura are given in Table-2.4 and figures 2.10, 2.11, and 2.12. The trend of production of pine apple was found to increase along with increase in area. The CAGR was recorded at 14.54 per cent and 8.26 per cent in case of area and production, respectively. But the productivity of pineapple had shown a declining trend from 17.44 MT/ha in 2005-06 to 14.30 MT/ha in 2015-16 with a negative CAGR of 5.55 per cent. This may be attributed to non-application of soil nutrients washed away by erosion in hilly tracts.

Table - 2.4
Area, Production and Productivity of Pineapple in Tripura

Year	Area (000' ha.)	Production in lakh MT	Productivity (MT/ha.)
2008-09	6.33	1.10	17.44
2009-10	6.47	1.17	18.15
2010-11	6.78	1.53	22.58
2011-12	7.12	1.57	22.05
2012-13	11.84	1.65	13.93
2013-14	11.59	1.62	14.00
2014-15	12.66	1.81	14.30
CAGR	14.54*	8.26*	(-) 5.55

Source: - Directorate of Horticulture, Tripura
Note: * indicates significant at 1% level

Figure - 2.10
Trend of growth of Area under Pineapple

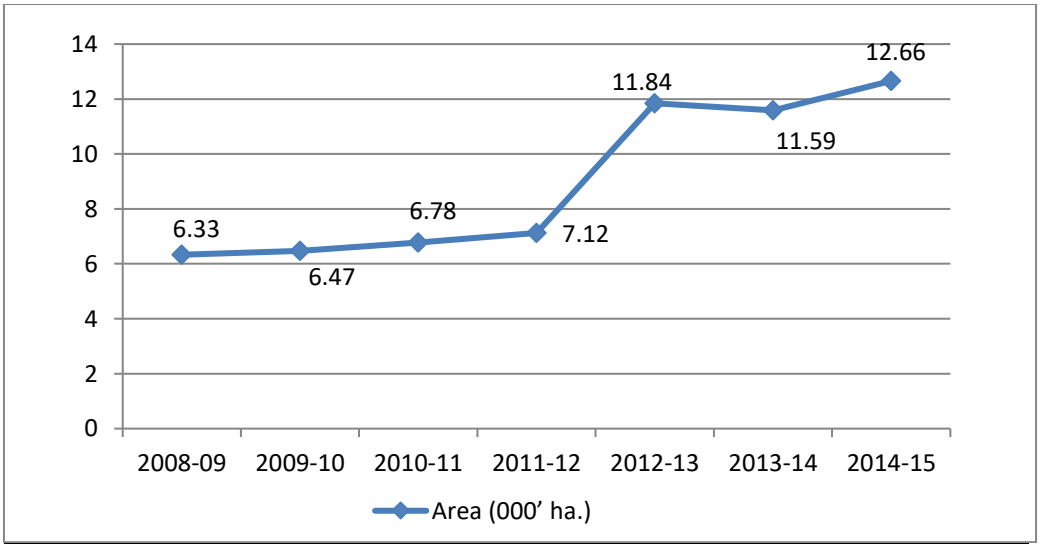


Figure - 2.11
Trend of production of Pineapple in Tripura

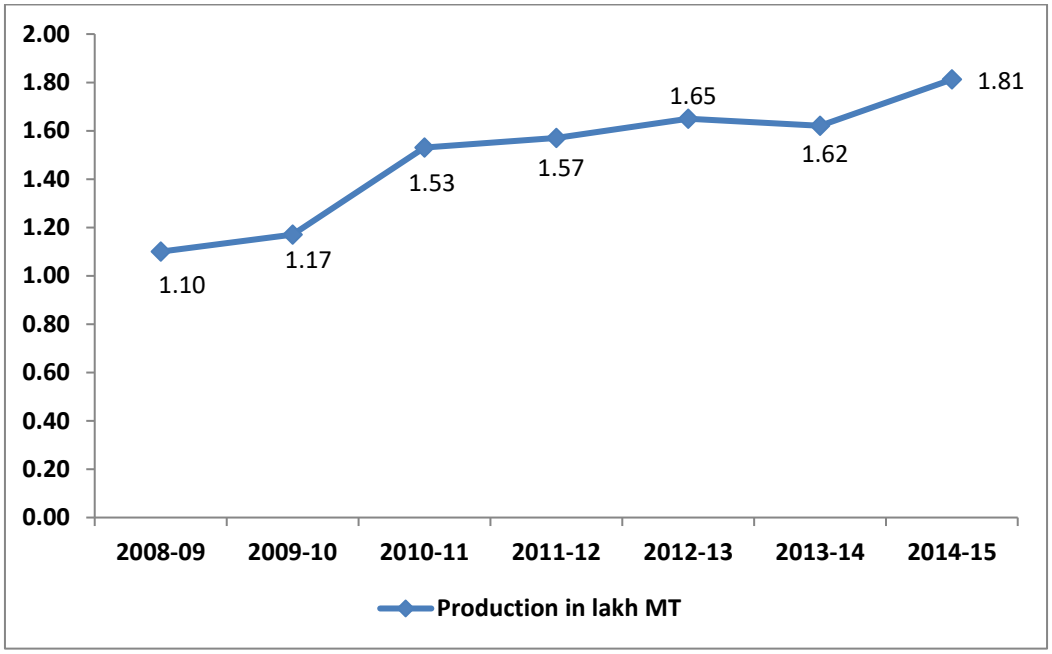
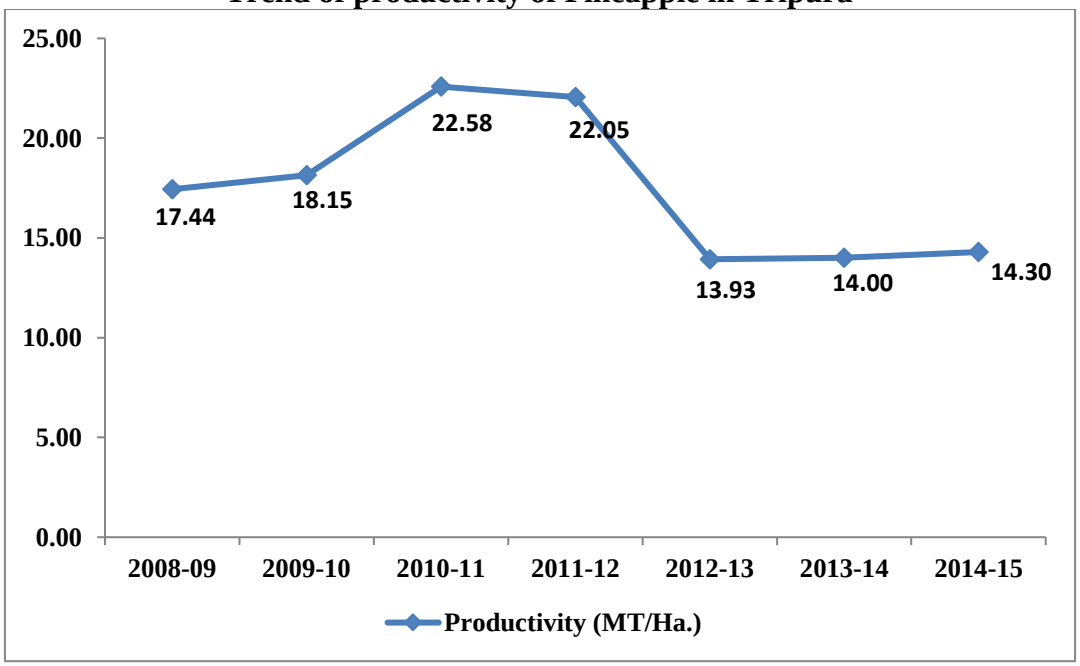


Figure - 2.12
Trend of productivity of Pineapple in Tripura



The State is already surplus in vegetable production. The area under vegetables has gone up substantially with the increase in vegetable consumption per capita (<500 gms). Major thrust areas for development of vegetables are: (a) Round

the year cultivation of selected vegetables; (b) Vegetable initiative in Tribal cluster; (c) Introduction of new vegetable varieties; (d) Protected cultivation of vegetables and (e) Bringing more area under vegetables by utilizing seasonal fallow land (Table-2.5, Fig.2.13, 2.14, and 2.15). The area under vegetables had shown an increasing trend

Table - 2.5
Area, Production and Productivity of total Vegetables in Tripura
(Area in 000' ha & production in lakh MT)

Year	Area ('000 ha)	Production (Lakh MT)	Productivity (MT/ha)
2005-06	26.09	2.89	11.08
2006-07	21.86	2.76	12.62
2007-08	26.29	3.06	11.64
2008-09	26.49	3.1	11.7
2009-10	26.69	3.47	13.02
2010-11	29.66	4.22	14.24
2011-12	34.2	5.53	16.17
2012-13	36.78	6.05	16.45
2013-14	37.971	6.267	16.51
2014-15	39.11	6.47	16.54
2015-16	40.30	6.69	16.47
CAGR	6.09*	11.08*	4.66*

Source: - Directorate of Horticulture, Tripura
Note: * indicates significant at 1% level

Figure - 2.13
Trend of Area under vegetables in Tripura

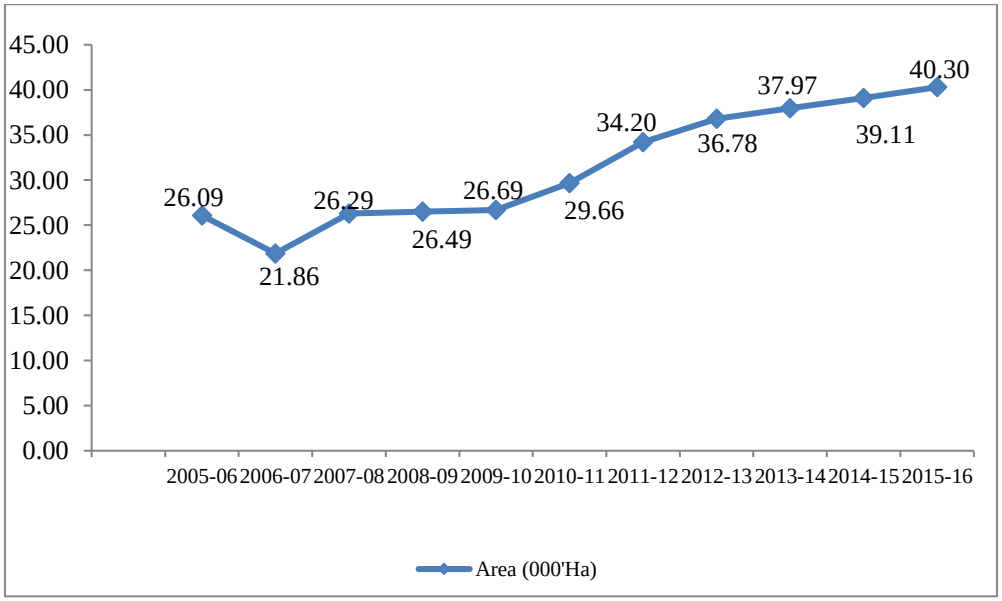


Figure -2.14

Trend of Production of vegetables in Tripura

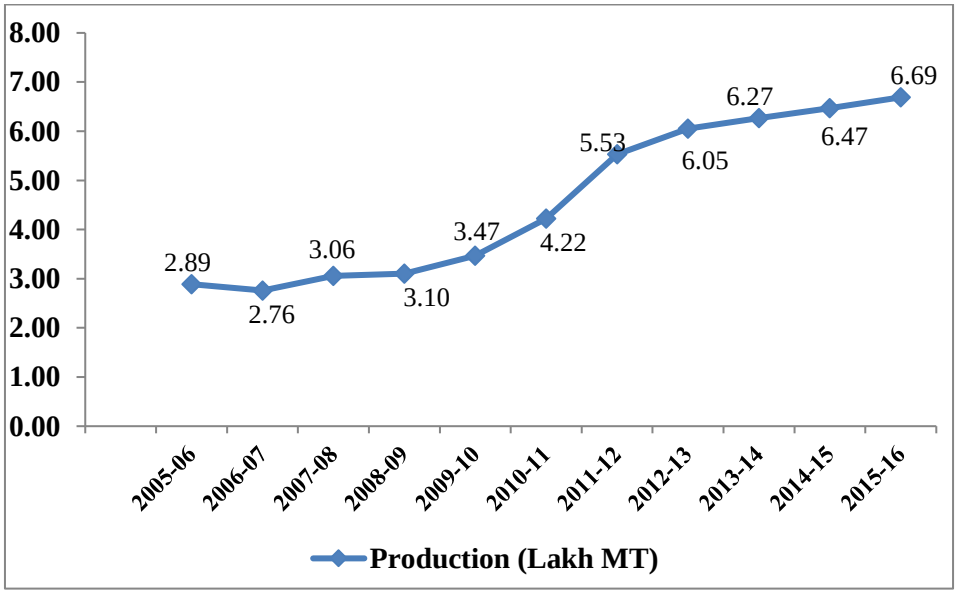
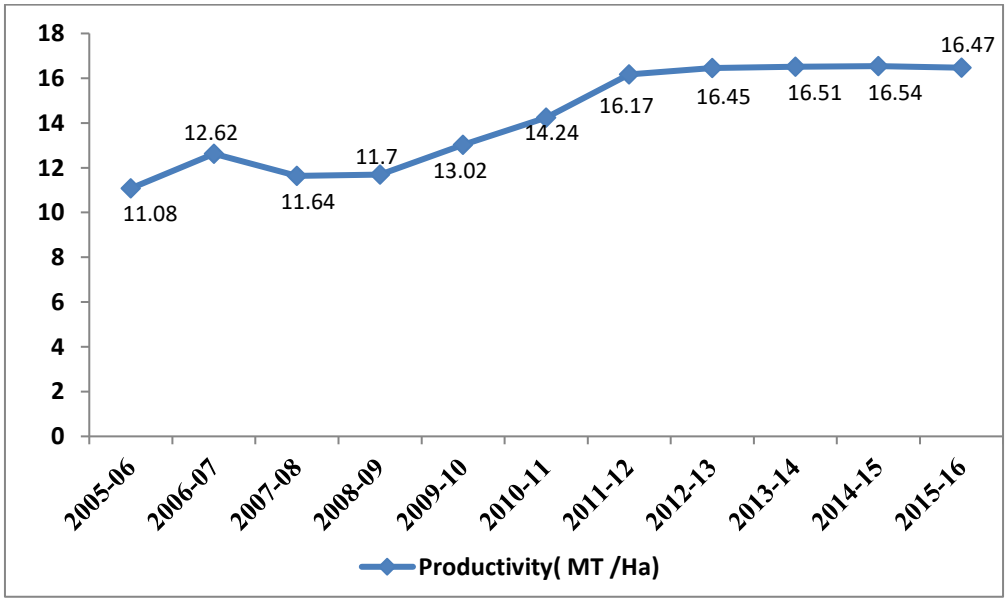


Figure - 2.15

Trend of Productivity of Vegetables in Tripura



from 26.09 thousand hectares in 2005-06 to 40.30 thousand hectares in 2015-16 with a CAGR of 6.09 per cent during the reference period while the production of vegetables had increased from 2.89 lakh MT in 2005-06 to 6.69 lakh MT in 2015-16 with a CAGR of 11.08 per cent. The productivity of vegetables had also shown an increasing trend from 11.08 MT/ha to 16.47 MT/ha during the reference period with a CAGR of 4.66 per cent.

2.2 Piggery Development

Pig rearing is the most popular economic activity in the State under the Animal Resources Development sector. Now it is the endeavor of the Department to make this sector more vibrant through enhanced productivity and value addition in order to ensure long-term sustainability. It is also planned to promote Cross-bred (CB) pig rearing among the forest dwellers under various developmental schemes.

The State Animal Resources Development Department (ARDD) has been implementing various socio-economic programmes to create gainful employment opportunities in the rural areas through various developmental schemes with the following objectives- (i) to provide health coverage to all the livestock and poultry in respect of contagious and non-contagious diseases, (ii) to improve livestock products, *viz.*, milk, egg and meat as well as to improve socio-economic status of the farmers,

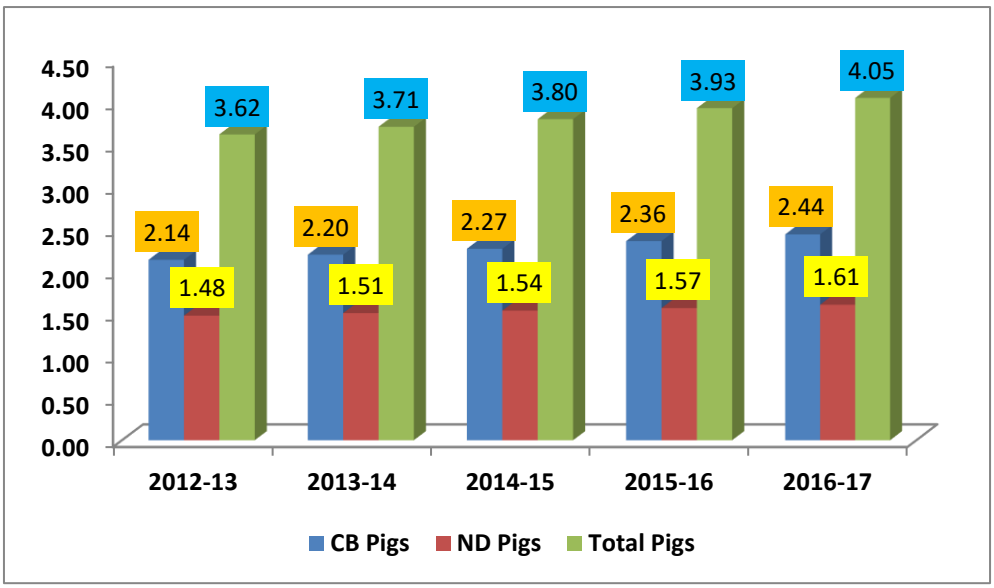
Table 2.6
Piggery Development in Tripura

(In lakh number)

Years	CB Pigs	ND Pigs	Total Pigs
2012-13	2.14	1.48	3.62
2013-14	2.20	1.51	3.71
2014-15	2.27	1.54	3.80
2015-16	2.36	1.57	3.93
2016-17	2.44	1.61	4.05
CAGR	3.38*	2.10*	2.86*

Source: Animal Resources Development Department, Govt. of Tripura
Note: * indicates significant at 1% level

Figure - 2.16
Trend of growth of Pigs in Tripura



which in turn, contribute to the Gross State Domestic Product. Table-2.6 and figure 2.16 clearly indicate the trends of piggery development in Tripura. The number of Cross-bred (CB) pigs in the State was 2.14 lakh in 2012-13 which increased to 2.44 lakh by the end of 2016-17 with a CAGR of 3.38 per cent. Although the number Non-descript (ND) pigs were less than that of CB pigs in the reference years, yet it showed an increasing trend with a CAGR of 2.10 per cent.

2.3 Trend of Area, Production and Productivity of *Jhum* Crops

In Tripura, the area under *Jhum* has been recorded at about 16,843 hectares in the year 2016-17 (Provisional) against an average production of 18,190 M.T. The average yield per hectare was found at 1,080 kgs. It was also evident from the available records that the productivity of paddy under *Jhum* was much lower as compared to the settled paddy cultivation. The details of area, production and yield of *Jhum* crops in Tripura for the period from 2006-07 to 2016-17 are given in Table-2.7 and figures 2.17, 2.18 and 2.19. The area under *Jhum* cultivation had shown an increasing trend with a CAGR of 1.75 per cent, while the productivity recorded a marginal growth of 0.85 per cent.

Table - 2.7
Area, Production and Productivity of *Jhum* Crops in Tripura

Years	Area in ha	Production in MT	Yield in Kg/ha
2006-07	15667	15514	990
2007-08	14956	14956	1000
2008-09	16390	16472	1005
2009-10	14452	14423	991
2010-11	19540	20517	1050
2011-12	17859	19038	1066
2012-13	16511	17705	1072
2013-14	18351	18993	1035
2014-15	19540	20517	1050
2015-16	17859	19038	1066
2016-17 (P)	16843	18190	1080
CAGR (per cent)	1.75***	2.60**	0.85*

Source: *Jhum* data collected from the Department of Agriculture, Govt. of Tripura
Note: (1) P-Provisional
(2) * indicates significant at 1% level, ** indicates significant at 5% level and *** indicates significant at 10% level

Figure - 2.17
Trend of growth of Area under *Jhum* cultivation

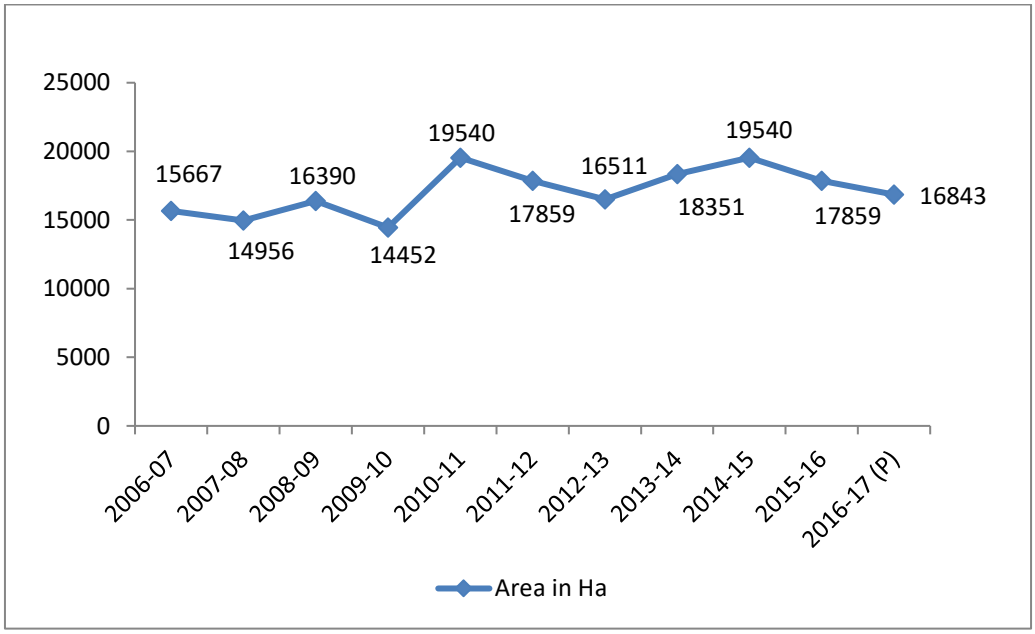


Figure - 2.18
Trend of production of crops under *Jhum* cultivation

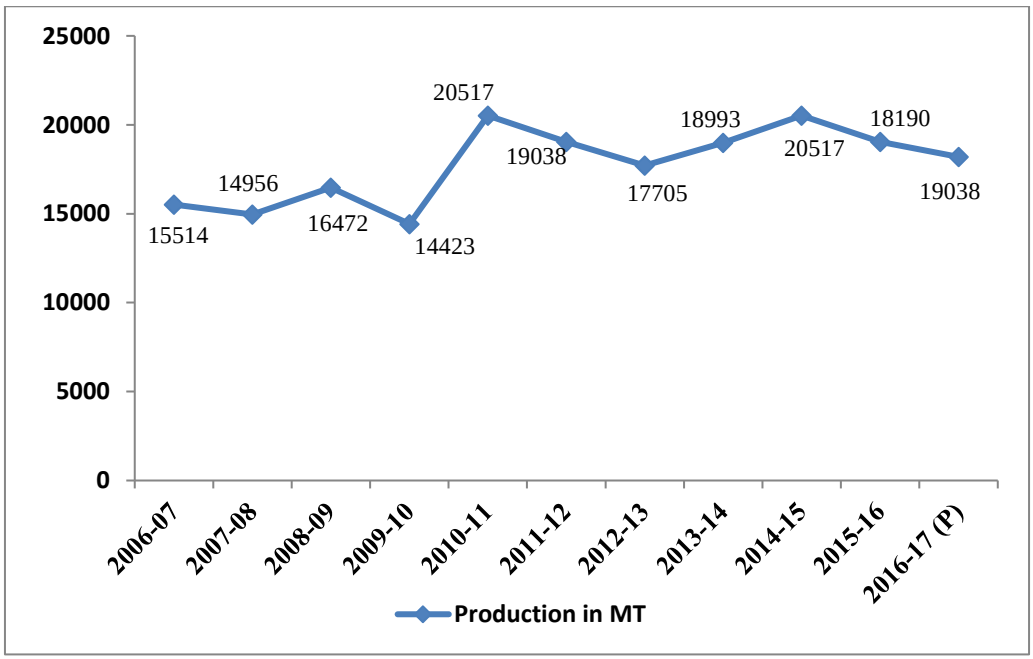
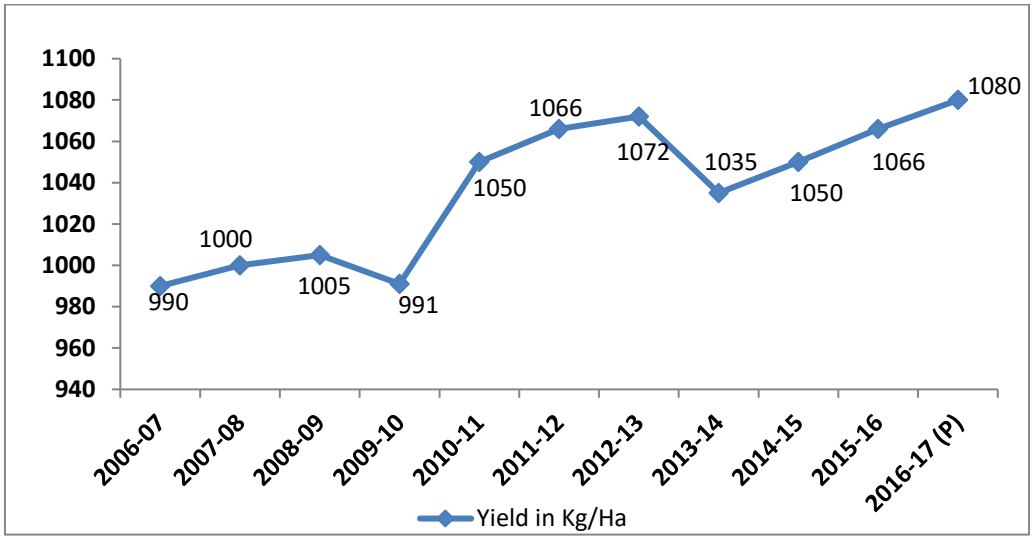


Figure - 2.19
Trend of Productivity of crops under *Jhum* cultivation



2.4 Trend Analysis of Agriculture and Allied Sector

The year 2005-06 has been taken as the base year because of the fact that prior to this year, the situation of the State was totally abnormal due to extreme violence and terrorism, during 2000-01 to 2004-05. An attempt in this study has also been made to draw statistical inference on the trend of development of agricultural sector in the State. The trend of agriculture and allied sectors was worked out by using linear growth model.

As per the report of the Economic Survey of Tripura (Table-2.8), it is clear that the growth rate of area under *Jhum* increased at the rate of 1.88 per cent per annum. The production had increased significantly at the rate of 2.53 per cent per annum (significant at 5 per cent) while the yield had increased at the rate of 0.86 per cent only.

Table - 2.8
Development of Agriculture and Allied Sectors of Tripura
(2005-06 to 2015-16)

(In percentage)

Particulars	Area	Production	Yield
Jhum	1.88	2.53**	0.86
Total Food Grains	1.06	3.03**	1.78
Paddy	0.38	1.97	3.85**
Fruits	8.35*	4.17*	8.38*
Vegetables	8.63*	20.95*	-0.36

Source: Economic Survey of Tripura
Note: * Significant at 1 per cent,** significant at 5 per cent,*** significant at 10 per cent

The higher growth of production may be attributed to increase in *Jhum* area following an increase of family size of the *Jhumia*s. The *Jhumia*s needed more food grains, more vegetables and other products to maintain their relatively bigger families and hence, they started bringing more areas under *Jhum* cultivation to produce more.

In case of vegetables also, growth rate of area and production were significantly higher while productivity was recorded at -0.36 per cent only. This might be due to increase in demand and high rise in prices, and to match the burgeoning demand in the short run, the farmers started increasing their *Jhum* area, without bothering much about productivity.

Further, it is clear from the Table-2.8 that higher growth of food grains and paddy were mainly due to significant increase in productivity and not merely for increase in area. The extension effort of the State Government was primarily aimed at to increase the production of food grains through adoption of HYV seeds and optimal allocation of resources, so that per hectare productivity can be increased. In case of fruits, there was an impressive growth of area and productivity resulting in higher growth rate of production. To maintain this impressive and significant growth of fruit productions, it is necessary to improve processing infrastructure and cold storage capacities. Together with this, adequate transport and marketing back-up are to be provided to maintain a positive growth of fruit production in Tripura.

In a similar manner, attempt was made to draw statistical inferences on the trend of growth of piggery production during 2005-06 to 2016-17.

Table- 2.9
Trend of Piggery Production during 2005-06 to 2016-17

Items	ND Pigs	CB Pigs	Total
Trend	3.50**	2.40***	6.60**

Source: Animal Resource Development Department
** Significant at 5 per cent, *** Significant at 10 per cent

It can be seen from Table-2.9 that the growth rate of total pig production was significantly high (6.60 per cent) during the reference period. Obviously, the growth rate of both ND and CB pigs were significantly high, but it was much higher in case of ND pigs as compared to CB pigs. This may be due to the inadequacy of the State extension service machinery to convince the pig growers about the added advantages of raising the CB pigs. Coupled with this, rearing of CB pigs needs heavy investment

on infrastructure and feeds which was very difficult to afford to on the part of the poor farmers without resorting to borrowings. The State Government may come forward to grant subsidy to the CB pig growers and can also arrange to supply credits from the Banks on easy terms. It is also equally important to create adequate facilities for treatment of pigs, in case of diseases and in supplying medicines at cheaper prices in the remotest village areas of the State.

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CHAPTER-3

SOCIO-ECONOMIC PROFILE OF THE SAMPLE AREAS UNDER STUDY

3.1 State Profile

Tripura became a full-fledged State on 21st January, 1972. The State is surrounded by Bangladesh on its south, west and north. The land use statistics indicate that the forest area covers more than 60 per cent and only 27 per cent of the total area is left for agricultural cultivation. A large part of the land is up-land/*tilla* land and hilly, with altitudes varying from 15 to 940 meters above the mean sea level, though majority of the population lives in the plains.

The population density of Tripura in 2011 was 350 persons per sq. km (It was 305 in 2001), which means that 45 more people are now living in a sq. km. area than they lived a decade ago. As against this, the population density of India in 2011 was 382 persons per sq.km. The State ranks 18th in terms of density of population, although, it is the third smallest State of the country in terms of area, after Goa and Sikkim. Tripura comes second (Table-3.1 and Figures 3.1 & 3.2) next to Assam in respect of population and population density among the North Eastern States of India.

Table - 3.1
Area and Population of North-Eastern States (2011)

States	Area(sq.km.)	Population	Decadal Growth Rate (1991-2011)	Population Density (persons per sq. k.m.)
Arunachal Pradesh	83,743	13,83,727	26.0	17
Assam	78,438	3,12,05,576	17.1	397
Meghalaya	22,429	29,66,889	27.9	132
Manipur	22,327	25,70,390	18.6	122
Mizoram	21,081	10,97,206	23.5	52
Nagaland	16,579	19,78,502	(-) 0.6	119
Tripura	10,492	36,73,917	14.8	350
Sikkim	7,096	6,10,577	12.9	86

Source: - RGI & CSO, New Delhi

Figure - 3.1
Population of N-E States as per 2011 Census (In lakh)

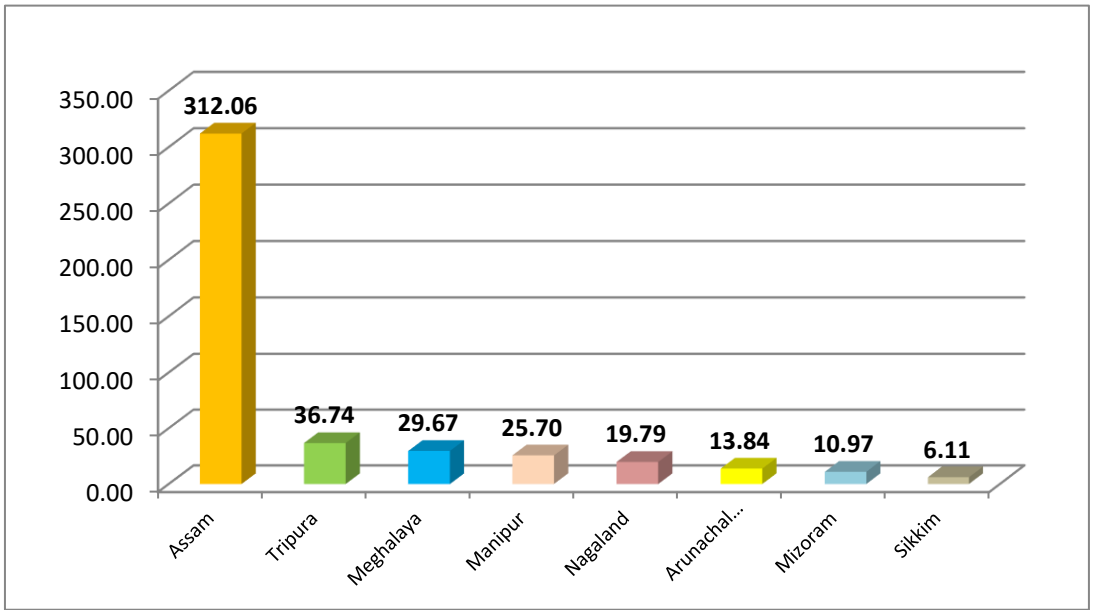

Figure - 3.2
Map of Tripura

The population of Tripura is characterized by social diversity. About one-third of the population belongs to Scheduled Tribes (ST) category. As per Census-2011, ST population of the State was 11, 66,813 which is 31.75 per cent of the total population

of the State. Out of the total ST population, males were 5,88,327 and females were 5,78,486. There are 19 sub tribes among the ST population of the State with their own cultural identity, namely i) Tripuri, ii) Reang, iii) Jamatia, iv) Chakma, v) Lusai, vi) Mog, vii) Garo, viii) Kuki, ix) Chaimal, x) Uchai, xi) Halam, xii) Khasia, xiii) Bhutia, xiv) Munda, xv) Orang, xvi) Lepcha, xvii) Santal, xviii) Bhil and xix) Noatia. The Census 2011 data shows that Scheduled Caste (SC) population of the State was 6,54,918 (17.8 per cent) of the total population.

More than 42 per cent of the State population now directly depends on Agriculture & allied activities and its contribution to the GSDP has increased with new base year 2011-12, as per the revised methodology and additional coverage. Small and marginal farmers constitute about 96 per cent of the total farmers in the State as against 78 per cent at country level. Agriculture and allied activities have remained the backbone of the State's economy.

Agriculture in Tripura has tremendous potential of being demand base for industrial and service sectors and supply base as well for food and raw materials. Better performance of agriculture has a direct and multiplier effect across the economy. The main agricultural crops grown in the State include paddy, maize, pulses, oilseeds, jute & mesta. Fragmentation of land holding still continues to be a part of social phenomenon. Rice continues to hold the key for sustaining food security in the State. Rice alone contributes 96 per cent of the total food grain production with per hectare productivity of 2937 kg/ha in 2015-16.

3.2 Sample Districts

Table-3.2 presents the administrative status of the two sample districts *viz.*, Dhalai and Gomati districts of Tripura.

Table - 3.2
Administrative units and socio-economic background of sample districts

District	District HQ	Sub-division	No. of Development Blocks	Selected Blocks	Total population of the district as per 2011 Census
Dhalai	Ambassa	4	8	1.Salema 2.Ambassa	377,988
Gomati	Udaipur	3	7	1.Matabari 2.Killa	436,868

3 .2.1 Dhalai District

Dhalai is an administrative district with headquarters at Ambassa. As per 2011 Census, it was the least populous district of Tripura, although area-wise, it is the

largest district in the State. The district headquarters is about 85 km. from the State capital, Agartala. The district is bordered by Bangladesh on the northern and southern sides. In the North-eastern part of Tripura, the district covers an area of about 2426 km^2. It is located between two hills: Atharamura Range and Sakhan Range. More than 70 per cent of the area is forest covered. The terrain is mostly undulating and hilly with small water streams (*Chharas*), rivers and fertile valleys intervening. Major rivers originating from Dhalai are Dhalai, Khowai, Gomati and Manu. Major hills are Atharamura, Longtharai, Kalajhari and a part of Sakhan.

The district has a tropical climate with hot and humid summers, prolonged rainy season and warm winters. Rains are frequent in March and April. Maximum temperatures in summers and winters are 36 degrees and 28 degrees Celsius, respectively. The minimum temperatures in summers and winters are 17 degrees and 5.3 degree Celsius, respectively. According to 2011 Census, Dhalai district has a population of 3,77,988. The district has a separate Zone of Tripura Tribal Areas Autonomous District Council, headed by a Zonal Development Officer.

Most part of the district is dependent on rain-fed farming although heavy rains in the monsoon and normal rains in the winter and summer make sufficient supply of water. Ponds are also used as a source of supply of irrigated water for agriculture. Vegetables like tomato, cabbage, cauliflower, snake gourd, pumpkin, okra, corn, cucumber, beans, potato, carrot, radish, bamboo shoot are grown in different parts of the district. Spice cultivation includes chili pepper, coriander, ginger, turmeric, tamarind, garlic, onion *etc*.

3.2.2 Ambassa Block

Ambassa Rural Development block has an area of 183.03 Sq. Km, out of which 70 per cent area is hilly and covered with dense forest. The people of this block mainly depend on agriculture and *Jhum* cultivation. Paddy is the main crop of this block. The block has a total population of 54,618 and as per the Census 2011, more than 95 per people live in rural areas. Nearly, 4,661 persons were reported to be cultivators (owner or co-owner) while 3,013 were agricultural labourer and Schedule Tribes constitute 72.50 per cent of the total population in the block.

3.2.3 Salema Block

Salema Block of Dhalai district has a total population of 1,19,282 as per the Census 2011. Out of the total population, 60,659 are males while 58,623 are females. As per the Census Report, only four per cent people live in urban areas while 96 per cent live in the rural areas and majority of them belongs to *Tripuri* tribes. Also, the sex ratio in the urban areas of Salema block is 1,016 while that of rural areas is 964.

Average literacy rate of the Block during 2011 was recorded at 94.17 per cent, with male and female literacy of 96.46 per cent and 91.79 per cent, respectively. The Salema block is dominated by the ST population and majority of them make a living below the poverty line. The ST groups are pre dominantly from *Tripuri* and *Reang* tribes. Due to hilly terrain and dense forest, this block comprises a considerable number of remote habitations. The *Jhum* cultivation is a common practice among the tribes of the area. Paddy is the most important crop grown by the *Jhumia*s of the block. Sanitation coverage is reported to be very poor, particularly among the tribal population.

3.2.4 Gomati District

Gomati is a district of Tripura with its headquarters at Udaipur, and was created in January 2012 along with three other districts, making the number of districts in the State from four to eight. The Gomati figures prominently in Tripura's indigenous folklore, culture, religious rites and ritual so much so that tribal people perform posthumous rites dedicated to their departed near and dear ones on the bank of the river Gomati in the conviction that ablution with the consecrated water of the sacred river will pave the way for ascendance to heaven of their departed dear ones.

As a part of the administrative reorganization effected in October, 2017, a new Sub-division called Karbook was created as a truncated version of the erstwhile South Tripura district to annex with the Gomati district comprising Udaipur and Amarpur Sub-divisions. Topographically, the Gomati district is marked by lush green and fertile Gomati valleys and the towering Debtamura hill range which straddles Udaipur and Amarpur subdivisions of the district with its exquisite sculptural works carved on panels of the hills.

3.2.5 Killa Block

Killa is a block situated in rural areas of Gomati district in Tripura. The block has 16 villages and there are as many as 8,682 families in the block. As per Census 2011, Killa’s population was 40,912, out of which 20,464 were males and the female counts stood at 20,448.

Average literacy rate of Killa block was recorded at 95.52 per cent, with male and female literacy of 96.98 per cent and 94.07 per cent, respectively.

Schedule Caste (SC) community constituted 0.30 per cent while Schedule Tribe (ST) were nearly 96.10 per cent of the total population in the block. The Killa block was dominated by the ST population and majority of them live below the poverty line. The ST groups are pre dominantly from *Jamatia* community. The block has a considerable number of remote habitations because of hilly terrain and dense

forest. The *Jhum* cultivation is a common practice among the tribes of the area and paddy is the most important crop grown by the *Jumia*s of the block. The aspect of sanitation was found to be neglected, particularly among the tribal population.

3.2.6 Matabari Block

Matabari is a rural development block in the Gomati district of Tripura. It has 30 village *panchayats*. The geographical area of Matabari block is 20,240 hectares with a cultivable area of 6,785 hectares. The tribal and non-tribal population of the block stood at 94,456 and 25,511, respectively. The block is dominated by the ST population and majority of them live in abject poverty. The ST groups are predominantly from *Tripuri* and *Jamatia* community. This block is also characterized by the presence of remote habitations, dominance of *Jhum* cultivation with paddy as the main crop and poor sanitation, particularly in the tribal areas.

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CHAPTER-4

CROPPING PATTERN, INCOME AND EMPLOYMENT OF SAMPLE FARMERS

4.1 Cropping Pattern

The type of soil, type of agro-climatic conditions, the extent of rainfall, irrigation status, the social back ground, the economic factors of the farmers, monetary gain from the crops, the agricultural economic policy of the state and the country as a whole, determine the cropping patterns of a region or State. Table-4.1 presents the cropping pattern scenario of the sample farmers, indicating crop diversification towards fruits and vegetables away from rice. This might be due to the growing demand for fruits and vegetables, following steady change of food habits of the people. At the same time, farmers' perception of replacing the low value crops by high value crops might also contributed towards this diversification. It is clear from the Table that *Aman* paddy was the major crop in both the districts under study so far as settled cultivation was concerned. The percentage of total area under HYV *Aman* paddy was highest with 40.98 per cent in Killa block of Gomati district followed by Ambassa block (36.36 per cent) & Salema block (33.64 per cent) of Dhalai district and Matabari block (31.09 per cent) of Gomati district.

Under *Jhum* cultivation, paddy was the major crop for all the sample households. Some other crops such as maize, pulses (*Arhar,* local beans), vegetables *etc* were also grown in *Jhum* areas. Traditionally, *Jhum* is a mixed cropping venture. But the details of other crops could not be traced out, as the areas under these crops were found to be insignificant. The highest area of *Jhum* paddy with 50.51 per cent was recorded against Ambassa block of Dhalai district followed by Matabari (50.42 per cent) & Killa block (47.29 per cent) of Gomati District and Salema block (46.73 per cent) of Dhalai district, with an overall total of 48.79 per cent per household.

Boro paddy was grown only in Killa block and accounted for 4.20 per cent of the total cropped area. The *Boro* paddy needs irrigation and high investment on inputs and considering its enhanced production and high productivity, the Government of Tripura may come forward to create irrigation facilities and other input support for the benefit of the farmers.

Pineapple is the most important fruit crop of Tripura. The total area under pineapple was recorded at 2.86 per cent of the total gross cropped area of all the blocks under study.

The average initial investment for growing pineapple is reported to be about Rs. 1 lakh per hectare. Hence, to increase the area under this crop, it is essential to supply credit to the farmers at a reasonable rate. Moreover, due to limited local demand and excess supply, the price of pine apple usually crashes in the peak season. To address this problem, particularly transport with cold storage facilities may be arranged at the behest of the Indian Railways and State Transport Department at subsidized rate to supply the crop in the cities of the mainland. The functioning of NERAMAC in Tripura also needs to be strengthened on priority basis.

Table - 4.1
Cropping Patterns of Sample Households of Dhalai and Gomati District of Tripura (Area per HH)

(Area in ha)

Blocks --->	**Salema**		**Ambassa**		**Matabari**		**Killa**		**Total**	
Crops ↓	Area	per cent	Area	per cent	Area	per cent	Area	per cent	Area	per cent
Settled Cultivation										
Aman (HYV)	0.36	33.64	0.36	36.36	0.37	31.09	0.39	40.98	0.37	35.22
Boro Paddy	0.00	0.00	0.00	0.00	0.00	0.00	0.04	4.20	0.01	0.95
Pine Apple	0.02	1.87	0.06	6.06	0.04	3.36	0.00	0.00	0.03	2.86
Brinjal	0.07	6.54	0.07	7.07	0.00	0.00	0.04	4.38	0.05	4.32
Potato	0.00	0.00	0.00	0.00	0.00	0.00	0.03	3.15	0.01	0.71
Chilli	0.12	11.21	0.00	0.00	0.08	6.72	0.00	0.00	0.05	4.76
Pumpkin	0.00	0.00	0.00	0.00	0.10	8.40	0.00	0.00	0.03	2.38
***Jhum* Cultivation**										
Paddy & other Crops [Maize, Pulses (*Arhar* & local beans), Mixed Vegetables]	0.5	46.73	0.5	50.51	0.6	50.42	0.45	47.29	0.51	48.79
Gross cropped area	**1.07**	**100.00**	**0.99**	**100.00**	**1.19**	**100.00**	**0.95**	**100.00**	**1.05**	**100.00**

Source: Primary data

In overall block total, the area under brinjal, potato, chilli and pumpkin were recorded at 0.71 per cent, 4.76 per cent and 2.38 per cent of the gross cropped area, respectively. The percentage area under brinjal, chilli, potato and pumpkin are needed to be increased to match the demand of the State and to bring down the import from outside. The storage facilities are also needed to be increased substantially to reduce the post-harvest losses and to create time utility of these vegetables and spices.

4.2 Pig Rearing Pattern with Production, Productivity and Price

Pig rearing is a traditional practice for almost all the farm households in the study area. Most of the settled cultivators reared cross bred (CB) pigs and the *Jhumias* reared non-descript (ND) pigs (Table-4.2). The average number of pigs and piglets per household for both types of pig & piglets (CB & ND) across the blocks stood at 5 each. However, the production of meat per pig was much higher in case of CB pigs as compared to ND pigs. The overall production of meat per pig was recorded at 101.35 kg in case of CB pigs while it was only 30.22 kg for ND pigs, *i.e*. nearly three times higher amount of meat in case of CB pigs. The growth in terms of size of CB pigs was also found to be at much higher side as compared to ND pigs. As far as price was concerned, it was little higher (Rs.283/kg) for ND pigs as compared to CB pigs (Rs.262/kg).

Table - 4.2
Block-wise per Farm Pig Rearing Pattern with Production, Productivity and Price of Sample Farmers in Dhalai and Gomati District of Tripura

Type of Pigs	Cross-bred (CB)					Non-Descript (ND)				
Salema	10	3	3.09	103.00	250	4	0	0	0	0
Ambassa	4	2	1.49	74.25	250	5	2	0.58	28.89	270
Mata Bari	4	2	2.06	103.19	275	7	2	0.67	33.56	300
Killa	4	2	2.50	124.95	272	3	1	0.28	28.23	280
Over all	5	2	2.28	101.35	262	5	1	0.38	30.22	283

Source: Primary data

4.3 Block-wise per Farm Area, Production, Productivity and Price of the crops

Table-4.3 gives the area, production and productivity of crops across 4 different blocks under Dhalai and Gomati districts. The productivity of crops mainly depends upon the natural fertility of soil and other inputs supplied to the crop field from outside. The highest productivity of *Aman* paddy with 5,219 kg per hectare was recorded against the Ambassa block followed by Salema block (5,155 kg/ha), Matabari block (4,030kg/ha.) and Killa block (3,892 Kg/ha). The cultivation of *Boro* paddy was found in Killa block of Gomati District only, with a productivity of 5,255

Table-4.3
Area Production, Productivity and Price of the Crops Grown by the Sample Farmers (Based on Per HH data)

Blocks	**Salema**				**Ambassa**				**Mata Bari**				**Killa**			
Settled Cultivation																
Aman (HYV)	0.36	18.56	5,155	15	0.36	18.79	5,219	15	0.37	14.91	4,030	18	0.39	15.18	3,892	18
Boro Paddy	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.04	2.10	5,255	12
Pine Apple (in nos.)	0.02	4.19	20,964	7	0.06	17.30	28,840	7.50	0.04	7.55	18,872	8	0.00	0.00	0	0
Brinjal	0.07	1.36	1,938	50	0.07	2.73	3,903	50	0.00	0.00	0	0	0.04	1.75	4,210	50
Potato	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.03	7.61	25,375	8
Chilli	0.12	2.99	2,491	40	0.00	0.00	0	0	0.08	2.61	3,257	50	0.00	0.00	0	0
Pumpkin	0.00	0.00	0	0	0.00	0.00	0	0	0.10	5.03	5,030	30	0.00	0.00	0	0
***Jhum* Cultivation**																
Paddy		13.08	2,615	22		14.37	2,874	22		9.92	1,654	25		12.74	2,832	24
Maize		1.76	351	15		1.90	379	15		1.46	243	20		1.21	268	18
Pulses		0.82	164	28		0.90	181	28		0.91	151	30		0.69	153	30
Mixed Veg.		1.80	360	16		1.78	356	16		1.52	254	18		1.44	320	18

Source: Primary Data

Note: *Jhum* cultivation is a mixed cropping practice, in which paddy is the major crop component in addition to few other crops like maize, pulses and vegetables *etc*. The areas under these crops are very insignificant, for which no separate analysis could be taken up.

kg /ha. The productivity of pineapple ranged between 28,840 to 18,872 nos./ha across three different blocks, namely, Salema, Ambassa and Matabari blocks. Pineapple was not cultivated in Killa block. The highest productivity of brinjal was recorded at 4,210 kg/ha in Killa block followed by Ambassa block with 3,903kg/ha and Salema block with 1,938 kg/ha. Potato cultivation was found in Killa block only with a productivity of 25,375 kg /ha. Chilli (raw) was grown in Salema and Matabari blocks only, registering a productivity of 2,491 kg/ha and 3,257 kg/ha, respectively. Cultivation of pumpkin was found only in Matabari block with 5,030 kg/ha productivity. As against this, *Jhum* cultivation is a traditional practice for all the hill tribes of Tripura and is basically community cultivation. The average area under different crops was not exceeding half a hectare of land for each household. The per hectare yield of *Jhum* paddy was found to be much lower (Nearly a half) than that of the settled area paddy. The highest yield with 2,874 kg/ha was recorded in Ambassa block followed by 2,832 kg./ha in Killa block, 2,615 kg/ha in Salema block and 1,645 kg/ha in Matabari block. The estimated yield of maize was recorded between 379 kg/ha and 243 kg/ha across the blocks under consideration. The estimated yield of pulses were between 181 kg/ha and 151 kg/ha while that of mixed vegetables ranged between 360 kg/ha and 254 kg/ha across the blocks. Interestingly, the price of *Jhum* paddy per kg was more than that of *Aman* and *Boro* paddy in all the blocks.

4.4 Block-wise benefit from Settled Farming, *Jhum* cultivation and pig rearing

It is worthwhile to study the costs and returns from settled *vis-à-vis Jhum* cultivation together with rearing of pigs, so as to know the income earning capacity of the farmers. The cost of cultivation and income varied according to type of farmers across the blocks under study. Hence, an attempt was made to see the variation in returns amongst the settled and *Jhum* cultivators.

There has been constant effort on the part of the Government to highlight the benefits of settled farming so that the *Jhum* cultivators get motivated to go for modern cultivation practices and try to reduce the area under *Jhum* cultivation for both econo-environmental and socio-political reasons.

From environmental point of view, there has been heavy soil degradation and de-forestation over the years as a consequence of practicing *Jhum* cultivation. Besides, the *Jhumias* are totally isolated from rest of the tribal and non-tribal communities and as a result, they could not take the advantages of education, health, drinking water and other facilities created by the Government. The mobility of the

farmers from one place another during the *Jhum* cycle had earlier debarred them from availing those benefits. Economically they remained secluded and poor as compared to other segments of the society. Keeping these ends in view, the present study attempted to examine and compare the status of settled farming and *Jhum* cultivation with three major components, *viz*. agriculture, horticulture and piggery, as identified from the official records.

The cost of cultivation of any crop covers different cost components *viz.,* tilling/ ploughing cost, bullock cost, labour cost (owned and hired), rental value of the land, machinery cost, fertilizer & manure cost, seed costs, pesticides and irrigation, *etc.* Machinery cost includes the hiring charges of machinery, fuel for machinery, electricity, minor repairs and interest charges on machineries. Labour cost covers the actual wages paid and the imputed value of family labour. The bullock cost includes the cost of maintenance towards feed cost, fodder cost, cost of veterinary medicine, value of the livestock and its depreciation. The costs in case of pig rearing, include labour cost, feed cost and medicines *etc*.

During the field survey, it was observed that all the settled crops were profitable in nature. But the vegetables and pineapple growers did not get their due returns most often. It might be due to the fluctuation of market prices of perishable fruit crops and vegetables during the peak season. At the same time, hike in input cost and labour cost was also quite alarming. Pumpkin was found to be a highly profitable crop in the study area. Its productivity was also recorded to be very high. But it was grown in Matabari block only. However, due to lack of adequate storage and marketing facilities and inadequate price regulation, the farmers usually had to suffer very often. The State Government needs to address these problems for large scale production of this crop in all the districts. Maize was still considered to be a minor crop in Tripura.

Tables-4.4 and 4.5 present per hectare cost of cultivation, gross returns and net returns from settled *vis-a-vis Jhum* cultivation across the selected blocks of Dhalai and Gomati districts, respectively. For *Aman* paddy, in the case of settled cultivation, the highest profitability with a BCR of 1.40:1 was recorded under Salema block followed by Killa block (with BCR. 1.34:1) and Ambassa block (with BCR 1.25:1). In case of pineapple, the highest profitability with a BCR of 1.71:1 was found under Ambassa block followed by Salema Block (with BCR 1.49:1) and Matabari block (withBCR1.36:1).

Table - 4.4
Block-wise per hectare cost of cultivation and returns from settled farming and *Jhum* cultivation in Dhalai District of Tripura

(in Rs.)

Salema Block										
	Settled Cultivation					*Jhum* Cultivation				
	***Aman* paddy**	**Pineapple**	**Chilli**	**Brinjal**	**Settled Total**	***Jhum* Paddy**	**Maize**	**Pulses**	**Mixed veg.**	**Total *Jhum***
Tilling/ Ploughing/ Cost	6,715	4,043	2,784	1,938	3,870	-	-	-	-	-
Labour cost	32,785	51,780	32,123	42,437	39,781	51,543	3,608	3,093	3,350	15,398
Fertilizer & Manure	12,633	15,704	21,318	24,000	18,414	0	0	0	399	100
Others	3,044	26,955	18,562	13,843	15,601	8,319	416	458	582	2,444
Total Cost	55,177	98,482	74,787	82,218	77,666	59,862	4,024	3,550	4,332	17,942
Gross Return	77,333	146,745	99,650	96,875	105,151	57,533	5,265	4,594	5,753	18,286
Net Return	22,156	48,263	24,863	14,656	27,485	-2,329	1,241	1,044	1,421	344
BCR	**1.40**	**1.49**	**1.33**	**1.18**	**1.35**	**0.96**	**1.31**	**1.29**	**1.33**	**1.02**
Ambassa Block										
	Settled Cultivation					*Jhum* Cultivation				
	***Aman* paddy**	**Pineapple**	**Chilli**	**Brinjal**	**Settled Total**	***Jhum* Paddy**	**Maize**	**Pulses**	**Mixed veg.**	**Total *Jhum***
Tilling/ Ploughing Cost	7,806	7,043	3,112	4,765	5,682	-	-	-	-	-
Labour cost	38,112	50,254	32,776	50,146	42,822	55,709	3,900	3,343	3,621	16,643
Fertilizer & Manure	12,786	22,039	24,556	39,814	24,799	0	0	0	269	67
Others	3,752	46,954	20,748	34,035	26,372	5,603	280	308	392	2,646
Total Cost	62,456	126,290	81,192	128,760	99,675	61,312	4,180	3,651	4,282	18,356
Gross Return	78,282	216,036	202,458	195,174	172,988	63,248	5,692	5,060	5,692	19,923
Net Return	15,826	89,746	138,266	67,842	77,920	1,936	1,513	1,409	1,410	1,567
BCR	**1.25**	**1.71**	**2.49**	**1.52**	**1.74**	**1.03**	**1.36**	**1.39**	**1.33**	**1.09**

Source: Primary data

Note: 1. Others= Cost of seeds, pesticides and irrigation.
2. In case of *Jhum* paddy, labour cost includes slashing burning, land preparation, *etc*.
3. Mixed vegetables include local beans, ash gourd, pumpkin, cucumber, sweet gourd, arum, leafy vegetables *etc*.

Table - 4.5
Block-wise per hectare cost of cultivation and returns from settled farming and *Jhum* cultivation in Gomati District of Tripura

Matabari Block										
	Settled Cultivation					*Jhum* Cultivation				
	***Aman* paddy**	**Pineapple**	**Chilli**	**Pumpkin**	**Settled Total**	***Jhum* Paddy**	**Maize**	**Pulses**	**Mixed veg.**	**Total *Jhum***
Tilling/ Ploughing Cost	7,806	7,043	2,550	4,765	5,541	-	-	-	-	-
Labour cost	33,040	45,294	34,186	47,572	40,023	39,158	3,524	3,133	3,328	12,286
Fertilizer & Manure	15,092	27,020	25,916	27,020	23,762	0	0	0	141	35
Others	4,315	31,367	23,872	31,367	22,730	2,933	147	161	205	862
Total Cost	60,253	110,724	86,524	110,724	92,056	42,091	3,671	3,294	3,675	13,183
Gross Return	72,544	150,896	162,888	150,896	134,306	41,340	4,862	4,532	4,572	13,827
Net Return	12,291	40,172	74,364	40,172	41,750	-751	1,191	1,238	897	644
BCR	**1.20**	**1.36**	**1.88**	**1.36**	**1.46**	**0.98**	**1.32**	**1.38**	**1.24**	**1.05**
Killa Block										
	Settled Cultivation					*Jhum* Cultivation				
	***Aman* paddy**	**Boro Paddy**	**Potato**	**Brinjal**	**Settled Total**	***Jhum* Paddy**	**Maize**	**Pulses**	**Mixed veg.**	**Total *Jhum***
Tilling/ Ploughing Cost	6,487	5,083	2,040	5,926	4,884	-	-	-	-	-
Labour cost	31,672	30,702	39,560	39,699	35,408	51,013	3,571	3,061	3,316	15,240
Fertilizer & Manure	10,637	12,214	43,317	37,445	25,903	0	0	0	384	96
Others	3,521	4,748	13,600	42,330	16,050	7,990	400	439	559	2,347
Total Cost	52,317	52,747	98,517	125,400	82,245	59,003	3,970	3,500	4,259	17,683
Gross Return	70,053	63,061	203,000	210,500	136,654	57,533	4,827	4,603	5,753	18,179
Net Return	17,736	10,314	104,483	85,100	54,408	-1,570	857	1,102	1,495	471
BCR	**1.34**	**1.20**	**2.06**	**1.68**	**1.66**	**0.98**	**1.22**	**1.31**	**1.35**	**1.03**

Source: Primary data

Note: 1. Others= Cost of seeds, pesticides and irrigation.
2. In case of *Jhum* paddy, labour cost includes slashing burning, land preparation, *etc*.
3. Mixed vegetables include local beans, ash gourd, pumpkin, cucumber, sweet gourd, arum, leafy vegetables *etc*.

The highest profitability in chilli with a BCR of 2.49:1 was recorded under Ambassa block (Dhalai District) followed by Matabari block (Gomati District) with a BCR of 1.88:1 and Salema block (Dhalai District) with BCR 1.33:1. The highest profitability in Brinjal cultivation with a BCR of 1.68:1 was found against Killa block (Gomati District) followed by Ambassa and Salema block (with BCR 1.52:1 and 1.18:1, respectively). Potato was found to be the most profitable crop with BCR 2.06:1 and was found in Killa block only while pumpkin cultivation was found in Matabari block with a BCR of 1.36:1. The overall BCR of settled cultivation was 1.35 :1 against Salema block, 1.74 :1 for Ambassa block, 1.46 :1 for Matabari block and 1.66 :1 for Killa block.

In case of *Jhum* paddy, there were all losses in all the blocks except for Ambassa block (with BCR 1.03:1). However, other crops raised under *Jhum* condition indicated better profitability, with BCR ranging from 1.22:1 to 1.39:1 across the blocks. It is also clear from the Tables 4.4 and 4.5 that the net returns from *Jhum* paddy were either very low or negative. The per hectare net returns from *Jhum* paddy were negative, varying from (-) Rs 751 in Matabari block to (-) Rs.1,570 in Killa block and to (-) Rs. 2,329 in Salema block. It was positive only in case of Ambassa block (Rs.1,936). The overall total profitability of *Jhum* cultivation (including *Jhum* paddy and other crops) ranged from 1.02:1 in Salema block to 1.09:1 in Ambassa block.

Table - 4.6
Block-wise cost and returns from pig rearing per farm per annum in Dhalai District of Tripura

(in Rs.)

Particulars	Salema Block		Ambassa Block	
	Type of Pigs		Type of Pigs	
		Non-descript (Reared by *Jhumias*)		Non-descript (Reared by *Jhumias*)
No. of (Pig + Piglets)	10	4	4	5
Labour Cost	23,500	10,642	14,006	13,500
Feeds	43,333	0	11,300	0
Medicine	4,116	0	1,616	0
Total Cost	70,949	10,642	26,922	13,500
Gross Returns	77,333	13,958	37,126	15,600
Net Returns	6,384	3,316	1,350	2,100
BCR	**1.09**	**1.31**	**1.38**	**1.16**

Source: Primary data

Tables-4.6 and 4.7 reflect per farm cost of rearing of pigs (CB and ND), gross returns and net returns across the blocks under the sample districts. The net returns per farm usually depend upon, to a great extent, on the number of pigs/piglets owned

by each farm. In Salema block, the BCR stood at 1.09:1 against CB pig and 1.31:1 against ND pigs while in Ambassa block, the BCR was recorded at 1.38:1 against the CB pig and 1.16:1 against ND pigs. In Matabari block, the BCR stood at 1.44:1 against CB pigs and 1.15:1 against ND pigs while in Killa block, the BCR were recorded at 1.85:1 against CB pig and 1.23:1 against ND pigs.

Table - 4.7
Block-wise costs and returns from pig rearing per farm per annum in Gomati District of Tripura

(in Rs.)

Particulars	Matabari Block		Killa Block	
	Type of Pigs		Type of Pigs	
		Non-descript (Reared by *Jhumias*)		Non-descript (Reared by *Jhumias*)
No. of (Pig + Piglets)	4	7	4	3
Labour Cost	19,033	17,010	16,180	6,406
Feeds	17,800	525	18,220	0
Medicine	2,666	0	2,416	0
Total Cost	39,499	17,535	36,816	6,406
Gross Return	56,756	20,135	67,973	7,903
Net Return	17,257	2,600	31,157	1,497
BCR	1.44	1.15	1.85	1.23

Source: Primary data

Thus, the selected blocks under the district of Gomati indicated higher profitability as compared to Dhalai district except for Matabari block against ND pigs.

4.5 Block-wise Employment Generation in Dhalai and Gomati District

Tables-4.8 and 4.9 present the employment scenario per household for both settled and *Jhum* cultivation. The employment pattern usually depends upon average

Table - 4.8
Block-wise Employment Generation in Settled and *Jhum* cultivation in a crop year in Dhalai District of Tripura on per Household basis

Salema Block		
Particulars	Settled Total	*Jhum* Total
Labour cost/ha (in Rs.)	39,781	61,594
Total Man days/ha (in days)	133	205
Area/Household (in Ha.)	0.57	0.50
Man days/ Household (in days)	76	103
Ambassa Block		
Particulars	Settled Total	*Jhum* Total
Labour cost/ha (in Rs.)	42,822	66,572
Total Man days/ha (in days)	143	222
Area/Household (in Ha.)	0.57	0.50
Man days/ Household (in days)	81	111
Block total/ District Total	**78**	**107**

Source: Primary Data

Note: Family Man days were worked out by dividing the total labour cost per hectare by the existing wage @ Rs.300.00 per day

size of the operational holding per household. Combining both the blocks of Dhalai district, the number of man days per household was worked out at 78 man days for settled cultivation and 107 man days for *Jhum* cultivation.

Table - 4.9
Block-wise Employment Generation in Settled and *Jhum* cultivation in a crop year in Gomati District of Tripura on per Household basis

Matabari Block		
Particulars	Settled Total	*Jhum* Total
Labour cost/ha (in Rs.)	40,023	49,143
Total Man days/ha (in days)	133	164
Area/Household (in Ha.)	0.59	0.60
Man days/ Household (in days)	79	98
Killa Block		
Particulars	Settled Total	*Jhum* Total
Labour cost/ha (in Rs.)	35,408	60,961
Total Man days/ha (in days)	118	203
Area/Household (in Ha.)	0.86	0.45
Man days/ Household (in days)	102	91
Block total/ District Total	90	95

Source: Primary Data

Tables-4.10 and 4.11 reveal block-wise employment in terms of man days per farm under CB and ND pig farming for Dhalai and Gomati districts. It has been observed that CB pig farming required more number of man days as compared to ND pig farming. Combining both the blocks in Dhalai district, CB pig farming consumed 63 man days while ND pig farming utilized 40 man days per farm.

Table - 4.10
Block-wise Employment for Rearing of Pigs per Farm per annum in Dhalai District of Tripura

Salema Block		
Particulars	CB Pig (reared by Settled Cultivators)	ND Pig (Reared by *Jhumias*)
No. of (Pig + Piglets)	10	4
Labour cost/Farm (in Rs.)	23,500	10,642
Total Man-Days/Farm (in days)	78	35
Ambassa Block		
Particulars	CB Pig (Reared by Settled Cultivators)	ND Pig (Reared by *Jhumias*)
No. of (Pig + Piglets)	4	5
Labour cost/Farm (in Rs.)	14,006	13,500
Man-days/ Farm (in days)	47	45
Block total/ District Total	**63**	**40**

Source: Primary Data

Note: Family Man-Days were worked out by dividing the total labour cost per hectare by the existing wage @ Rs.300.00 per day during field survey

Table-4.11
Block-wise Employment for Rearing of Pigs per Farm per annum in Gomati District of Tripura

Matabari Block		
Particulars	CB Pig (reared by Settle Cultivators)	ND Pig (Reared by *Jhumias*)
No. of (Pig + Piglets)	4	7
Labour cost/Farm (in Rs.)	19,033	17,010
Total Man-Days/Farm(in days)	63	57
Killa Block		
Particulars	CB Pig (Reared by Settle Cultivators)	ND Pig (Reared by *Jhumias*)
No. of (Pig + Piglets)	4	3
Labour cost/Farm (in Rs.)	16,180	6,406
Man-days/ Farm (in days)	54	21
Block total/ District Total	**59**	**39**

Source: Primary Data

Note: Family Man-Days were worked out by dividing the total labour cost per hectare by the existing wage @ Rs.300.00 per day

As against this, in Gomati district, taking both the blocks together, CB pig farming generated 59 man days and ND pig farming consumed 39 man days.

Finally, per farm net returns from settled cultivation *vis-à-vis Jhum* cultivation and also from pig rearing for all the sample farmers across the selected blocks were computed, compiled and presented in Table-4.12. In case of settled farmers of Dhalai district, the percentage contribution of settled farming to the total net returns was estimated at 56.29 per cent and the remaining 43.71 per cent was contributed by CB Pig rearing. But in Gomati district, of the total net returns, 86.59 per cent was contributed by CB pig rearing and the rest 13.41 per cent was from crop cultivation. Combining both the districts, the overall net returns from CB pig rearing stood at 76.28 per cent of the total net returns. In case of *Jhum* farmers, combining both the districts, the overall per farm net returns from ND pig rearing stood at 58.26, while the contribution of *Jhum* cultivation was estimated at 41.74 per cent.

From Table 4.12 it was also seen that the net returns from settled cultivation was 1.56 times more than that of *Jhum* farming. Piggery, in general, is a profitable venture. The CB pig rearing in the study area was 4.90 times more profitable than ND pig rearing. In overall analysis, the total net returns from settled farming with CB pig rearing was found to be 3.51 times more profitable than that of *Jhum* farming with ND pig rearing.

Table - 4.12
Overall per farm Net Returns from Settled *vis a vis Jhum* Cultivation and per farm Net Returns from (CB & ND) Pig Rearing

Particulars	Net Return (in Rs.)					
	Settled farmers			*Jhum* farmers		
	Settled Cultivation	CB Pig	Settled + CB Pig	*Jhum* Cultivation	ND Pig	*Jhum* + ND Pig
Salema Block	3,238	6,384	9,622	1,288	3,316	4,604
Ambassa Block	6,723	1,350	8,073	3,134	2,100	5,234
Dhalai Ditrict (per cent to total NR)	**4,980 (56.29)**	**3,867 (43.71)**	**8,847 (100.00)**	**2,211 (44.95)**	**2,708 (55.05)**	**4,919 (100.00)**
Matabari Block	4,030	17,257	21,287	1,545	2,600	4,145
Killa Block	3,467	31,157	34,624	848	1,497	2,345
Gomati District (per cent to total NR)	**3,749 (13.41)**	**24,207 (86.59)**	**27,956 (100.00)**	**1,197 (36.87)**	**2,049 (63.13)**	**3,245 (100.00)**
Over all Net Returns (per cent to total NR)	**4,365 (23.72)**	**14,037 (76.28)**	**18,402 (100.00)**	**1,704 (41.74)**	**2,378 (58.26)**	**4,082 (100.00)**
Overall proportion of increase in net returns of Settled farmers over the *Jhum* farmers	**1.56**	**4.90**	**3.51**	-	-	-

Source: Primary Data

From the above analysis, it may be concluded that the average net returns per farm for settled farmers was significantly higher than that of *Jhum* farmers of Tripura. Under the situation, the findings are to be highlighted and constant efforts should be made to educate the *Jhum* farmers to go for settled cultivation together with pig farming, particularly CB piggeries in order to attain better livelihood options.

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CHAPTER- 5

EMPOWERMENT OF WOMEN

Empowerment is the process of becoming stronger and more confident, especially in controlling one's life and claiming one's right. Women's empowerment, according to the United Nations, mainly has five components, *e.g.* 1) Generating women's sense of self worth, 2) Women's right to have and to determine their choices, 3) Women's right to have access to equal opportunities and all kinds of resources, 4) Women's right to have the power to regulate and control their own lives, within and outside the home and 5) Women's ability to contribute in creating a more just social and economic order. Thus, women empowerment is nothing but recognition of women's basic human rights and creating an environment where they are treated as equals to man.

Empowering women (Bera, 2012) increases the ability of women to access and participate in the process of development in various sectors, including health, education, employment opportunities and social and political rights. An economy can not grow well, if half of its population is left aside from participating in different activities. Thus, for achieving a better quality life, empowerment of women is a must for a sound economy. Making them empowered will ensure real growth and development of the family, the community, the society and the country as a whole.

Gender equality is the cornerstone of development. When women and men are equal in a society, poverty is reduced, health of children and mothers improves and economy flourishes. When women are alienated from the world of work, it affects not only their own lives but make whole society poorer. Women's empowerment brings socio-economic benefits to the entire population. The principle of gender equality is enshrined in the Indian Constitution in its Preamble, Fundamental Rights, and Directive Principles. The Constitution not only grants equality to women, but also empowers the State to adopt effective measures in favour of womenfolk.

Studies over the years have shown that there has been marked empowerment of women in different activities including agriculture. Successful settled farming adopted by the erstwhile *Jhum* cultivators had resulted in increased production, income and employment besides empowering the womenfolk in socio-economic and political spheres.

In the present study, an attempt was made to see the impact of mainstream farming on empowerment of women in the study areas. Accordingly, in course of the interview, questions were put before the sample farmers mainly to know their awareness and involvement in taking education, association with other socio-political entities, working with Government or Private Agencies, undergoing any kind of training, taking decisions in family matters or household activities *etc*. Table-5.1 indicates that in the event of adoption of settled cultivation/CB piggeries, the level of education among the womenfolk had improved substantially, as reported by 87 and 66 per cent of the respondents in Salema and Ambassa block, respectively.

Table-5.1
Women Empowerment due to Adoption of Settled Cultivation (mainstream farming) and CB Piggery in Salema and Ambassa Block of Dhalai District of Tripura

(In percentage)

Sl. No.	Queries	**Salema Block**		**Ambassa Block**	
		Yes	No	Yes	No
1	Improved level of education	87	13	66	34
2	Adoption of political membership	27	73	13	87
3	Membership in NGO/SHG	66	34	66	34
4	Engagement in Govt. Organization	27	73	20	80
5	Engagement in Private Organization	34	66	30	70
6	Participation in training programme	80	20	40	60
7	Receipt of credit	27	73	60	40
8	Decision taken by both men and women in family matter	53*	47**	87*	13**
9	Day to day household work done by men and women	27*	73**	20*	80**

Source: Source: Primary data
*Decision taken both by men and women.
** Decision taken by women only along with day- to-day household works

Further, it has been observed that 27 per cent of the women in Salema Block and 13 per cent of the women in Ambassa Block had political affiliation/membership in the district of Dhalai. About 66 per cent of the womenfolk in the study area were registered with some NGO or SHG in both the blocks. Twenty seven per cent women in Salema block and 20 per cent women in Ambassa block had engagement in Government organizations, while 34 per cent women in Salema block and 30 per cent women in Ambassa block were engaged in private organizations.

About 80 per cent women in Salema block and 40 per cent women in Ambassa block had undergone some kind of training programmes organized by various Govt. Department of the State. They were of the opinion that the newly acquired skills and knowledge gained through such trainings had benefitted them handsomely to increase their production and income from agriculture and allied enterprizes.

So far as institutional credit was concerned, about 27 per cent women in Salema Block and 60 per cent of the womenfolk in Ambassa Block availed the benefits from different financial agencies.

In family matters, the decisions were mostly taken by both men and women. Nearly, 53 per cent in Salema Block and as high as 87 per cent of the respondents in Ambassa Block reported that both men and women participated in the decision making process. Shifting from *Jhum* cultivation to settled cultivation had contributed immensely in increasing the participation rate of the women members in taking decisions relating to family matters, as perceived by the respondents.

In Salema block, the day-to-day household works were performed by both man and woman, as reported by 28 per cent of the respondents. As against this, as high as 73 per cent of the women, independently handled the day-to-day household works. In case of Ambassa Block as well, only 20 per cent of the sample farmers opined that both men and women handled the day-to-day work. However, majority of the women (80 per cent) had to manage the household jobs, indicating the work pressure on them.

Thus, it is observed that although there was a marked improvement in the participation rate of the womenfolk in the decision making process, particularly on family-related matters, the household work of the families continued to be the major domain of the women population in the study area.

The responses of the sample farmers from Matabari and Killa Block of Gomati district, against the same set of queries are presented in Table-5.2. The collected data indicate that there had been marked improvement in the level of education of the womenfolk following the adoption of settled cultivation, as reported by 93 per cent and 87 per cent of the sample farmers in Matabari and Killa Block, respectively.

Under the changed scenario, nearly 26 per cent women in Matabari block and 27 per cent women in Killa block acquired membership of the political organizations

in their own locality. A large percentage of women still remained untouched by the political parties in both the blocks.

Table-5.2
Women Empowerment due to Adoption of Settled Cultivation and CB Piggery in Matabari and Killa Block of Gomati District of Tripura

(In percentage)

Sl. No.	Queries	**Matabari Block**		**Killa Block**	
		Yes	No	Yes	No
1	Improved level of education	93	7	87	13
2	Adoption of political membership	26	74	27	73
3	Membership in NGO/SHG	87	13	66	34
4	Engagement in Govt. Organization	26	74	40	60
5	Engagement in Private Organization	26	74	34	66
6	Participation in training programme	66	34	80	20
7	Receipt of credit	66	34	27	73
8	Decision taken by both men and women in family matter	60**	40*	53**	47*
9	Day to day household work done by men and women	13**	87*	20**	80*

Source: Primary data.

Note: *Decision taken both by men and women.
** Decision taken by women only.

As against this, about 87 per cent women in Matabari Block and 66 per cent women in Killa Block had NGO/SHG membership to well utilize their free time, after adoption of settled farming/CB piggeries.

An improved level of education among the women had resulted in getting Government employment to the extent of 26 and 40 per cent in Matabari and Killa Block, respectively. Another 26 per cent women in Matabari Block and 34 per cent women in Killa Block were reported to be engaged in private organizations.

Any kind of capacity building programme relating to economic activities is always welcome to develop skills and awareness on modern technologies/ method/ schemes. During the course of investigation, it was reported that about 66 per cent women in Matabari Block and 80 per cent women in Killa Block received some kind of trainings or workshops organized by the Government Departments at different point of time. They were in an advantageous position in the sense that they could avail the benefits of trainings following the acceptance of settled cultivation/CB piggeries by their male counterparts..

It was also reported that as high as 66 per cent of the women had the access to institutional credit in Matabari Block as against 27 per cent in Killa Block. The financial institutions came forward to advance loans on the basis of their settled nature of farming. However, a large segment of the womenfolk are yet to be covered under institutional credits, particularly in Killa Block.

About 60 per cent of the women in Matabari Block and 53 per cent women in Killa Block took active part in decision-making process together with their male counterparts particularly on family matters. But nearly half of the women population were still left outside the decision making process.

So far as day-to-day household work was concerned, the decisions were mostly taken by the womenfolk, as reported by 87 per cent of the respondents in Matabari Block and 80 per cent in Killa Block.

Thus, the above observations clearly indicate that with the replacement of *Jhum* cultivation by that of settled one, the tribal women of the study area became really empowered socially, politically and economically.

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CHAPTER 6

ANALYSIS OF FARMERS PROBLEMS

The problems confronted by the *Jhum* cultivators as well as settled farmers were ascertained by asking specific questions at the time of interview. The Government resources are utterly limited to solve all these problems and hence, scarce resources are to be utilized judiciously based on intensity of the problems (Prioritization). It is therefore, necessary to rank the problems so that resources can be allotted as per seriousness of these problems. The Garrett Ranking Technique (Garrett, 1969) was used for ranking of the problems faced by the farmers.

6.1 Problem areas and viewpoints of the *Jhumias*

On the basis of the opinion of the *Jhum* farmers, the following observations were made as indicated in Table 6.1 & Table 6.2.

- From 87 to 100 per cent farmers in different blocks opined that shrinkage of *Jhum* cycle had led to low productivity of crops under *Jhuming.* And it was mainly attributed to increase in *Jhumia* population.
- Nearly 87 to 93 per cent respondents considered *Jhum* cultivation as their identity and tradition across the blocks, for which they were little reluctant to leave the age-old practice and take up settled cultivation.

Table - 6.1
Problems faced by the *Jhum* Cultivators in Salema and Ambassa Block of Dhalai District of Tripura

(In percentage)

Sl. No	Problems	**Salema Block**		**Ambassa Block**	
		Yes	No	Yes	No
1.	Shrinkage of *Jhum* cycle leads to low productivity of crops under *Jhuming*	93	7	100	0
2.	Shrinkage of *Jhum* cycle is due to increase in *Jhum*ia population	87	13	87	13
3.	*Jhum* cultivation is an identity of the *Jhumias*	93	7	93	7
4.	*Jhumias* are not aware of the harmful effect of *Jhum* cultivation	20	80	27	73
5	*Jhum* cultivation is practiced for non-availability of plain land	13	87	13	87
6.	*Jhumias* do not use HYV seeds.	100	0	100	0
7.	*Jhumia* feels that it is the least risky method of cultivation	100	0	100	0

Source: Primary data

- Only a small segment of *Jhum* farmers *i.e.* 7 to 27 per cent were not aware of the harmful effect of *Jhum* cultivation on the flora and fauna of the locality.
- Thirteen per cent of the farmers in the district of Dhalai were of the opinion that they were continuing with the *Jhum* cultivation due to non-availability of plain land. The percentage of farmers in this category in Gomati district ranged from 7 to 40 per cent against Matabari and Killa block, respectively.
- In both the districts, there was no instance of using HYV seeds by the *Jhumias*
- All the respondents in Dhalai district considered *Jhum* cultivation as the least risky method of cultivation. In case of Gomati district, the percentage of farmers expressing similar opinion ranged from 93 (Matabri block) to 87 (Killa block).

Table - 6.2
Problems faced by the *Jhum* Cultivators in Matabari and Killa Block of Gomati District of Tripura

(In percentage)

Sl. No	Problems	**Matabari Block**		**Killa Block**	
		Yes	No	Yes	No
1.	Shrinkage of *Jhum* cycle leads to low productivity of crops under *Jhuming*	87	13	93	7
2.	Shrinkage of *Jhum* cycle is due to increase in *Jhum*ia population	93	7	100	0
3.	*Jhum* cultivation is an identity of the *Jhumias*	87	13	87	13
4.	*Jhumias* are not aware of the harmful effect of *Jhum* cultivation	7	93	13	87
5	*Jhum* cultivation is practiced for non-availability of plain land	7	93	40	60
6.	*Jhumias* do not use HYV seeds.	100	0	100	0
7.	*Jhum*ia feels that it is the least risky method of cultivation	93	7	87	13

Source: Primary data.

6.2 The Garret rankings for the problems of *Jhumias*

The Garret ranking for the problems confronted by the *Jhum* cultivators were worked out and presented in Table 6.3 to draw inference on the magnitude of the problems. Lower rank indicated higher intensity of the problems as given in the table.

It is clear from the Garrett ranking that

- *Jhumias* were not at all using HYV seeds and hence it ranked 1, in the problem list.

- The *Jhumias* also considered the practice as the least risky method of cultivation for which they wanted to continue with the *Jhum* cultivation. This attitude of *Jhumia*'s was the 2nd severe problem with rank 2.
- Shrinkage of *Jhum* cycle led to low productivity of crops grown under *Jhuming* was the third severe problem with rank 3.

Table - 6.3
The Garrett Ranking for the Problems of *Jhum* Cultivators

Sl. No.	Problems	Rank
1	Shrinkage of *Jhum* cycle leads to low productivity of crops under *Jhuming*	3
2	Shrinkage of *Jhum* cycle is due to increase in *Jhumia* population	4
3	*Jhum* cultivation is an identity of the *Jhumias*	5
4	*Jhumias* are not aware of the harmful effect of *Jhum* cultivation	7
5	*Jhum* cultivation is practiced for non-availability of plain land	6
6	*Jhumia* do not use HYV seeds.	1
7	*Jhumia* feels that it is the least risky method of cultivation	2

Source: Primary data.

- Shrinkage of *Jhum* cycle was due to increase in *Jhumia* population was ranked 4.
- The fifth ranked problem with the *Jhumias* was that they were not ready to leave the practice of *Jhum* cultivation as majority of them considered *Jhuming* as their identity or tradition.
- Non-availability of plain land to go ahead with settled cultivation was identified as yet another problem with rank 6.
- The seventh important problem faced by the *Jhumias* was that they did not even realize the fact that this method of cultivation could destroy the flora and fauna of the State.

6.3 Problem areas and viewpoints of the settled cultivators

During the field survey, relevant queries were raised before the sample respondents in order to identify the problems of settled cultivation. Based on their feedback, the following observations were noted, as reflected in Table 6.4 and Table 6.5.

- About 20 to 27 per cent of the settled farmers in both the districts considered shortage of family laborers to be a problem of high intensity; nearly 53 to 80 per cent considered it to be a moderate problem and about 7 to 27 per cent of the farmers deemed it to be a problem with low intensity.

- Shortage of hired laborers during the peak period of agricultural operation was yet another problem with high intensity, as reported by 87 to 100 per cent respondents. Only a small segment of the farmers (13 per cent) deemed it to be a problem of moderate intensity.
- The prevailing wage rate in both the districts was found to be high, as pointed out by 87 to 100 per cent of the sample farmers; only 7 to 13 per cent found it to be a moderate problem,
- High input cost was another problem to reckon with, as expressed by 73 to 100 per cent of the sample farmers across the blocks. Another 20 to 27 per cent respondents considered input cost to be moderate.

Table - 6.4
Problems of Settled Cultivation in Salema and Ambassa Block of Dhalai District of Tripura

(In percentage)

Sl. No	Problems	Salema Block			Ambassa Block		
		High	Moderate	Low	High	Moderate	Low
1	Shortage of family labour	27	66	7	0	73	27
2.	Shortage of hired labour in peak period in agricultural operation.	87	13	0	87	13	0
3.	High wage rate of casual labour	87	13	0	100	0	0
4.	High input cost	73	27	0	100	0	0
5.	Attack of pests and diseases	40	53	7	47	53	0
6.	Shortage of quality seeds	93	0	7	80	20	0
7.	Low price of produce	53	47	0	87	13	0
8.	Inadequate irrigation facilities	58	21	21	87	7	6
9.	Shortage of inputs	51	42	7	13	74	13

Source: Primary Data

- Pests and diseases attack was high, as reported by 40 (Salema Block) to 47 (Ambassa Block) per cent of the sample farmers of Dhalai district. This attack was reported to be moderate in both the blocks according to 53 per cent of the respondents. In case of Gomati district, pest and disease attack was reported to be high as pointed out by 13 to 47 per cent of the respondents in Matabari and Killa Block, respectively. The attack was reported to be moderate by 87 (Matabari Block) to 53 (Killa Block) per cent of the sample farmers.
- A large majority of the sample farmers (80 to 93 per cent) were of the opinion that there was marked shortage of good quality seeds in the study area. Shortage of seed was reported to be moderate by 13 to 20 per cent of the sample farmers.

➢ Low price of produces was yet another burning issue as expressed by more than half of the sample farmers (47 to 87 per cent) in both the districts. The problem of low price of produces was considered to be moderate by fifty per cent of the sample farmers in all the blocks except for Killa Block wherein it was recorded at 13 per cent only.

Table - 6.5
Problems of Settled Cultivation in Matabari and Killa Block of Gomati District of Tripura

(In percentage)

Sl. No	Problems	Matabari Block			Killa Block		
		High	Moderate	Low	High	Moderate	Low
1	Shortage of family labour	20	53	27	20	80	0
2.	Shortage of hired labour in peak period in agricultural operation.	87	13	0	100	0	0
3.	High wage rate of casual labour	93	7	0	100	0	0
4.	High input cost	100			80	20	0
5.	Attack of pests and diseases	13	87	0	47	53	0
6.	Shortage of quality seeds	87	13	0	87	13	0
7.	Low price of produce	47	53	0	53	47	0
8.	Inadequate irrigation facilities	93	7	0	60	33	7
9.	Shortage of inputs	7	13	80	40	53	7

Source: Primary data.

➢ The irrigation facility was found to be inadequate in all the blocks under study, and was considered to be a severe problem, as reported by 58 to 93 per cent of the sample farmers.

➢ The status of input supply varied from block to block. In Salema Bolck, shortage of inputs was found to be high, moderate and low, as reported by 51, 42 and 7 per cent of the sample farmers, respectively. In case of Ambassa Block, 13 per cent considered the shortage to be high, 74 per cent considered it to be moderate and another 13 per cent marked it to be low. Shortage was reported to be high, moderate and low in Matabari Block by 7, 13 and 80 per cent of the sample farmers. As regard to Killa Block, 40, 53 and 7 per cent of the respondents considered shortage of inputs to be high, moderate and low, respectively.

6.4 The Garret rankings for the problems of settled cultivators

The Garret Rankings for the problems of settled cultivators were worked out and presented in Table 6.6 to draw inference on the severity of the problems. It is clear from the Garrett rankings that

- Higher wage rate stood as the most severe problem of the settled cultivators with rank 1
- High input cost occupied rank 2
- The third rank was secured by shortage of quality seeds
- Shortage of hired laborers in peak period of agricultural operations was yet another difficult problem with rank 4
- Inadequate irrigation facilities occupied rank 5 across the blocks
- Low price of produces as compared to its cost of cultivation was ranked 6
- Attack of pests and diseases during the plant growth period was ranked 7
- Shortage of inputs at the time of need secured rank 8 and
- Shortage of family worker was ranked 9

Table - 6.6
The Garrett Rankings for the Problems of Settled Cultivators

Sl. No.	Problems in Crops Cultivation	Rank
1	Shortage of family labour	9
2	Shortage of hired labour in peak period in agricultural operation.	4
3	High wage rate of casual labour	1
4	High input cost	2
5	Attack of pests and diseases	7
6	Shortage of quality seeds	3
7	Low price of produce	6
8	Inadequate irrigation facilities	5
9	Shortage of inputs	8

Source: Primary data.

6.5 Problems of raising Horticultural crops in Tripura

The problems of the sample farmers growing horticultural crops in both the districts were collected, compiled and presented in Table 6.7 and Table 6.8. Based on their feedback, the following observations were made

- About 60 to 93 per cent of the horticultural farmers in both districts noted the existence of wide gap between demand and supply of crops during peak harvesting season across the blocks.
- Almost all the sample farmers (87 to 100 per cent) from both the districts identified post-harvest losses to be the most serious problem of growing horticultural crops.

- Another high-intensity problem was the shortage of Processing Units, as opined by all the sample farmers (100 per cent) in all 4 blocks.
- In Dhalai district, nearly 57 to 87 per cent sample farmers assigned high priority on acute shortage of cold storage facilities while in Gomati district, 87 to 100 per cent farmers opined likewise.
- The intervention of the State or Private traders for export of surplus products was reported to be very low in Ambassa and Killa Blocks, as opined by 80 per cent of the sample farmers. It was reported to be moderate as expressed by 13 (Ambassa Block) to 63 (Salema Block) per cent of the sample farmers. Nearly 20 per cent in Killa Block and 33 per cent in Matabari Block found it to be moderate. The intervention was reported to be high by 7 per cent of the sample farmers in Ambassa and Matabari Blocks.

Table-6.7
Problems of the Farmers raising Horticultural Crops in Salema and Ambassa Block of Dhalai District of Tripura

(In percentage)

Sl. No	Problems	Salema Block			Ambassa Block		
		High	Moderate	Low	High	Moderate	Low
1	Wide gap in demand and supply during peak harvesting season	60	40	0	87	13	0
2.	Post-harvest losses	87	13	0	100	0	0
3.	Shortage of processing unit	100	42	0	100	0	0
4.	Acute shortage of cold storage	57	43	0	87	13	0
5.	Intervention of state or private traders in export of surplus product.	0	63	33	7	13	80

Source: Primary data.

Table-6.8
Problems of the Farmers raising Horticultural Crops in Matabari and Killa Block of Gomati District of Tripura

(In percentage)

Sl. No	Problems	Matabari Block			Killa Block		
		High	Moderate	Low	High	Moderate	Low
1	Wide gap in demand and supply during peak harvesting season	93	7	0	87	13	0
2.	Post-harvest losses	100	0	0	100	0	0
3.	Shortage of processing unit	100	0	0	100	0	0
4.	Acute shortage of cold storage	87	13	0	100	0	0
5.	Intervention of state or private traders in export of surplus product.	7	33	60	0	20	80

Source: Primary data.

6.6 The Garrett rankings on the problems of farmers growing horticultural crops

The Garrett rankings for the problems of the farmers growing horticultural crops were computed and presented in Table 6.9.

Table - 6.9

The Garrett Ranking for the Problems of the Farmers Growing Horticultural Crops

Sl. No.	Problems	Rank
1.	Wide gap in demand and supply in peak harvesting season	4
2.	Post-harvest loss	2
3.	Shortage of processing unit	1
4.	Acute shortage of cold storage	3
5.	Intervention of state or private traders in export of surplus product	5

Source: Primary data

It is clear from the **Garrett ranking** that

- Shortage of processing facilities for fruits and vegetables was the most serious problem of Tripura with rank 1
- Post-harvest losses of fruits and vegetables were very high and was ranked 2nd.
- The acute shortage of cold storage facilities was identified as the third most serious problem of the farmers growing horticultural crops in the State.
- Wide gap of demand and supply of output in peak harvesting season compelled the producers to sell their produces at lower prices and hence was identified as the fourth most important problem of the farmers.
- Intervention of the State and private traders for marketing of surplus products in the study area was far from satisfactory level and was therefore identified as yet another problem with rank 5.

6.7 Major problems faced by the sample farmers in rearing of CB pigs

The problems encountered by the sample farmers involved in CB pig rearing, as reported, were in the following order, in terms of intensity, from high to low:

- Price of product was low.
- Wage rate of laborer was very high.
- Price of medicine for treatment of CB pig was high.

- Cost of shed construction for pig was very high.
- Shortage of owned capital.
- Low subsidy.
- Difficulty in getting credit from the bank. Process of sanctioning credit was complicated and time consuming. Small producers can't arrange guarantor for the loan.
- Non-availability of medicine on time.
- Poor quality feeds and high price of feed
- Shortage of cold storage facilities

6.8 Major problems faced by the sample farmers in rearing of ND pigs

The major problems encountered by this category of farmers, in descending order included

- Construction of shed
- Shortage and high price of piglets
- Price per matured pig was determined by the middle-man
- High price of feed
- Shortage of cash capital to increase the numbers of piglets
- Non-availability of cross bred piglets and difficulty in obtaining semen for artificial insemination.

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CHAPTER 7

SUMMARY AND CONCLUSION

The study has attempted to portray the status of shifting cultivation, popularly known as *Jhuming* in the State of Tripura with special focus on its continuance, impact and economics. The practice of *Jhum* is mainly followed by the hill tribes of the State as they do not have much interest in extensive settled cultivation. They used to consider the practice as their traditional custom for which they are reluctant to leave the age old practice. *Jhum* land is used for raising multiple of crops; at least 4 to 5 crops are grown in a plot of land and the *Jhumias* mainly use either animal dung or plant extracts as soil nutrients.

But due to erosion of top soil on account of rain and wind and continuous use of poor quality home grown seeds over the years, together with traditional package of practices, *Jhum* cultivation has become uneconomic. The *Jhumias* are not only living below the poverty line but also are deprived of most of the benefits emanating from various welfare schemes launched by the Government, may be because of their lack of interest or unawareness. The studies by the experts, on the other hand, also indicate that forced conversion from shifting cultivation to settled cultivation may be counterproductive (Murtem *et. Al*, 2008). As such, methodical efforts are imperative to motivate and inspire the *Jhumias* for adoption of settled cultivation and modern agro-techniques. This is possible only when they realize the comparative benefits of settled cultivation with improved package of practices and accept readily to go ahead with the changes. Also, there need to be policy changes under a different perspective to address the biases against shifting cultivation. This is so because, many of the Government programmes launched for eradication of shifting cultivation are not yielding desirable results in Tripura. This can be attributed to lack of proper assessment of the requirements of the farmers. Naturally, participatory approach, under such a situation may give positive results.

For the present study, two *Jhum* dominated districts of Tripura *i.e*. Dhalai and Gomati were selected purposively and from each district, two development blocks were randomly selected. Again from each of the blocks, 20 sample farmers each from three categories of farms, namely, agri-horti proper, pig farmers, and the *Jhumias*, totaling 60 were picked up, thereby giving a total sample of 240 for the study.

Results of the investigation clearly indicate that adoption of settled cultivation could fetch handsome amount of profits to the *Jhumias* on per hectare basis. Precisely speaking, the income from settled cultivation was 1.56 times more than that of *Jhum* cultivation. Although, in general, piggery was a profitable venture, Cross-bred (CB) pig rearing was about 5 times more profitable than Non Descript (ND) pig rearing. In the overall analysis, the net total income from settled farming with CB pig was 3.51 times more profitable than that of *Jhum* cultivation with ND pig rearing. Further, once settled, they could reap the benefits of easy access to education, health, hygiene and drinking water, besides all other socio-economic advantages of plain farmers. Emergence of nuclear-families, spread of education, opening of job avenues and woman emancipation, as expected, gave rise to perceptible changes in the contemporary society.

Low productivity, shortening of *Jhum* cycle, adherence to age old tradition, negligence to environmental concern, perception of a less risky proposition and non-use of HYV seeds were identified as the prominent problem areas faced by the *Jhumias.* The field surveys also indicate that the settled farmers encountered the problems of shortage of family and hired labour, high wage rate, incidence of pests and diseases, unavailability of good quality seeds, inadequate irrigation support, shortage of agro-inputs in local markets and low prices of the products.

Shortage of processing facilities, post harvest losses of fruits and vegetables, acute shortage of cold storage facilities, wide gap between demand and supply, high cost of construction of sheds and inadequate market support were the prominent issues before the farmers cultivating horticultural crops in the study area. The problems encountered by the sample farmers involved in CB pig rearing included low price of products, high wage rate, high price of medicines, poor quality feeds, low owned capital, low access to institutional credit and shortage of cold storage facilities. Major problems faced by the farmers involved in ND pig rearing encompassed high cost of construction of sheds, shortage and high price of piglets, high price of feeds and shortage of cash capital.

The study was found to be important from socio-economic view-point as well. Due to increase in the level of education, women in the family, after settling with normal farming, got a better chance to participate in the decision making process in family matters, besides playing a crucial role in household affairs. Even they came

forward, at times to take joint decision outside the family matters, thereby reinforcing their position in the family, society and the community at large.

Under the circumstances, the Government can play a crucial role to bring these masses out of the morass of economic backwardness and political oblivion by addressing the twin challenges of poverty eradication and environmental protection. For this to happen, programmes should be launched to encourage the *Jhumias* to go for settled cultivation and at the same time, apply some proven technological guidelines and principles for replacement of shifting cultivation, like maximizing both cropping and fallow period, providing good quality seeds and credit support *etc*.

7.1 Suggestions for improvement of pig farms

The tribal farmers of the State are well experienced in rearing of pigs by tradition and if supported by the Government appropriately, it can definitely change the livelihood status of the farmers involved in settled and *Jhum* cultivation as well. Pig farming has already established itself to be a profitable enterprise among the tribal population and if adopted in right perspective, can handsomely supplement the income of the *Jhumias.* The following suggestions can be put forwarded for improvement of pig farming on the basis of interaction with the farmers.

- Variation in prices of CB pigs and ND pigs at different point of time was a major issue, which may perhaps be taken care of by the Government.
- Initially, credit at a lower rate of interest may be arranged by the Government to procure CB piglets.
- Subsidy may be given for infrastructure development of pig farm.
- Price of medicine for treatment of pigs may be subsidized or may be distributed free of cost.
- Visits of veterinary doctors at regular interval may be ensured in order to improve the health and growth of pigs/ piglets.
- Slaughtering of animals should be made more scientific and hygienic.
- Cold storage facilities may be created nearby the market yard.
- Market place need to be hygienic.
- Extension machinery needs to be strengthened for creating awareness about scientific pig farming.
- Scientific interventions for utilization of non-conventional feed resources, capacity building in health care services, adoption of scientific breeding, use of artificial insemination and promoting entrepreneurship for medium to large

scale production and judicious use of pig by-products could transform the traditional pig farming to a commercially viable proposition.

- The non-availability of cross bred piglets and difficulty in obtaining semen for artificial insemination may be overcome by establishing more breeding farms to supply upgraded piglets in the remote areas.

7.2 Suggestions for improvement of agriculture/horticulture

Following few suggestions were drawn from the interactions with the sample farmers for overall improvement of agriculture/horticulture in the study area

- Transport costs of the agricultural produce may be subsidized by the Government.
- Private parties need to be encouraged for establishment of more number of cold storage and fruit processing units in the tribal areas.
- Small sheds for selling of agricultural produce in the roadside and market areas may be constructed. Also, private entrepreneurs may be encouraged to make mobile fruit stalls in selective areas.
- Appropriate participatory soil and water conservation measures need to be adopted.
- The ongoing rehabilitation programme may be further strengthened with new approaches by involving them in rubber plantation
- The drip and sprinkler irrigation need to be introduced in *tilla* lands particularly, for horticultural crops
- The "Tong Houses" in the vicinity of *Jhum* field may be constructed for settlement of the *Jhumias* in selected locations.
- Front line demonstration need to be arranged for the *Jhumias* for introducing newly developed varieties.
- Capacity building through massive awareness programme may be resorted to.
- The rubber cultivation, though profitable, is not environment friendly. Moreover, gestation period for production of rubber is 6 to 7 years. Therefore, Government should encourage seasonal crops, horticultural crops and piggery farming in lieu of rubber plantation.

7.3 Conclusions

The present study attempts to describe the status of shifting cultivation in Tripura with clear indication of some alternative livelihood options based on field studies. In essence, the shifting cultivation is interwoven into the culture and tradition of near about 19 tribes inhabiting in the hilly terrain of Tripura. But from economic point of view, it can be said that lack of settled agricultural land and irrigation facilities, remoteness, high cost of labour, energy and inputs and in the absence of other viable alternatives, the tribal population of the state still continue to practice *Jhum* cultivation for their subsistence livelihood. There is an urgent need to encourage and inspire this chunk of population to get involved in settled cultivation without hurting their cultural ethos. And for this to happen, the Government should come forward with innovative technology package and institutional and policy support to address the twin challenges of poverty eradication (of *Jhumia*s) and environmental protection.

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REFERENCES

1. Acharjee, Milton and A. K. Ray (2013), "Research Issues and Priorities in the Field of Agriculture Sector and Dairy Scenario of Tripura - A Critical Analysis", International Journal of Research in Engineering and Technology, Vol. 02 (07) | Jul-2013, pp.49-55.
2. Anonymous (2009). "A Report on Tripura's March towards Self-sufficiency in Production of Fish": Performance of the Fisheries Department (April 2008–March 2009).
3. Bera, Gautam Kumar (2012), "Shifting Cultivation in Tripura," TRI, Government of Tripura, pp.1-4.
4. Biswas, B. C. (2010), "Farming System Approach to Improve Employment and Income in Eastern India", Fertilizer Marketing News, Vol. 41 (5), pp. 6-12.
5. Biswas, B. C. (2010), "A Success Story of an AP Farmer: Rice, Mango and Mousumbi", Fertilizer Marketing News, Vol. 41 (1), pp.1-2.
6. Biswas, B. C. (2010), "The Policy Initiatives and the Success Story of a UP Farmer". Fertilizer Marketing News, Vol. 41 (4), pp.1-7.
7. Biswas, B. C. and D. K. Shukla (2010), "Poverty Alleviation Through Grass - root Based Planning and Execution of Vegetable Farming System- An Experience of HP Farmers", Fertilizer Marketing News, Vol. 41 (9), pp.13-18.
8. Cameron, R.J. (1964). *N. Z. Jl For*. 9. 98-109. Destruction of the Indigenous Forests for Maori Agriculture during the nineteenth century.
9. Jyotishi, A. (2004). "Ecological, Economic and Institutional aspects of Shifting Agriculture: A Study in Orissa", retrieved from http://www.isec.ac.in/Theses%20new/Ecological_economic_and_institutional_aspects_of_shifti8
10. Karthik, T., G. Veeraswami & P. Samal (2009). "Forest Recovery following Shifting Cultivation: An Overview of Existing Research". Mongabay.com Open Access Journal, Vol. 2(4):374- 387.

11. Koech, K. E., K. B. Mutai, K. L. Kibet & K. G. Kosgei (2015). "Determination of Facilitators Choice by Small Holder Farmer in Laikipia County, Kenya". IOSR Journal of Agri. and Vet. Sciences, 8(1), pp 78-82
12. Lightfoot, C., M. Precin and J. K. Ofori (1996). "The Potential Impact of Integrated Agriculture-Aquaculture System on Sustainable Farming". ICLARM/IAB Workshop on Research for the Future Development of Aquaculture in Ghana, Accra. (Ghana). pp. 5-8.
13. Makdo, Badapmain, L. Touthang, T. Angami, R. Bhagawati, Nirmal Chandra, J. Kumar, B. Pait, Amit Sen and K. K. Shukla (2016), "Farming System Approach through Land Use Model; Strategy towards Food Security Under Changing Climate Scenario in Arunachal Pradesh". National Seminar on Integrating Agri-Horticultural and Allied Research for Food and Nutritional Security in Era of Global Climate Disruption, March 4-6, ICAR Research Complex for NEH Region, Meghalaya, pp.10.
14. Mishra, K. (2005). "Growing Discontent of Adivasis in Assam". Retrieved from http://www.countercurrents.org/adivasi-mishra120405.htm
15. Mittal, S. (2007), "Can Horticulture be a Success Story in India". Indian Council for Agricultural Research on International Economic Relations, publication 197, pp 1-79
16. Murtem, G., G. Sinha and J. Dopum (2008). *Jhumias* view on Shifting Cultivation in Arunachal Pradesh. Bulletin of Arunachal Forest Research 24 (1 & 2), pp. 35-40.
17. Patra, M., S. Begum & B. Deka (2014). "Problems and Prospects of Traditional Pig Farming for Tribal Livelihood in Nagaland", Indian Res. J. Ext. Edu. 14 (4), pp. 6-10.
18. Ray, A. K., M. Acharjee and S. Sarkar (2017). "Impact of Block (Rubber) Plantation in Tripura-An Evaluation Study", TRI, Government of Tripura, pp-91-93.
19. Saikia, T. N (1985). "Price Structure of Pine apple: A Study in Meghalaya" Agricultural Economics Research Review, 40 (3) pp. 35-40
20. Sarkar. S. (2011). "Economic Settlement of Tribals through Piggery", Research Journal of Animal Husbandry and Dairy Science, (1 & 2): pp. 90-92.

21. Singh, R., A. Kumar & R. Dewry (2016). "Improved Management Practices for Enhancing Productivity of Piggery Farm", http://www.cau.ac.in/docs/PiggeryFarm.pdf
22. Singh, H (2007). "Consumer Awareness and Consumption Pattern of Food Products in Haryana", Journal of IMS Group, 3(1), pp. 24-33
23. Suklabaidya, A. and M. Datta (2015). "Need for Diversification in Poverty Alleviation of Small and Marginal Farmers of Tripura". *In* Sustain Hill Agriculture in Changing Climate: A Compendium of Seminar Papers, December 05-07, pp 10.
24. Tochhawng, L. & S. Rewani (2013). "Constraint Analysis of Backyard Pig Farming in Tribal Areas of Mizoram", Indian Research Journal on Extension Education, 13 (2), pp. 12-127.
25. Tolani and Hussain (2013). "Strategic Changes in Models of Fruits and Vegetables Supply Chain", Journal of Management and Business Studies, 3(9), pp. 965-970
26. Vedini, K. H. (1997). "Cost and Margin in Jasmine Flower Marketing", Agricultural Marketing, pp. 44-46
27. Vikas, D. (2012). Sustainable Livelihood Enhancement of Remote Tribal People in India, Retrieved from http://www.globalhand.org/en/search/org/request/7392
28. World Bank (2007). Horticultural Producers and Super Market Development in Indonesia, World Bank, Washington DC, Report No. 38543-ID, pp. 1-50.

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APPENDIX

Action Taken Report on Reviewer's Comments on the Draft Report

1. **Title of the Draft Report** : *Jhuming* to Mainstream Farming as an Alternative way of Livelihood amongst the Tribal Farmers of Tripura

2. **Date of receipt of the Report** : 25/02/2019

3. **Date of dispatch of the Comments** : 12/03/2019

4. **Comments on Objectives of the Study** : All the objectives of the study have been addressed.

5. **Comments on Methodology** : The methodology section includes only sampling frame. Analytical tools are missing. For example how the CAGR is calculated? What are the statistical significance of the growth rates in Table 2.1 to 2.7?

Action: All the statistical tools are incorporated in appropriate places of the report with statistical interpretations.

6. **Comments on Analysis/Organization/Presentation**: :

a. Executive summary of the report is missing

Action: Executive summary of the report is included with the main report

b. Support your statements (in Ch-I), regarding constraints and economics of *Jhuming*, with references.

Action: Done as per suggestion

c. The instability in the area under rice & *Jhum* (as evident from Fig. 2.4; 2.17) need to be highlighted.

Action: The main reason of instability in area under rice & *Jhum* has been highlighted in proper place of the report

d. There is a clear case of crop diversification towards fruits and vegetables (away from rice) and that need to be highlighted.

Action: Yes, there is a clear case of crop diversification towards fruits and vegetables (away from rice) which has been reflected in the cropping pattern Table-4.1. Reason for crop diversification has been incorporated in the report.

e. Provide the success stories as it is an important objective. A better treatment is needed.

Action: Indicated as per suggestion

f. From the results it is not clear whether the women empowerment is due to mainstream farming or it is a generic empowerment due to other socio-economic

development over time. A comparative analysis or econometric treatment would have been better.

Action: It is clearly mentioned in Tabe-5.1 that the women empowerment is due to mainstream farming (settled cultivation and piggery), but at the same time, it cannot be denied that other factors did also influence the women empowerment under different schemes launched by the Central and State Government. Yes, it would have been better if some econometric treatment could be given to the present study for a comparative analysis. It could not be done due to the inherent constraints in collection of primary level data as per requirement.

g. The policy recommendations should primarily be based on findings of the study (instead of advocating widely acknowledged generic issues). Highlight the issues like strategies to reduce risk perception in mainstream farming; awareness campaign for ill effect of *Jhuming*; scope for using HYVs; provision for alternative livelihoods to the tribal people, etc as came out from this study.

Action: Done as per suggestion

h. Most of the cited studies in the text are not referred in the bibliography (e.g.-Ray *et al*; Bikas, Das *et al*; Shanley *et al*; Garrett *etc*.). Each and every cited study (in addition to other consulted data base/reports/url/others) need to be given in the bibliography.

Action: Done as per suggestion

i. Also ensure following corrections:
Content page: Change font size; **Farmers'** problem (instead of farmers problem)
Page-1: Also large number **of** tribal; yet **to** mitigate
Page-3: In ST **dominated** area
Uniformity in font type, font size, alignments; and use in %/percent/per cent/percentages need to be ensured. At the beneath of primary tables, sources of data should be indicated as 'Primary Survey.'

Action: Done as per suggestion

7. **Overall view on Acceptability of Report**: The report is a good piece of work and thus it may be accepted after incorporating above suggestions.

Suggestions incorporated and submitted

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