Crop Diversification: A Study on Challenges of Farmers in Tripura

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Abstract

This paper is an attempt to highlight the problems faced by the farmers in sifting rubber cultivation and mixed cultivation in Tripura. A study conducted to find out the respondent's preference towards the kind of cultivation revealed that a large number of females prefer rubber cultivation to other types of cultivation. Further, the study revealed that standing for a long time while doing the cultivation work, bending while working, exposure to wild animals in the cultivation field such as snakes, scorpions, bears, jackals, etc., contact with sharp objects like nails, bushes are the basic problems faced by the farmers in rubber and other cultivations. It has been ascertained from the study that there is no significant difference in the quantum of problems faced by the shifting families working in rubber fields compared to the families in other cultivations has been accepted. Moreover, it can also be inferred that the number of respondents facing different problems in rubber cultivation is almost equal to those that are engaged in other cultivation work. The researcher to arrive at any conclusion has used descriptive and inferential statistics.

Keywords: Shifting cultivation, Gender, Income, Mixed cultivation, and Rubber cultivation.

Introduction

Shifting cultivation (also known as rotational firming) is an old and traditional cultivation practice. It is a combined rain-fed farming system with a rotation of land. This agricultural system is purely temporary, where land is abandoned for a particular period for unplanted flora to grow freely after harvesting the crops (Jong, 2001). Rotational firming is a traditional practice of cultivation in tropical regions. It is practised in hilly areas where the temperature is high and enjoys plentiful rainfall. It is the main source of livelihood and food for the primitive tribes of this area which is dominated by tribal people (Ziegler et. al., 2009). Currently, very few of the shifting cultivators follow the long jhum cycle for cultivation. More than 250 million people are involved in this cultivation. The alternative name for shifting cultivation is bush fallow agriculture, jhum cultivation, and slash and burn agriculture. It is known by various names in various countries (Chaudhuri et. al., 2013).

Shifting cultivation still exists in the northeastern states of India. Tribals are generally involved in shifting cultivation. Production and yield from the soil depend on the length of the jhum cycles (Vongkhamheng et. al., 2016). Initially, the return from the shifting cultivation was higher because of long jhum cycles, but to increased population and demand for goods, jhum cycle has now been reduced to 2-5 years in many areas. It has caused deforestation and ecological problems. There are negative ecological implications of shifting cultivation. The Government of Tripura has already prohibited shifting cultivation considering its environmental consequences (Fox et. al., 2013).

During this time the cultivators move to another patch of land for cultivation. After a particular period, the cultivators again cultivate in the previous lands. This time gap is known as jhum cycle (Vinitha & Ramalingam, 2017). For cultivation, farmers cut the trees and burn them. After burning the jungles, the ashes of the burnt trees mixed with the soil and prepared the clean land for future cultivation. It is a subsistence farming that uses little technology and inputs. Farmers use rainwater and indigenous seeds for cultivation. Food grains and vegetables are produced in jhum field and produced goods are more organic (Jagadale et. al., 2015).

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Review of Literature

To identify the problems, the researchers have gone through several works of literature available both in National and International contexts, the summary of which is depicted below;

Cyriac (1986) in his study stated that India is the only country where the average size of rubber holding is small and the average size of minor holding is less than one hectare of land. Carron et al. (1989) claimed that only advanced technology can induce a significant change in the condition of the small rubber holding sector and can create sustainable economic benefits. Haridasan (1990) conducted a study in Kottayam district and pointed out that in covering the four hundred eighty growers of small rubber and concluded that only if the small growers are provided with sufficient training on the field, then only the income from cultivation shall rise.

Ushadevi (2001) in her study found that the work of a tapper is not an easy task as it needs skill and is labour concentrated on maintaining the health of the rubber tree and the longevity of its production period. He further studied that the major problems faced by the small growers are the unawareness of modern scientific processing of latex, the ignorance of proper training to tapper; the trappers who are not experts always damaged rubber trees which resulted in poor production and the basic method of grading of sheets help dealers of rubber exploit the small rubber holders. Thomas (2004) in his study focused on the growers of rubber in the state of Kerala. He concluded that small rubber growers always face a lot of problems from the stage of planting till the marketing of their products.

Bhowmik (2009) in his study revealed that the poorest and borderline holdings extract only a small percentage of their income from rubber trees of their own but they earn income and handsome amount from their work as tappers and labourers on nearby plantations and are thus totally dependent on the income from the natural rubber sector. According to Anuja et al. (2012), small rubber producers face challenges including low production, poor processing quality, and a dismal marketing structure. The prevalence of smallholdings renders the industry vulnerable to price instability, middleman manipulation, etc. The establishment of cooperative societies known as Rubber Producers' Societies (RPSs) was suggested as a solution to these problems facing small rubber farmers. In the current study, the function of RPSs in the supply, management, and marketing of natural rubber inputs in the state of Kerala was assessed. Additionally, the study found that RPS members outperform non-members in terms of product price realisation and manufacturing costs.

Rajeevan (2013) noted that it is necessary to enhance the price stability fund plan. Therefore, greater attention must be paid to the focal point when developing and implementing programmes for price stability, insurance, and credit. The Price Stabilization Fund (PSF) scheme should either be made mandatory or changed to the point where many farmers embrace it. This can be done by connecting the PSF programme to finance, insurance, replanting/new planting subsidies, etc. The environmental effects of replacing natural flora with rubber plantations and using conventional land use practices have been a topic of serious concern among the nations that produce natural rubber across the world (Priyadarshan 2014; Fox, 2014). Since rubber plantations have proven to be extremely successful and have contributed to the resurgence of the economy in general and the rural economy in particular, this transition may pose a threat to sensitive local habitats. It may also be impossible to envision. It may be sensible to critically investigate the environmental effects of this significant change in land use at the local level given the present room for development, economic reality, and potential environmental issues related to the rubber plantation.

According to Shanumugavadivu and Kavitha (2015) study, Kerala accounts for roughly 4.0% of India's population despite taking up only 1.2% of the nation's total land area. About 90% of the natural rubber produced in India is produced in the state of Kerala, according to Nair (2015). Workers in rubber plantations are subject to a variety of health risks. The common health issues that field workers experience include respiratory, dermatological, ophthalmological, and musculoskeletal ailments. To lower work-related morbidities, rubber plantation employees must get adequate health and safety training on ergonomics and workplace risks.

In his research, Karunakaran (2017) confirmed that rubber is a significant plantation crop grown in the state of Kerala. In terms of both area and output, the state is in first place. For the vast majority of farmers in the field, it is their primary source of income. Any fluctuations in the price of rubber made life difficult for the employees. The price of rubber has fluctuated significantly in recent years. Natural rubber output is at its lowest level in the nation as a result of the downward trend in rubber prices. The study also showed that prices were so low that rubber farmers were unable to pay workers' wages and that the recent price volatility and drop in rubber output were to blame for the farmers' declining standard of living. Since most rubber farmers in Kerala are small-scale operators, any financial limitations, pricing volatility, or technological lag would have a significant impact on the operators. Dalai and Shankar (2022) in their study revealed that different agro-climatic conditions are the main reason for growing different crops in different

regions. With the growth of new technologies like the irrigation process and other relevant practices, a higher amount of yield can be witnessed. Crop diversification is a new illustration to maintain sustainability in the production of agriculture. It helps to raise the quality; quantity and income from the production thus protecting the economic condition of farmers.

Objectives of the Study

The main objective of this study is to investigate the existence of any significant difference between the problems faced by the shifting cultivators in rubber and other cultivators and to study the existence of significant differences in the problems faced by male and female cultivators in rubber cultivation, and other cultivation.

Methods and Materials

The present study is based on the primary data. This study was conducted in Tripura which is a smaller state in the North-eastern region of India. It is surrounded by north, west and south Bangladesh and on the eastern side by the Indian states Assam and Mizoram. Primary data have been collected with the help of a semi-structured questionnaire from 600 shifting cultivator households, randomly selected from the four undivided districts of Tripura where the shifting cultivator's rehabilitation programme had been implemented by the government. There are three subgroups of the respondents identified; the first group is engaged in cultivation work on their land. The second group is engaged in cultivation work both on their land and as a labourer on others' land while the third group is engaged only as a labourer in the cultivation land owned by others only because they don't have their land. The sample households have been selected from the following 24 randomly selected villages from four districts of Tripura i.e. North Tripura District, South Tripura District, West Tripura District and Dhalai District where shifting cultivators have been transformed into rubber cultivators.

For the present study, the researcher has used cross-tabulation, z test and t-test to authenticate the hypotheses. Data analyses have been done on the following hypotheses:

H_{01}: There is no significant difference exist between the problems faced by the shifting cultivators in rubber and other cultivation

H_{02}: There is no significant difference exist in the problems faced by male and female respondents in rubber cultivation

H_{03}: There is no significant difference exists in the problems faced by the male and female respondents in other cultivation

Result and Findings

In natural rubber production, Tripura holds the second position after Kerala. There are eight districts in Tripura and rubber is being cultivated in all these districts. the area covered under rubber cultivation is the highest in Dhalai district followed by West Tripura and South Tripura. As such, Khowai district is the only district in Tripura where the area under rubber cultivation is very low compared to the other districts.

Problems faced by the respondents

We formulated certain hypotheses based on the available works of literature. These hypotheses were tested using z-test, t-test and Levene's F-test statistics and the details of the hypothesis testing are given as follows:

Table1: Testing of Hypothesis using z-test based on the list of Problems faced by the respondents in rubber and other cultivations

Problems	Rubber	%	Rank	Other	%	Rank
1. Standing too long for the work	459	76.50	6.00	245	40.83	1.00
2. Bending while working	148	24.67	2.00	433	72.17	7.00
3. Exposure to wild animals during work	544	90.67	8.00	598	99.67	11.00
4. Contact with a sharp object	147	24.50	1.00	414	69.00	6.00
5. Heat exposure	288	48.00	4.00	389	64.83	5.00
6. Body strain due to heavy work	423	70.50	5.00	434	72.33	8.00

Problems	Rubber	%	Rank	Other	%	Rank
7. Inadequate rest period	597	99.50	11.00	349	58.17	3.00
8. Payment is not at par with the work	564	94.00	9.00	488	81.33	9.00
9. Breathing problem due to burning	154	25.67	3.00	376	62.67	4.00
10. High exposure to mosquito-borne diseases like malaria, dengue etc.	578	96.33	10.00	562	93.67	10.00
11. No Basic Facilities like Water, Shelter for rest etc	476	79.33	7.00	314	52.33	2.00
Total	4378			4602		
Average	398.00			418.4		
Variance	29858.2			9694.8		
SD	172.8			98.5		
Z	-1.173					
P(Z<=z) one-tail	0.120					
z Critical one-tail	1.645					
P(Z<=z) two-tail	0.241					
z Critical two-tail	1.960					

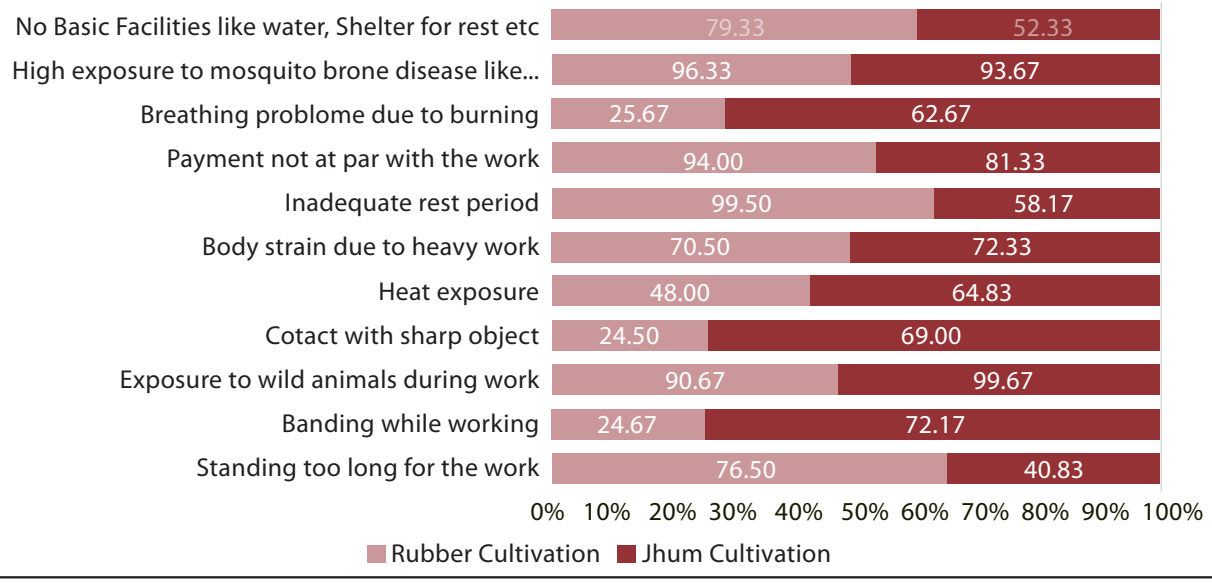
Null Hypothesis H01: There is no significant difference that exists between the problems faced by the shifting cultivators in rubber and other cultivation.

Accept the null hypothesis at p-value>0.05.

Source: Field survey

The above table provides information regarding the different kinds of problems faced by the farmers in rubber and other cultivation. Some of the problems highlighted in the list are standing for a long time while doing the cultivation work, bending while working, exposure to wild animals in the cultivation field such as snakes, scorpions, bears, jackals, etc., and contact with sharp objects like nails, and bushes. Heat exposure to hot sun or burning of the crop in shifting cultivation or burning the garbage in the field of rubber as well as in different other cultivations, body strain due to heavy work, insufficient rest period during work, earnings not at par with the work, breathing issues due to burning smoke, fog etc., high exposure to mosquito-borne disease like malaria, dengue etc., non-availability of basic facilities like drinking water, temporary shelter rooms for rest etc. The major problems are identified in the pilot study and these eleven numbers of problems have been more or less witnessed by the farmers or cultivators both in the case of rubber and other cultivation.

Figure 1: Percentage of response towards different problems faced in Rubber vs. Other cultivation



A comparative analysis of these problems for rubber and other cultivation has been presented in the above figure. A diagrammatic presentation of the problems in rubber and other cultivation has been given above. It clearly shows that 79.33% of the respondents said that in rubber cultivation the rubber growers or the companies do not provide basic facilities like drinking water or shelter homes for the rest of the workers. Similarly, in the case of other cultivation, 52.33% of the respondents felt that there is a non-availability of such basic facilities. On the other hand, almost equal proportion (96.33% in the case of rubber cultivators and 93.67% in the case of Jhum Cultivation) of the respondents opined that there is a high exposure to mosquito-borne diseases like, malaria, and dengue due to forest areas with a humid atmosphere. Similarly, breathing problems are high in the case of other cultivation (62.67%) due to burring of left-out crops, however, 25.67% of respondents in rubber cultivation face similar problems due to the burning of leaves and other waste material generated from rubber cultivation.94% of the respondents opined that the payment in rubber cultivation is not at par with the work compared to 81.33% who complained about the earning is not at par with even in other cultivations. 99.5% of the respondents in rubber cultivation said that there is an adequate rest period during work while in other cultivations, 58.17% of respondents don't find any rest during work.

A similar level of problems is faced in both other cultivations and rubber cultivation for body strain due to overwork and exposure to wild animals. However, the exposure to wild animals is quite high in the case of other cultivations. Contact with sharp objects is comparatively higher in the case of other cultivations than in rubber cultivation which is only 24.5%. Exposure to heat or the hot sun is higher in the case of other cultivations as it is 65% compared to rubber cultivation where it is only 48%. Banding while working puts a lot of strain on the spinal cord. It prevents a person from working for a long period. This problem is quite high in the case of other cultivation (72%) compared to rubber cultivation (25%). On the contrary, the problem of standing is higher in the case of rubber cultivation which is 76.5% compared to other cultivations where it is only 40.8%.

To compare the two groups i.e. the problems faced in other cultivation and rubber cultivation with a hypothesized mean difference in problems between the two groups is 50, the z-test is found appropriate for a small sample containing two groups. The findings of the z-test are presented in Table-1 indicating that in the one-tail z-test, the corresponding p-value is 0.12 which is greater than the 0.05 level of significance. Similarly, the p-value for the two-tail z-testis given by 0.241 which is also greater than 0.05 and indicates that the mean difference of problems faced by the number of respondents in rubber and other cultivation is not significantly different from the hypothesized mean of 50. Therefore, it leads to the conclusion that the null hypothesis stating that there is no significant difference in the quantum of problems faced by the shifting families working in rubber fields compared to the families in other cultivations has been accepted. Further, it can also be inferred that the number of respondents facing different problems in rubber cultivation is almost equal to those that are engaged in other cultivation work.

H01: There is no significant difference that exists between the problems faced by the shifting cultivations in rubber and other cultivation. (Accept the Null Hypothesis)

Testing of Hypothesis on the Problems faced by the Shifting cultivators are gender specific or not

This section discusses the association between gender and what types of problems they faced in the cultivation. To examine the variation between the two groups, whether they are independent or dependent on each other, a t-test has been used. As the primary data has the assumptions associated with the particular test, independent samples t-test has been used. The normality and homogeneity tests were used to find out the suitability of the data for the t-test. The following figures give the normality of test results. It can be observed that the data is quite convincing as far as the normality criteria are concerned.

Figure-2: Test of Normality

The t-test now produces the two tables that are shown below. The group statistics are shown in the first table, and Levene's test for homogeneity and the independent samples t-test is discussed in the second table. The groupings in this instance are made up of male and female migrant farmers working in the rubber and other agricultural sectors. It is clear from the group data that there were 269 female respondents and 331 male respondents. The table includes the mean and standard deviation for each group. The mean for female respondents in the rubber farming category is 7.215, while the mean for male respondents is 7.362, with SD of 1.22 and 1.27, respectively. Similarly, in the case of other cultivation, the mean of problems for females is 7.49 with an SD of 1.31 and for males is 7.40 with an SD of 1.35.

Figure 2: Test of Normality

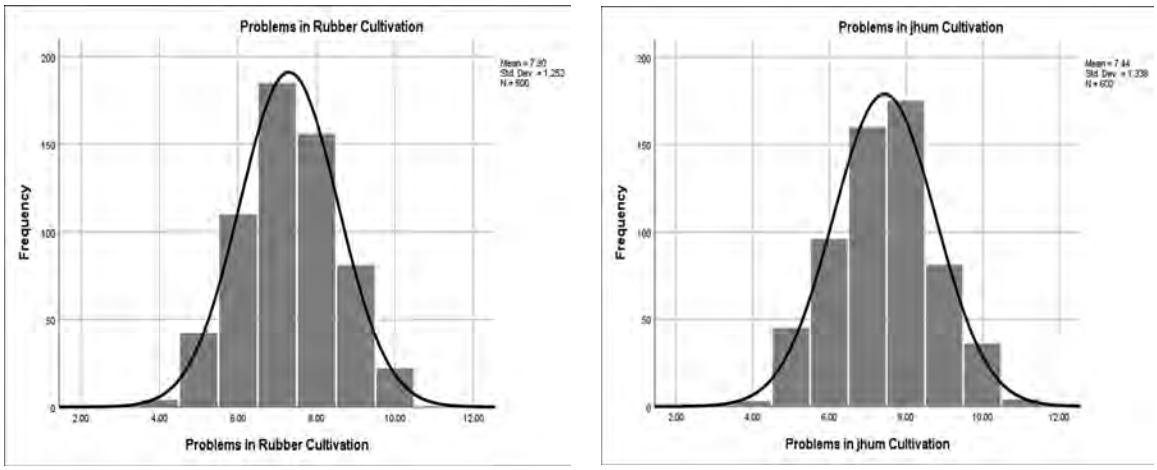


Table 2 (a): Group Statistics

		N		SD
Problems in Rubber Cultivation	Female	269	7.2156	1.22397
	Male	331	7.3625	1.27267
Problems in other Cultivation	Female	269	7.4944	1.31189
	Male	331	7.4018	1.35910

Source: Field survey

Table 2 (b): Group Statistics

		Problems in Rubber Cultivation		Problems in other Cultivation	
		Equal variances assumed	Equal variances not assumed	Equal variances assumed	Equal variances not assumed
Levene's Test	F	0.674		0.291	
for Equality of Variances	Sig.	0.412		0.590	
t-test for	T	-1.431	-1.436	0.843	0.846
Equality of Means	df.	598	581.358	598	580.651

Source: Field survey

t-test for Equality of Means	T		-1.431	-1.436	0.843	0.846
	df.		598	581.358	598	580.651
	Sig. (2-tailed)		0.153	0.151	0.400	0.398
	Mean Difference		-0.146	-0.146	0.092	0.092
	Std. Error Difference		0.102	0.102	0.109	0.109
	95% Confidence Interval of the Difference	Lower	-0.348	-0.347	-0.123	-0.122
		Upper	0.054	0.053	0.308	0.307

Source: Field survey

The above table shows that the t-test for examining the problems faced in rubber and other cultivations is dissimilar for the male and female respondents. The test results give a two-tailed sig value of 0.153 for rubber cultivation and 0.400 for other cultivations-related problems faced by the two categories of respondents i.e. the male and female. This allows the researcher to accept the null hypothesis H02 and H03. Therefore, it can be concluded that male and female respondents are not facing any substantial variation in problems in rubber cultivation. Again, it is also concluded that in other or mixed cultivation also having no there exists no significant difference in problems faced by the male and female respondents.

Conclusion

Shifting cultivators are facing nearly similar types of problems in rubber cultivation and shifting cultivation. Standing for a long time while doing the cultivation work, bending while working, exposure to wild animals in the cultivation field such as snakes, scorpions, bears, jackals, etc., contact with sharp objects like nails, and bushes; high exposure to mosquito-borne disease like malaria, dengue etc., non-availability of basic facilities like drinking water, temporary shelter rooms for rest etc. are the most prominent problems. There is no significant difference in the quantum of problems faced by the shifting families working in rubber fields compared to the families in other cultivations. There is no significant difference in the challenges that male and female respondents are having with the cultivation of rubber. Again, it is determined that there is no appreciable difference in the issues experienced by the male and female respondents in other or mixed agriculture. By developing various growth plans and programmes for rubber producers, significant factors should be given more priority and upkeep in the context of the rubber farming system. To repair farming concerns and associated grievances, awareness programmes should be held more regularly. This would improve my understanding of contemporary farm methods. The farmers are advised to study equalised mechanisms and visit additional therapeutic services for their issues. Utilizing clinical services may improve resource usage effectiveness, productivity, and loss reduction.

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