Natural Rubber: Development and Present Status in Arunachal Pradesh, India.

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Abstract: Knowledge about the uses of rubber tree was known to the people of Arunachal Pradesh since British era. They used to collect its latex at early age from naturally grown Rubber Tree (*Fiscus elastica an Indian Rubber Bush*) but this species is replaced by *Hevea brasiliensis.* First rubber was planted in 1980 for experimental purposes and it came to be used for commercial purposes since 1994. Now the rubber plantation is rapidly increasing in the state. The study area is the main latex production area in the state. The study covered about the development and present status of rubber plantation in area. To achieve the objectives of the study, GIS software like ArcGIS 10.3 and GPS has been used for digitizing and computing map of rubber cultivated areas in the state. For the reliability, information collected from sources and the field was analyzed by using MS word, MS excel and SPSS 18 package for generating appropriate qualitative and quantitative result. The information has been gathered through field investigation and 500 household from rubber cultivators were taken as sample. So far, state with 4,149.20 hectares (approx) of land under rubber plantation with 550 hectare under latex production. It is also found that, the rubber plantation has not only brought unprecedented increase in cash income to local farmers, but also accelerated economic stratification in the state. The farmers of the area are replacing the old traditional agricultural system after the introduction of the rubber plantation.

Key words: Natural rubber, British era, plantation, transformation, *Fiscus elastica,hevea-brasiliensis*.

Introduction

Arunachal Pradesh is the 24th states of India and is the northeastern-most state of the country. Arunachal Pradesh borders the states of Assam and Nagaland to the south and shares international borders with Bhutan in the west, Myanmar in the east and is separated from China in the north by the disputed McMahon Line. Arunachal Pradesh is located between 26.28° N and 29.30° N latitude and 91.20° E and 97.30° E longitude and has an area of 83,743 km^2**.** Most of the terrain is mountainous and it consists of lofty, haphazardly aligned ridges that separate deep valley and rises to the peaks of the Great Himalayas. The valleys, Hills and Plain are dominated in the low laying areas in the state.

Arunachal Pradesh fall in Non-traditional zone of rubber plantation and it has infancy stage in the field of rubber cultivation which begun in 1980 for experimental purposes and commercial rubber cultivation started since 1994. Despite of favorable condition of geographical background, social and economy, it cannot reach at the impressive stage. So far, only 4,149.20 hectares area is covered under rubber cultivation in Arunachal Pradesh. Out of which total cultivated area, only 550 hectares are producing rubber latex. According to the Remote Sensing Survey of Rubber Board of India, Arunachal Pradesh has 25,000 hectares area which is suitable for the rubber cultivation. Low laying areas of the eleven district of Arunachal Pradesh are suitable for rubber plantation.

Methods

In order to achieve the laid objectives in the present study, information is collected from field investigation through filling of questionnaire of 500 sample households who presently cultivating rubber in small scale. The questionnaire was regarding information related to development of rubber cultivation since *Ficus elastica* era to the present cultivation and

the present status of rubber cultivation in the state. GIS software like ArcGIS 10.3 and GPS has been used for digitizing and computing map of rubber cultivated areas in the state. For the reliability, information collected from sources and the field was analyzed by using MS word, MS excel, MS publishers and SPSS 18 package for generating appropriate qualitative and quantitative results.

Data Source

Both Primary and Secondary source of data have been used for this purpose. Primary data was collected from the field itself, visiting rubber plantation sites, interviewing the cultivators, and other section of people who are related to rubber plantation. Secondary data was collected from published and unpublished books, journals, internet, institution like NEDFi, RBI, etc. An extensive literature review has been done to eliminate the biasness of information.

Results and Discussions

1. Development of Natural Rubber Plantation in Arunachal Pradesh

Development of rubber cultivation in Arunachal Pradesh could be roughly classified into two historical phases. The first phase is *Ficus* era and second phase is *Hevea brasiliensis* era.

a. *Ficus esastica* era

Ficus elastica, (Indian rubber bush) Indian rubber bush is a species of plant the fig genus, native to northeast India, Myanmar, China (Yunnan), Malaysia, and Indonesia. It has become naturalized in Sri Lanka, the West Indies, and the Florida of United State. It is a large tree in the banyan group of figs. It is grown around the world as an ornamental plant, outside in frost-free climates from the tropical to the Mediterranean and inside in colder climates as a houseplant. Although it is grown in Hawaii, the species of fig wasp required to permit it to spread naturally is not present there. It yields a milky white latex, a chemical compound separate from its fluid and carried and stored in different cells. This latex was formerly used to make rubber, but it should not be confused with the Para rubber tree, the main commercial source of latex for rubber making. Just as with *Hevea brasiliensis*, the latex of *Ficus elastica* is an irritant to the eyes and skin and is toxic if taken internally.

The *Ficus elastica* is also found in Arunachal Pradesh and the people of Arunachal Pradesh knew the knowledge of usage about its latex since early 19th century (Yomri Riba of Village Seren, East Siang District). They used to collect the rubber (*ficus*) latex/saps for domestic and commercial purposes. Nyishi tribe of Arunachal Pradesh used the saps (Tachur/Tacher) of the tree for the trapping birds (Rajiv Comdir, Ph.D. Scholar, RGU). Galo and Adi called it as Ata and Atang (Tumbom Padung of Pote Village of East Siang District). In olden days, the people of the hills went to Assam to tap rubber latex and sold dry latex to Marwari (businessmen) at Silapathar, Dhemaji, Murkongselek, etc, the rate of Ek-ana (1 paise) per kg. Still some of that species are alive in the different forest of the Arunachal Pradesh Atang Ane the rubber tree (*ficus elastica*) over 100 years old with a girth of 59.3 meters is located near the remote Kallek Village under Kebang circle in East Siang district at the altitude 648 meters ASL in plate no. 3.1 (b) (The Times of Arunachal, Itanagar 23rd January 2013). Now this species has been replaced by the present Rubber species called *Hevea brasiliensis*.

b. *Hevea brasiliensis* era

Hevea brasiliensis rubber tree firstly planted in 1980 at Bordumsa (Changlang District of Arunachal Pradesh) by Arunachal Pradesh Forest Development Cooperation (APFDC) for experimental purposes (K. Joshep. Development Officer and Summy Doye Jamoh. Field Officer, Regional Office, Itanagar, RBI). But it could not turn into commercial purposes till 1994 in the state. The plantation was started at Ngorlung Village by Shri. Ojing Aje (Pioneer of rubber in the state) and the production began in 2000.

Since then, rubber plantation is rapidly progressing in the state. Today, more than 25,000 (approx.) people are growing rubber in different parts of the state with 4,149.20 hectares (approx) of land under rubber plantation which is 4.95% of its total geographical area. Out of which 1,746.58 hectares are from East Siang District alone, including 550 ha. latex producing fields by 11,00 (approx.) small rubber growers.

The development of present rubber plantation was initiated by the Rubber Board of India (RBI) in the state with supplying of free rubber nursery to the entire interested household in foothills of East and West Siang district, Arunachal

Pradesh (Sri Ojing Aje of Ngorlung Village and Baluk Sora of Nari Village). As per field study report most of the beneficiaries failed except i.e. Sri Ojing Aje of Ngorlung Village and Sri Baluk Sora of Nari Village.

The Rubber Board of India established four regional offices for the better development of the rubber plantation in the Arunachal Government has also set up its separate State Board for Rubber and Tea under the department of Trade and Commerce.

2. The present status of rubber plantation in Arunachal Pradesh

Rubber cultivation is still in its infancy stage though it has the favorable agro-climatic condition for the rubber plantation in the state, especially in the southern parts. The Rubber Board of India (RBI) and Government of Arunachal Pradesh are encouraging the farmers and youths to grow rubbers. As per the Rubber Board of India, Tirap, Longding, Changlang, Lohit, Lower Dibang Valley, East Siang, West Siang, Papum Pare and East Kameng districts have a potential for cultivation of rubber around 25,000 hectare as per initial survey. The present status of rubber cultivation in the state area is estimated to be of 4,149.20 hectares under rubber cultivation out of which 530.00 hectares are under production (Rubber Board Regional Office Itanagar, 2017).

According to the above table, the farmers of East District showed their immense interest of Natural Rubber cultivation which shares highest in area under the rubber cultivated in Arunachal Pradesh. East Siang District alone shares 42.02% from total areas under the rubber cultivation in the state. Papum Pare District is the second highest growing areas which accounts 31.12% of total cultivated areas of Arunachal Pradesh. Whereas West Siang District shares 12.32%, Upper Subansiri District shares 4.41%, Lower Dibang Valley shares 4.21% followed by Namsai District sharing 3.13% of its total area under rubber cultivation in the state. Whereas other districts like Lohit, Changlang, Lower Subansiri, Longding, Upper Siang and Tirap have less area under rubber cultivation which accounts 2.79% of total areas under the rubber cultivation in the state. Tirap District has the lowest sharing of areas under rubber cultivation among the rubber growing district of Arunachal Pradesh.

Sl/No	Name of District	Area in hec-tare	Area share in (%)
1	East Siang	1746.58	42.02
2	Papum Pare	1303.76	31.12
3	West Siang	532.29	12.32
4	Upper Subansiri	188.00	4.41
5	Lower Dibang Valley	175.26	4.21
6	Namsai	130.00	3.13
7	Lohit	45. 00	1.04
8	Changlang	35.00	0.84
9	Lower Subansiri	27.81	0.67
10	Longding	4.00	0.09
11	Upper Siang	3.50	0.08
12	Tirap	3.00	0.07
Total		4,149.20	100.00

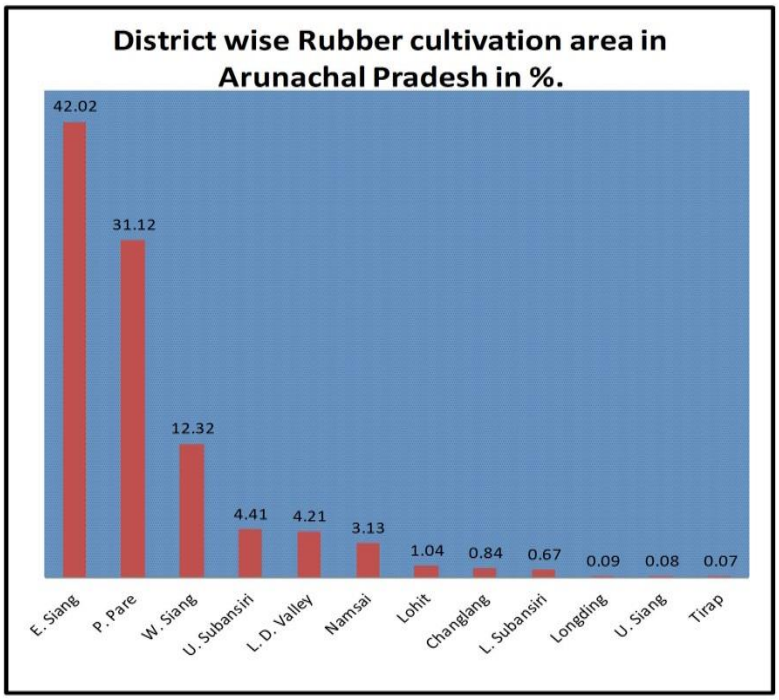
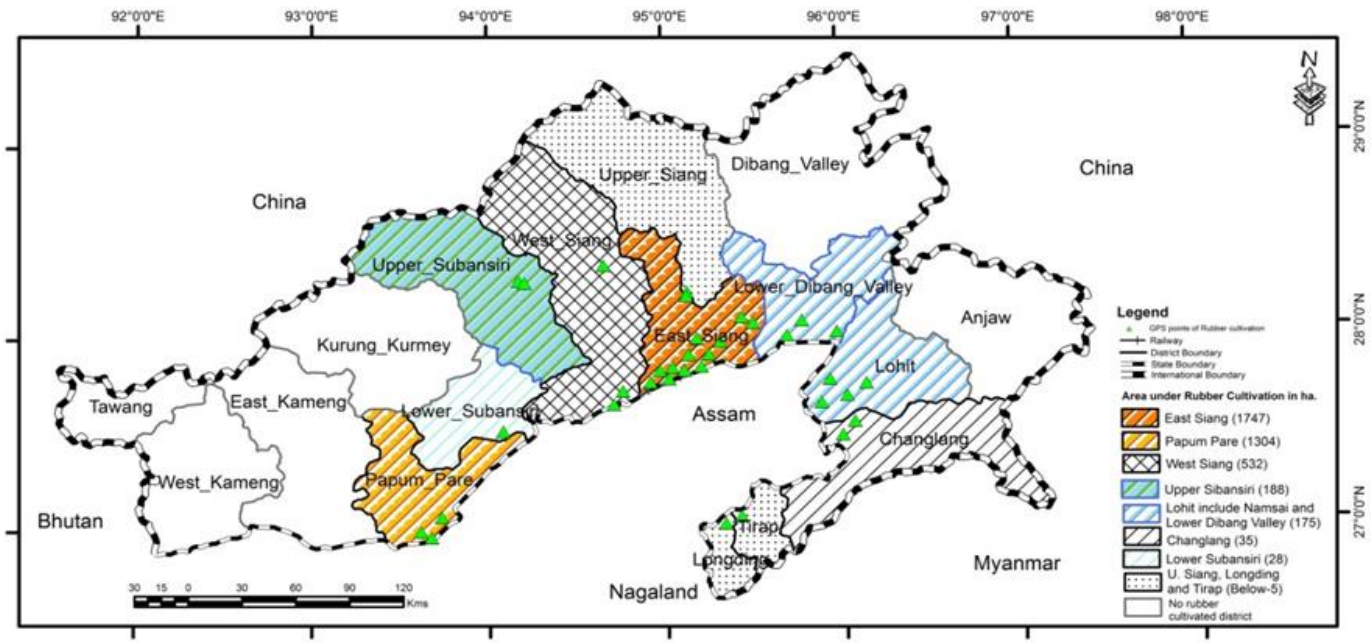


Table and diagram of district wise rubber cultivation area in Arunachal Pradesh

Source: Regional Office, Itanagar, Roing and Namsai, Rubber Board of India (2017).

Map of Rubber cultivated districts and GPS points in Arunachal Pradesh



Source: Over layered on administrative map of Arunachal Pradesh and GPS points and data collected from field study.

Production Area, Production and income from rubber cultivation

Years	Production Area (in ha.)	Production approx. (in tons.)	Total Income (in Rs.)
2006-07	8.36	12.08	10,87,200
2007-08	9.10	12.70	11,43,000
2008-09	10.00	14.50	14,50,000
2009-10	11.39	17.09	18,79,900
2010-11	12.17	18.26	34,69,400
2011-12	14.92	22.38	46,99,800
2012-13	100.00	180.00	3,15,00,000
2013-14	200.30	360.54	6,12,91,800
2014-15	350.00	630.00	8,82,00,000
2015-16	550.00	1,000.00	12,00,00,000

Source: - Field Study and Regional office Ruksin RBI 2016.

Production Area of Rubber

From 2006-07 to 2011-12 for five years area under production was very much meager. Then there was gradual rise from 2012-13 and abrupt rise from 2015-16. In 2012-13 85.08 hectares added which increased 6.70 more times against previous year. It is recorded that, highest addition of production area in 2015-16 with addition of 1.57 more times against 2014-15. Ruksin circle has highest production area which account 314.20 ha in 2016, followed by Nari ,Oyan and Seren circle and other circles are nil in production.

Annual Rubber Production

Production of the rubber started in Arunachal Pradesh, since 2000 but its progress was slow. Natural rubber production was only 10.3 tons in between 2007-12. Sudden changes in the production of Natural Rubber took place in 2013, where 157.62 tons increased against the anticipated 22.38 tons in 2012. As per above table, 180.54 and 534.46 tons increased during 2013-14 and 2014-15 respectively.

In 2015-16, the annual productions in the study area is 1,000.00 tons and annual income of Rs. 12.00 crores at the rate of Rs. 2,16,000 per hectare.

Annual Rubber Income

The total income during the year 2006-07 was Rs. 10,87,200 (Ten Lakh eighty-seven two hundred only) at the rate of Rs 1,30,000 (One Lakh thirty thousand rupees only) per hectare. The highest market price and an average income is recorded in 2011-12 with average rate of Rs. 3,15,000.00 (Three lakh fifteen thousand) per hectare. In 2015-16, annual income of Natural Rubber production was Rs.12,00,00,000 with an average production of 1.818 kg per a hectare. Despite the low market price, it produced Rs 2,18182.00 per a hectare in 2015-16 which is higher than the average annual income of per hectare n the study area i.e. Rs. 1.5 lakhs.

Conclusion

Rubber cultivation is a boon which wills relief this economically backward tribal community and is the ray of hope of releasing from the pain of traditional shifting cultivation. The profitable outcome of it could be an eye opener to rest of the state where climate, topography, soil etc are suitable for it. In this venture, scheme being implemented for the welfare of farmers like providing of inputs at subsidized rate and technical support from government will boost the farmers especially to those who cannot start cultivation. Awareness is required to make people realize the worth of hard work and the possibility of earning income from scale of rubber production. If the endeavor to grow rubber examines, one day, Arunachal Pradesh would be the one of the leading rubber producing state in India.

Acknowledgement

This research was supported/partially supported by Prof. Tomo Riba, my Ph.D. supervisor and Registrar i/c of Rajiv Gandhi University, Doimukh Arunachal Pradesh. I thank my all friends who showed support their and assist during the research. I thank my family members and other associated members for support and financial assistance during my data collection. I would also like to show my gratitude to the Regional Office Rubber Board and State Rubber Board for sharing data and pearls of wisdom with me during the course of this research.

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