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AN OVER VIEW OF RUBBER PLANTATION DEVELOPMENT IN NORTH EAST INDIA

51

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History of commercial cultivation of *Hevea brasiliensis*, the source of natural rubber (NR) in India dates back to exactly 100 years, *i.e.*, 1902. Traditionally, the crop was grown in the geographical region falling between 8 to 12° North of equator, *i.e.*, Kanyakumari District of Tamil Nadu and the state of Kerala. Increase in demand of NR prompted the search for other regions which are agro-climatically suitable for establishing commercially viable rubber plantations. The non-traditional regions identified as suitable for planting are in the states of Madhya Pradesh, Andhra Pradesh, Orissa, Goa, Maharashtra and the entire north-eastern region.

This paper attempts to present an overview of rubber plantation development in the north-eastern region comprising the states of Tripura, Assam, Meghalaya, Mizoram, Manipur, Nagaland and Arunachal Pradesh. It also discusses the prospects, constraints, opportunities and threats for large scale expansion of rubber cultivation in the North East (NE) India. Rubber Board's current promotional activities and the future plan of action for the region are also touched upon. An extent of 4,50,000 ha has been broadly identified as potential area for planting rubber in this region of which 49771 ha has been planted. The region produces 15133 t of rubber. This region accounts for 8.77% of the rubber area in the country and 2.40% of the annual production. It provides direct employment of 1000 mandays per ha during immature phase and permanent employment for 7 persons per 10 ha during the mature phase. Influence of the crop on economic development and ecological restoration of the region has also been well proven.

INTRODUCTION

India has been a net importer of natural rubber (NR) in general in spite of the expansion in area under rubber cultivation, increase in production and high levels of productivity attained. Rubber is a long gestation crop necessitating formulation of production strategies well in advance. The gap between production and consumption started widening during the 1980s after a slump in consumption during the previous decade. Considering the indispensability of NR and the drain of foreign exchange due to large scale imports, the government of India has realized that confining rubber cultivation to the traditional rubber growing tracts, where availability of land for further expansion is scarce will not help in meeting the future NR requirements in the country. Exploratory surveys for identifying suitable areas for expansion outside the traditional region was initiated by the Rubber Board in the 1960s itself. North-eastern region comprising of the states of Assam, Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Nagaland and Tripura with moderate agro-climate suitable for growing rubber was identified as potential regions for extending cultivation. Though this region (20-28° N latitude) lies far away from the traditional rubber growing belt (upto 10° on either side of the equator), rubber has

Table 1. **Comparison of the climatic conditions required for optimum growth of rubber with that prevailing in NE India**

Parameters	Optimum	Condition in NE India
Rainfall	Minimum 2000 mm without marked dry season; 125 to 150 rainy days per annum	Average rainfall is 2150 mm
Temperature	Maximum about 29 to 35°C; minimum about 20°C; monthly mean 25 to 28°C	Maximum 30.25°C Minimum 18.98°C
Relative humidity	High atmospheric humidity in the order of 80%; moderate wind	Fall in RH during winter season is pronounced
Sunshine	Bright sunshine of 2000 h per annum. 6 h per day throughout all the months	Not a limiting factor
Hailstorm	Not present	Hails accompanied by high velocity wind occur occasionally

been observed to grow successfully in this tract under appropriate agro-management practices. The trial plantings undertaken in the region confirmed that the region has potential for growing rubber, though there are some agro-climatic constraints Table 1. Though rainfall is adequate, the minimum temperature falls below that experienced in the traditional region (Table 2).

Table 2. **Rainfall and temperature recorded in four regional research stations (RRS) of RRII**

Location of RRS	Rainfall (mm)	Mean temperature (°C)	
		Minimum	Maximum
Guwahati	1800	30.0	19.4
Agartala	2000	30.7	20.5
Tura	2300	28.1	17.7
Kolasib	2500	32.2	18.3
Average	2150	30.25	18.98

Source: Vijayakumar *et al.*, (2000)

There are reports that in Kachar district of Assam state, trees planted in 1913 having girth in the range of 125-525 cms still exist. (This is the earliest record of rubber planting in the NE region) In Meghalaya, the earliest planting dates back to 1950s and that in Tripura to 1960s. In Tripura, commercial planting of rubber was initiated in 1963 by the State Government. In Assam, Meghalaya and Mizoram also the Soil conservation Department of the State Governments took up rubber planting almost in the same period. During the period 1974-86, three public sector corporations were established in the NE region to take up rubber planting for settlement of the tribal population. In the year 1974 the Govt. of Assam set up the Assam Plantation Crops Development Corporation Ltd., with a view to tap the potential of rubber as a plantation crop. Another Corporation, the Tripura Rehabilitation Plantation Corporation was constituted in 1982 for settlement of the tribal shifting cultivators through rubber planting.

Rubber plantation in the region besides meeting NR demand helps in the development of one of the most underdeveloped regions in the country. It provides employment and also helps in ecological restoration. Even though the initial plantings were mostly in the public sector, bulk of the planting is currently undertaken by smallholders majority of whom are tribal shifting cultivators. Rubber has already proved as an excellent crop for the rehabilitation of tribal shifting cultivators. Systematic implementation of

need based development and extension programmes backed up by research has helped in extending rubber cultivation to an area of about 46, 000 ha in the north-eastern region. The development and extension progammes implemented by the Rubber Board with informed participation of the target group has already proved to be successful and rubber cultivation is already recognized as a means to alleviate poverty and attain economic prosperity particularly among the tribal population in the north-eastern region.

Exploratory surveys and studies conducted by the Board in the past indicate that rubber can be successfully grown in an extent of 450000 ha (Table 3). A land use survey using satellite imagery, carried out under a World Bank assisted Project in Tripura, engaging the NBSS& LUP has also identified about 100,000 ha in Tripura as meeting the suitability criteria for rubber (Bhattacharyya *et al.*, 1996).

Table 3: **Details of area identified as suitable for rubber planting in NE region.**

State	Area suitable for rubber planting (ha)
Tripura	100000
Assam	200000
Meghalaya	50000
Nagaland	15000
Manipur	10000
Mizoram	50000
Arunachal Pradesh	25000
Total	450000

Source: Krishnakumar and Meenattoor (2000)

PROMOTIONAL ACTIVITIES OF RUBBER BOARD

Infrastructure development

The Rubber Board's development activities in the region started with setting up of a Field Office at Agartala in 1967. Over a period of 35 years from then, the Research and Development set up of the Board in the region has been strengthened with a network of Zonal, Regional and Field Offices as well as NRETC and research and training infrastructure. Organizational set up of the Board in the North-East India is given in Figure 1.

Rubber plantation development (RPD) scheme

The RPD scheme provides for free technical assistance at all stages right from the selection of plot. The financial assistance provided under the scheme meets around 37% of the cost of cultivation and maintenance of immature plantations by way of planting grant and planting material cost. Different rates of grant are applied for small and large growers. During 1989 to 2001 a total of 28938 growers in the region have been benefited under the scheme (Table 4). Rubber plantation in an area of 25495 ha has been developed under assistance of subsidy through this scheme.

Table 4. **Beneficiaries of RPD scheme and the extent of plantation developed during 1989 to 2001**

State	No. of growers benefited	Area (ha)
Tripura	16388	15803
Assam	6136	5127
Meghalaya	3425	1773
Nagaland	1563	1592
Manipur	717	667
Mizoram	237	250
Arunachal Pradesh	472	283
Total	28938	25495

Source : Rubber Board Annual Reports (1989 – 2001)

Other development schemes

Cattle menace is a serious problem in rubber plantations in the NE region especially during the immaturity period.

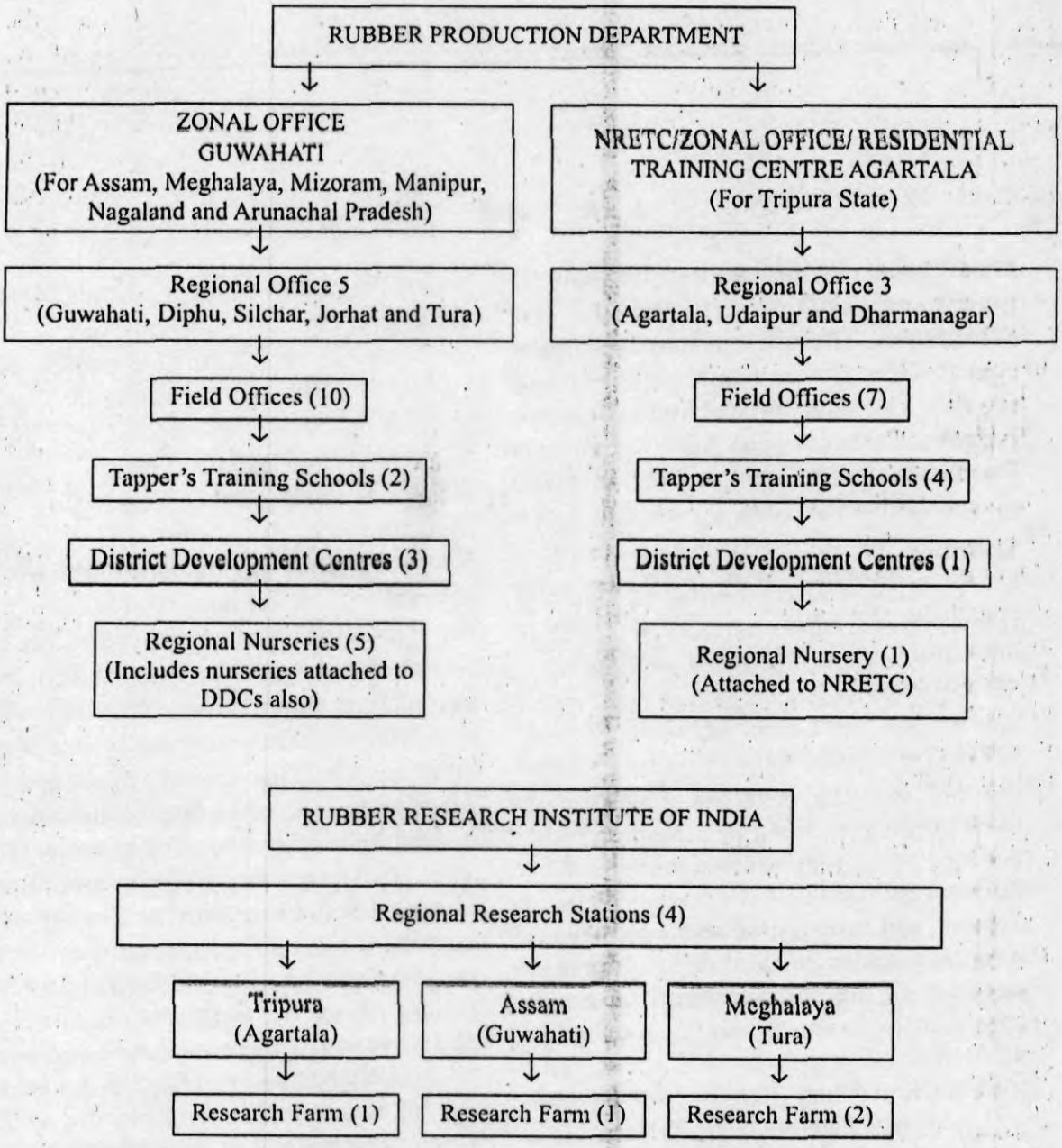

Figure 1. Rubber Board's organizational set up in the North East India

Adequate protection has to be given to young plantations. The boundary protection scheme provides for financial assistance upto Rs. 4,000/- per ha for fencing of plantations. Free supply of fencing materials is made for scheduled caste/tribe category of growers. Under the scheme for development of irrigation facilities assistance at the rate of Rs. 5,000/- per ha is provided for setting up irrigation facilities in immature plantations upto third year.

In order to develop facilities for primary processing of rubber assistance is given for procuring rubber rollers and for

construction of smoke houses. The subsidy given to individual growers is Rs. 1,000/- per set of rollers. The rollers are provided free of cost to Non governmental organizations (NGO) for group processing of rubber. Assistance at the rate of Rs. 5,000/- is provided for construction of smokehouse for drying rubber sheets to individual growers.

Training

Training is also provided to the local people in various aspects of rubber cultivation. Visit of selected growers from NE region to traditional region is arranged to provided first hand knowledge about cultivation and developments under smallholder sector. Selected growers were given overseas training by arranging visits to other rubber growing countries like Malaysia and Thailand. It is hoped that these growers will function as resource persons in group meetings/training programmes organized in the north-eastern region and share their experiences and the knowledge acquired to other growers in the area. The Rubber Board has also sponsored two batches of tribal youths from Tripura for a two year diploma course in NR production to the Kerala Agricultural University under the World Bank Assisted Project.

Group approach

In order to evolve a rubber culture in the north-eastern region, the first generation plantation in this region require more support than the traditional region. The Board has therefore adopted a strategy of participatory group approach from 1992 on wards for the successful implementation of various development programmes. Under the group management programme, the Board has established block plantations, group plantations and community processing centres, with participation of various state government organizations in the region especially in Tripura

The block plantation project was started in 1992 for rehabilitation of tribal shifting cultivators in association with the Government of Tripura. This poject meets almost entire cost of planting and maintenance upto maturity through resources from various sources already available for development of tribals. The beneficiaries themselves work in the plantation as wage earners so that their daily earnings are maintained unaffected. The plantations are raised directly under the supervision and management of the Rubber Board and are handed over to the owners of the plot when ready for tapping. The beneficiaries are organized into groups and training on tapping and processing are provided. Community processing facilities are also established by the Board. Rubber Producers Societies (RPS) are organized in each locality. Common management problems are handled by the RPS. A total of 1993 families took up rubber planting under the scheme and 2539 ha was brought under plantation upto 2001. Table 5 gives details of year wise planting and number of beneficiaries under block planting scheme. The group management practices adopted in block plantations have resulted in better

Table 5. **Performance of block planting scheme**

Year	Area planted (ha)	No. of beneficiaries
1992	122	96
1993	271	306
1994	189	230
1995	401	296
1996	152	124
1997	242	104
1998	437	218
1999	171	151
2000	147	118
2001	407	350
Total	2539	1993

Table 6. **Average survival rate of immature plants in block plantation units and other plantations in Tripura**

Year from planting	Survival (%)	
	Block plantations	Other plantations
1	98	98
2	95	96
3	93	92
4	92	90
5	93	89

Source: Rubber Board (1998)

survival rate of young plants during the immaturity period as is evident from Table 6.

Plantations raised in 1992 and 1994 have reached tapping stage. The block plantation project has been well appreciated by many agencies including a World Bank Mission, which commented that in Tripura the project confirmed the benefits associated with the block planting approach which is more suited to tribal societies and lands degraded by the adoption of shifting cultivation (World Bank, 2001). During the 10th plan period, 3000 ha is proposed to be covered under block plantation programme in the NE region, with the co-operation of the concerned state governments.

Group planting project is an improvisation of RPD Scheme where farmers are organized into groups and assisted to raise community nursery. All cultural operations are done under the direct supervision of Rubber Board officials. A beneficiary representative assists the Board in implementing the scheme. No extra assistance other than that allowed under RPD Scheme is given for group planting units. As right from the beginning the growers are organized to a group, this helps in building up of grass root level organization for collective farming in the rural areas. This also helps in group processing and marketing.

Under community processing facilities, common processing shed, sheeting roller and smoke houses are provided to rubber growers' societies with membership of around 50-100 growers. Public sector corporations like Tripura Forest Development and Plantation Corporation (TFDPC) and Tripura Rubber Plantation Corporation (TRPC) in Tripura and Assam Plantation Crops Development Corporation (APCDC) in Assam are also involved in rehabilitation of shifting cultivators. These corporations are also supported by the Rubber Board. One hundred and fifty community processing centres have already been established in the NE region.

PERFORMANCE OF YOUNG RUBBER PLANTATIONS IN TRIPURA

Tripura is one of the major rubber growing states in the NE region with 27947 ha of land already planted with the crop. A study undertaken to assess the performance of young rubber plantations (planted between 1993 –1997) in Tripura in comparison to those in Kerala, revealed that the level of adoption of manuring, plant protection, weed control and boundary protection in Tripura is relatively low (Table 7). In the use of polybagged plants and establishment of cover crop, the plantations in Tripura performed better than

Table 7. **Adoption of various plantation practices by small farmers in Tripura and Kerala**

Cultural operation	Adoption (%)	
	Tripura	Kerala
Polybag planting	99.8	94.2
Manuring done	47.1	89.6
Plant protection methods adopted	69.4	89.8
Cover crop establishment	75.7	47.8
Weeding	89.2	100
Boundary protection	86.1	98.6
Soil conservation	99.0	100

Source: Rubber Board (1998)

those in Kerala. It was observed that 89.2% of the plantations in Tripura carried out weeding whereas in Kerala, 100% plantations did the operation. The study also assessed the performance of young rubber plantations in the state of Tripura in terms of survival rate, height and girth. The average survival rate realized after 5 years of planting in Tripura was 92% against 94% in Kerala. (Table 8).

Table 8. **Average survival rate at different age**

Age (years)	Survival (%)	
	Tripura	Kerala
1	98	99
2	95	98
3	93	95
4	92	94
5	92	94

In terms of growth during the first year after planting, no difference was found between the plantations in Tripura and Kerala. The height of 2 year old plants in Tripura was 29% less than that in Kerala. At the end of the 3rd and 4th years after planting, plants in Tripura recorded 20% and 17% less girth than the plants in Kerala. (Table 9). Though rubber plants in Tripura exhibited a slightly lower growth during the second, third and fourth years after planting, the difference between the regions diminished steadily and neutralized by the fifth year. It merits attention that the growth in Tripura was despite the lower adoption of manuring and other important agronomic practices. Further, the small farmers of Tripura are quite new to rubber planting whereas the growers in Kerala belong to second or third generation in planting. The pattern of growth performance and adoption of technological practices in Tripura is almost comparable to that in the remaining part of the NE region.

Table 9. **Average growth at different age**

Age of plants (years)	Growth parameter	Tripura	Kerala
1	No. of leaf whorls	3.1	3.1
2	Height (m)	2.2	3.1
3	Girth (cm)	12.2	15.3
4	Girth (cm)	16.9	20.3
5	Girth (cm)	28.7	28.6

WORLD BANK ASSISTED RUBBER PROJECT

The World Bank Assisted Rubber Project (WBARP) implemented in the country from 1993 to 2000, had a separate component for Tripura under which 9,600 ha of degraded land previously under shifting cultivation was brought under permanent rubber based cropping system. Rubber cultivation is estimated to have generated about 7.5 million mandays of additional employment (direct and indirect) in the region.

In Tripura another programme for women and tribal development was also implemented under the project with the objective of empowering women in the sector and generating additional income during the gestation period of rubber. The programme was implemented by the Board through a development unit formed exclusively for the purpose by the Goverment of Tripura. The implementation was done mostly through NGOs and the activities included infrastructure development like building approach roads, providing solar light and sanitary latrines to tribal households, functional literacy programmes, health & family welfare and gender sensitization. The programme provided economic assistance through income generation activities to 4,000 poor

Table 10. **Progress of women and tribal development programmes in Tripura**

Activity	No. of beneficiaries
Families provided with economic sustenance	4000
Tribal youths trained at diploma level	37
No benefited through 110 RPS formulated	3276
No benefited through 130 self help group organized	2074

Source: World Bank (2001)

tribal families enabling them to sustain themselves economically through the gestation period of rubber. women's credit and savings group could also be established to introduce a banking culture to the tribal women. This in turn had a multiplier effect leading to initiation of a number of micro enterprises which are income generating. Introduction of rubber enabled the tribals to move away from their traditional slash and burn farming system with highly uncertain and low income. The institutional development approach adopted by the project in Tripura through establishment and strengthening of women's group has provided the tribal women in Tripura with greater empowerment and enhanced gender equality (Table 10).

Under the WBARP, three consultancy studies on the following subjects carried out by various agencies on rubber planting in Tripura. These were (1) Land use planning in Tripura carried out by NBSS and LUP, Nagpur (2) Future processing requirements in Tripura by CIMMCT, Kottayam and (3) Performance of plantations in Tripura vis-a-vis Kerala by the Rubber Board.

Marketing of rubber

There are about 100 licensed dealers in the NE region. The farm gate price realized is only 85% and is not comparable with that of Kerala (94%). Manimalayar Rubbers, a company promoted by Rubber Board and Rubber Producers Societies has opened up branches in 3 states namely Meghalaya, Assam and Tripura and in activity involved in marketing of rubber. Already 81 t of sheet rubber has been exported to Bangladesh from Tripura.

BENEFITS OF RUBBER PLANTING IN THE NORTH EAST INDIA

The socio economic benefits of rubber plantation in the region include (1) rubber yield at the rate of 1 to 1.5 t per ha per year providing year round income to the growers (2) generation of direct employment opportunities of 1000 mandays per ha during the immature phase and 0.7 per ha/ year during the mature phase and indirect employment opportunities by way of setting up rubber based and allied industries, marketing and processing etc and (3) serving as a source of ancillary income like rubber honey (around 250 kg per ha.), seeds, seed oil, seed oil cake, cover crop seeds etc.

The rubber plantation has ecological benefits as the rubber tree has almost all the attributes of a forest species. It helps in sequestering atmospheric carbon through photosynthesis. The tree provides cover to barren lands subjected to shifting cultivation and controls soil erosion. It improves the soil through addition of organic matter and moderates the microclimate. About 6 t of litter from rubber and 6 to 8 t of organic matter from cover plants is added to the soil per ha per year. The cultivation practices of rubber do not interfere with soil as zero tillage is adopted. Rubber plantation

enriches the soil and improves the water intake capacity of the soil. The atmospheric temperature is less by 2 to 4°c in rubber plantation. Soil temperature is reduced by 10°C than in exposed soils. In short, planting rubber can be considered as an afforestation activity.

FUTURE PLANS FOR DEVELOPMENT

A comprehensive scheme for rubber development in NE region, comprising components for area expansion, formation and capacity building of farmer groups, strengthening human resource development activities, arranging community processing of latex, establishing infrastructure development for storage of rubber and setting up a strong marketing network has been formulated under the tenth five year plan and approved by the Government of India. The thrust areas for NE in the tenth five year plan proposals are newplanting in 10,000 ha, strengthening of RPS, increasing productivity, improving quality of sheets produced, setting up Community Processing facilities, establishing a good marketing network in the joint sector for distribution of plantation requisites and purchase of rubber produced by growers, augmenting the training activities, setting up godowns for storage of rubber and revitalization of sick plantations upto the age of 4 years as well as productivity enhancement of mature plantations through an "Integrated Village Level Rubber Development" programme with financial support from state governments.

Though the potential area for rubber planting in NE Region is 4,50,000 ha, only 49771 ha has been actually planted with rubber so far. This is only 8.77% of the total rubber area in the country and 11.06% of the potential area for planting in the north-east. The total rubber produced in the NE region during 2001-02 is 15133 twhich is 2.40 % of the total production of rubber in the country. (Table 11).

CONCLUSION

North eastern region holds good potential for expansion of rubber cultivation. Though the trial planting in north-east dates back almost to the same period of beginning of commercial planting in India, significant expansion took place only since the 1970s. At present only about 10% of the potential area available for expansion is planted. Rubber development in the region has multifarious benefits. It has been successful in weaning tribals from shifting cultivation and has

Table 11. **State wise area and production of rubber in the North East India**

State	Area (ha)	Share in India (%)	Production (t)	Share in India (%)
Tripura	27947	4.93	10304	1.63
Assam	12806	2.26	1755	0.28
Meghalaya	4354	0.77	2378	0.38
Nagaland	2024	0.34	393	0.06
Manipur	1698	0.30	198	0.03
Mizoram	619	0.11	63	0.01
Arunachal Pradesh	323	0.06	42	0.01
Total North East India	49771	8.77	15133	2.40
Total India	**566560**	**100.00**	**631400**	**100.00**

helped in economic development of rural areas through generation of income and employment. Shifting of focus of development schemes of the Rubber Board from individual to group and adopting integrated approach harnessing resources from various sources and involving state governments in rubber development programmes have helped a faster development. The region produce about 15,000 t of rubber annually and the production is likely to go up. Availability of this raw material can lead to industrial development. Rubber has already proved its worth as a crop for eco-restoration. As the region is endowed with agro climatic suitability, cheap labour and good market, it holds potential to develop as an important rubber producing region in the country.

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