INDIAN RUBBER PLANTATION INDUSTRY IN RETROSPECT

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1. Developments in the production sector

The Indian rubber plantation industry has completed a century of accomplished growth since the British successfully established the crop on a commercial scale during the dawn of the 20th century. The enviable growth of rubber plantation industry in terms of production, productivity and area has no analogue in the agrarian history of the country and it is now in the forefront of all major rubber producing countries of the world. During the evolutionary transition from its infancy, a host of factors, historical, agro-climatic, and socio-political and policy initiatives have contributed to the present enviable status of India as the third largest rubber producer with the highest average productivity.

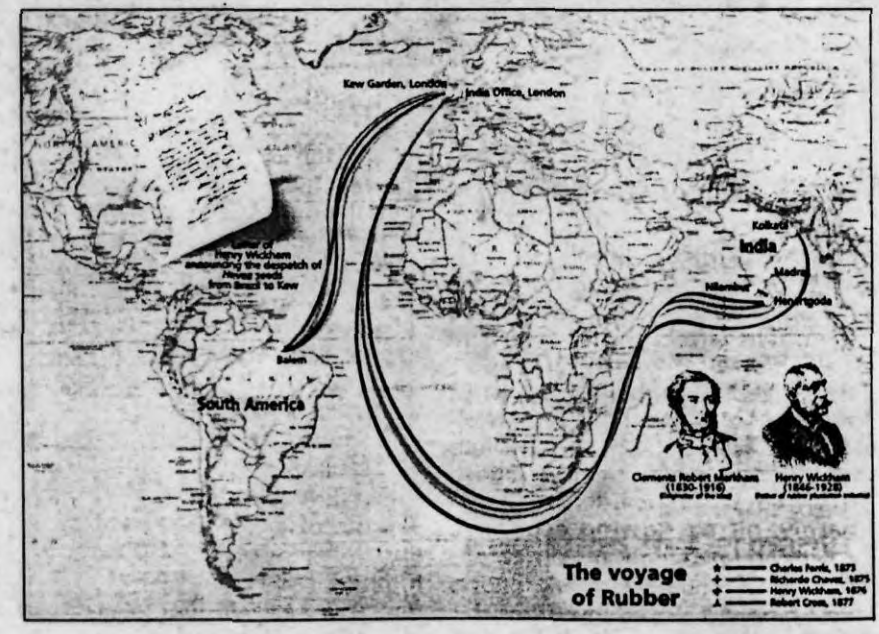
Early developments under colonial patronage

The modern age of natural rubber (NR) actually started during the 1870s when the British successfully transported *Hevea* seeds from Brazil for planting in the then British India (Fig. 1) even though rubber was known to the natives of tropical America. Though India has the rare distinction of being the first country that received germinated *Hevea* seedlings from the Royal Botanical Garden, Kew, England in the 1870s, agro-climatic unsuitability of the first selected sites at Calcutta inhibited its early growth in India and rubber cultivation moved outside the Indian main land and was established in Ceylon. Subsequently, attempts to introduce rubber as a forest crop in the teak plantations of Nilambur valley in 1878 from the Royal Botanical Garden, Heneratgoda, Ceylon, also failed due to lack of proper care and patronage.

Planting of rubber in Travancore on a commercial basis started in 1902 on the banks of the Periyar river by a syndicate of which J.A. Hunter, K.E. Nichol and M.M.F. Rose were members. The planting extended to Konney and Mundakayam during 1903-05, to Cochin in 1905 and subsequently to South and Central Malabar. By 1910 Tranvancore became the lead state in rubber planting in India with 7390 ha and Mundakayam became the main centre of planting with over 4000 ha. The British held an upper hand in the initial development with better access to surplus capital and necessary essential information of rubber planting and processing. The large demand and limited supply of rubber, developments in plantation agro-technology and easy availability of labour during the early 20th century provided a very favourable environment for rubber cultivation and more areas being brought under the crop.

Following the lead provided by the British, Indian entrepreneurs soon started rubber cultivation. This resulted in the emergence of an indigenous commercial class who channeled their accumulated surplus from banking, agriculture and trade to plantation agriculture, especially rubber. In Travancore, Malankara Rubber and Produce Company was floated in 1910 with planting programme in Thodupuzha. It was followed by Vaniampara Rubber Company in 1911, for planting near Trichur in Cochin. The joint stock companies were followed by proprietary plantations and by 1947, about 73% of the area under rubber in India was controlled by Indian entrepreneurs.

However, during the course of the World War I (1914-'18) the allied countries imposed restrictions on export of rubber to Germany and NR prices took a sharp plunge due to the accumulation of surplus stock in all rubber producing countries. Malaya and Ceylon were compelled to impose among themselves



some voluntary restrictions through the Stevenson Restriction Scheme (1922-25). As India was not a signatory, both area and production of NR increased substantially. In 1926 alone, 9660 ha of land were newly planted with rubber and the increase in area under smallholdings was over 200% compared to about 30% in the estate sector.

The great economic depression during 1929-33 resulted in a slump in the prices of all agricultural commodities and rubber prices also came to an unprecedented low. There were no buyers for rubber and many planters removed rubber trees and planted cashew, tapioca and other more remunerative short-term crops. To tide over this crisis, all major rubber producing countries including India entered into the International Rubber Regulation Agreement (IRRA) in 1934, which imposed restrictions on replanting and new planting and assigned fixed quotas for exports. Consequent to the formation of the Indian Rubber Licensing Committee in 1934 for the enforcement of IRRA, the prices of rubber in India began to rise and area increased up to the extent permitted. The IRRA, which was originally intended for control from 1st June 1934 to the end of 1938 was extended several times and finally terminated on 30th April 1944.

During the World War II (1939-'45), the conquest of Malaya and South East Asian colonies by Japan left India and Ceylon as the only sources of NR for Britain and allied countries. Growers were encouraged to adopt intensive tapping practices like slaughter tapping of old trees to maximise rubber production for meeting war emergencies. The Indian Rubber Production Board was constituted in 1942 by the issue of Indian Rubber Control and Production Order under the Defence of India Rules. Thus, all restrictions on production and planting of rubber were removed. On 27th May 1942, rubber price was brought under statutory control for the first time in India and a government purchasing agency was set up at Cochin. After the war, the monopoly purchase was terminated on 30th September 1946, when the Rubber Control and Production Order lapsed, but the price control measures continued.

Developments under Institutional Support

In view of the growing demand for a permanent organization to look after the interests of the rubber industry, an ad-hoc committee was constituted by the Government to make suitable recommendations during 1946. As per the recommendations of the committee, the Government passed the Rubber (Production & Marketing) Act, 1947, which came into force on 18th April 1947 and the Indian Rubber Board was created. The Act was further amended several times (Fig. 2) and by the Rubber (Production & Marketing) Amendment Act, 1954, the Indian Rubber Board was renamed as 'The Rubber Board'. The main functions of the Rubber Board under the Rubb Act, 1947 are;

- to devise suitable promotional measures such as undertaking research, providing training on improved cultural practices to the target groups, improving processing and marketing of rubber, collection of statistics from growers, dealers and manufactures and securing better working conditions to the labourers for the overall development of the industry; and
- to advise the Government on all matters relating to the development of the rubber industry.

Three broad objectives were proposed for the Rubber Board strictly based on the provisions of the Act and revised or modified according to the changing dimensions of the industry over time. The focus of the activities of the Rubber Board was:

- to enhance the production of NR by increasing production in the traditional area and extension of cultivation to non-traditional areas so as to achieve self sufficiency in NR production.
- to ensure remunerative prices to farmers so as to

Fig.2: History of the Rubber Act, 1947

sustain the viability of NR cultivation ; and ● value addition through quality upgradation and development of marketing channels.

The Rubber Board is vested with powers of assessment and collection of a duty of excise (cess) on all NR produced in India and the cess was collected from the producers till 31st March 1961. With an amendment in the Rubber Act in 1961, the liability of the payment of cess was shifted from producers to rubber manufacturers. The revenue collected through cess helps the Rubber Board in getting adequate funds for its various development activities.

Rubber Rules, framed in 1955, clearly defined the manner in which the Board had to discharge its functions and laid down clear provisions for the implementation of activities envisaged. Organized under eight departments (Table 1) with several extension centres, research stations, training forums and nurseries, functioning all over the country, Rubber Board is a well-structured organization, catering to the development of the Industry (Fig. 3).

Table 1. Departments of Rubber Board

Name	Year of establishment	Head of the Department
Development*	1947	Rubber Production Commissioner
Administration	1947	Secretary
Research	1955	Director (Research)
Department of Rubber Processing**		
	1977	Project Officer (Director, Processing & Product Development)
	1985	Director (Finance)
	1994	Joint Director (Statistics & Planning)
	1997	Director (Training & Technical consultancy)
	1998	Director (Licensing & Excise Duty)

** Renamed as Rubber Production Department in 1970*
*** Renamed as Department of Processing & Product Developmentin 1991*

Fig 3: Rubber Board Headquarters

Fig 4: Rubber Research Institute of India

Research

The Rubber Research Institute of India (RRII) was established in 1955 to undertake scientific research on various aspects relating to production, cultivation and processing (Fig. 4). The four broad research priorities of the RRII are: ● improvements in production and productivity; ● integrated approaches to reduce cost of production and ensuring quality competitiveness; ● research support for extension of cultivation to non-traditional areas and (4) improvements in post-harvest technology and product development. Over the years, the RRII with its eight research divisions has developed into a research centre of international acclaim.

Through its breeding programmes, RRII was successful in evolving the highest yielding clone, namely RRII 105. The yield levels of around 300 kg per ha of *Hevea* during the mid- 20th century, have been raised to the high levels of about 4000 kg per ha through this. The clone RRII 105, blending high yield potential with good tolerance to abnormal leaf fall disease has been instrumental in increasing production and productivity of NR in India. This clone became so popular among the rubber growers that more than 85 per cent of the rubber area in the traditional tract is planted with it. A few other clones developed by the RRII have performed well in certain areas. Another set of 11 improved clones that RRII has developed recently is found significantly out-yielding RRII 105 in experimental trials.

In order to broaden the genetic base of *Hevea*, RRII has acquired 5000 accessions from the IRRDB collections and these are under evaluation for yield and secondary characters like timber quality, disease and drought tolerance. During 1986, RRII initiated biotechnological research to supplement conventional crop improvement techniques and tissue culture protocols were developed for rubber using different plant sources.

To supplement the development of high yielding clones appropriate agro management practices were also developed, which also had contributed to the production levels achieved. Agromanagement strategies like cover cropping and intercropping, weed control and water and soil conservation also ensures healthy plant growth. By

strict adherence to the recommended package of practices, growers could bring the trees to yielding in about five to six years. Further, the recommended intercropping schedules generate additional income to the farmers and also contribute to better growth and early maturity of rubber.

The International Rubber Research and Development Board (IRRDB) has recognized the contributions of RRII in the field of plant physiology by declaring the Institute as a Centre of Excellence in Plant Physiology. Research on stress physiology, particularly tolerance to drought and cold, was aimed at development of appropriate agrotechnology for non-traditional regions like North Konkan and North Eastern India.

In the field of exploitation major achievements was in reduction in cost of tapping which accounts for up to 70 percent of the cost of production of natural rubber. Success in evolving low frequency tapping (LFT) systems such as fourth daily (three tappings per fortnight) and weekly tapping (one tapping per week) without any reduction in yield compared to that obtained under third daily tapping with stimulation, is a novel achievement. Controlled Upward Tapping (CUT) was modified to suit the agro-climate in India and it was recommended with periodic panel change. This is found more productive than the original recommendation in Malaysia. Mini and reduced spiral cuts were found suitable for early opening of trees for cost reduction. In recognition of the contributions, the International Rubber Research Development Board (IRRDB) has made RRII the center for co-coordinating international research efforts in exploitation technology.

Cost reduction was the main concern in crop protection research. Reduction in cost of high volume spraying by reducing the total spray volume, reduction in weight of sprayers for low volume spraying, development of smaller micron sprayers for younger plantations etc. were some of the areas. Cost effectiveness in pink disease control by prophylactic spraying was also achieved. Treatment schedules have been developed for panel and stem diseases. RRII had co-coordinated an international research programme on tapping panel dryness (TPD), a disorder of serious concern in all rubber growing countries, under the auspices of IRRDB.

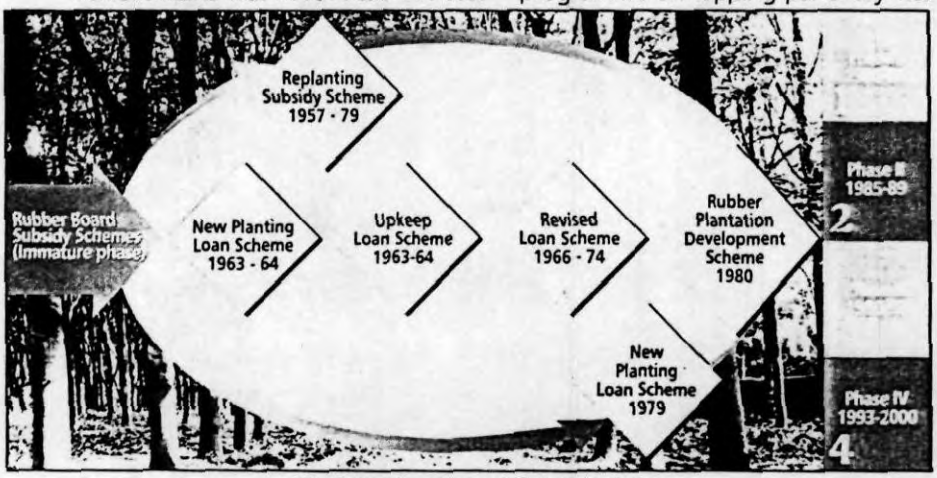


Fig5:Rubber Board Subsidy Schemes

Research efforts in non-traditional areas were aimed in formulating appropriate location specific agrotechnology for these regions. Clones suitable for rubber growing areas in Tripura and Assam and fertilizer requirements for rubber in these states have been identified.

Improvements in processing of NR have been the prime need for addressing quality competitiveness. Modifications in rubber sheet drying smoke houses for use of alternative energy sources like biogas and solar energy have been experimented. The technology for using biogas to supplement the biomass of smoke houses has been developed and is being adopted at a fast rate. Technology for the production of modified forms of NR like liquid natural rubber (LNR), epoxidised natural rubber (ENR) and constant viscosity (CV) rubber has been evolved. The break through made in developing a sheet-cleaning machine and a versatile trolley for use in smoke house are being patented.

Extension

Organized extension work of [illegible] Rubber Board began in 1949 thro[illegible] the distribution of rubber seeds. From a modest beginning with two rubber nurseries in 1951 for the distribution of planting materials, the Rubber Board has developed an efficient extension network with four zonal offices, 37 regional offices and 172 field stations. It also has regional nurseries, tappers training schools, district development centres and Nucleus Rubber Estate and Training Centres.

Since 1957, the Rubber Board has been implementing a variety of schemes equipped with proper technical and financial assistance for modernizing the rubber plantation industry (Fig. 5 & 6). Till the 1970s, the thrust has been on the replanting of low yielding clonal tr[illegible] and from 1979 onwards new planting also was encouraged. The most important scheme in the immature phase, the Rubber Plantation Development Scheme could modernise planting in smallholding ensuring high quality of planting materials and adoption of scientific cultural practices. To ensure timely flow of information, availability of inputs and a fair marketing network, several programmes were taken up. A range of other schemes is also implemented for encouraging adoption of technology to increase production and to improve quality.

Though co-operatives were active in the extension system since 1960s, a significant change has been evident with

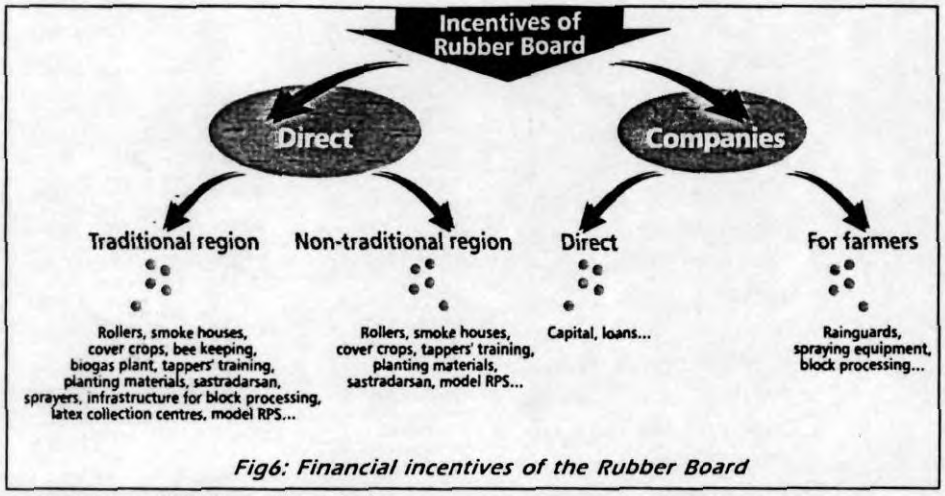


Fig6: Financial incentives of the Rubber Board

the formation of Rubber Producers' Societies (RPS) in 1985. RPS, voluntary associations of small rubber growers, registered under Charitable Societies Act, are envisaged to function as non-profit making institutions imparting scientific and technical know-how to its members for the general improvement and modernization of the smallholding sector. The RPS, about 2100 in number, have contributed significantly to the modernization process. Besides community processing and marketing, they distributes about 30 – 40% plantation inputs to smallholders at reasonable price and also ensures adoption of critical agricultural operations.

In the process of empowerding RPS through the devolution of extension function, 35 Model RPS were facilitated as technology transfer centers and were provided with training for processing of quality sheets. Realising the success of Model RPS in both processing quality sheets and imparting training to other RPS on technical aspects and group management, another 100 selected RPS also were supported to set up not only as community processing centers but also for assisting the Rubber Board in implementing various schemes and for training.

During the early 1990s, private limited companies as joint ventures of RPS and Rubber Board were formed for setting up processing factories and trading of latex, sheet rubber, field coagulum and agro-inputs. All the studies conducted for assessing the performance of RPS revealed that they have considerable impact on the production and productivity of rubber and the quality of life of rubber small growers. The growers have better access to the technical information and could maintain better liaison with the Rubber Board through RPS.

As part of Rubber Boards' Women Development programme, women self-groups in Kerala and Tripura linked to RPS were formed and assisted in various activities of income generation, hygiene, sanitation etc. With liberal funding from the Govt. of Tripura and active involvement of NGOs, the Rubber Board initiated a project since 1992 for the rehabilitation of tribal shifting cultivators and about 2500 families were benefited with 2500 ha being planted with rubber. The planting since 1992 have already come under tapping, opening new sustained avenues for their livelihood.

As suitable land for expansion in traditional areas has been exhausted, Rubber Board has built up extensive infrastructure facilities for extension activities and implementation of development schemes for the non-traditional regions. In addition to Rubber Plantation Development Scheme with a higher scale of financial assistance, a set of other schemes has been implemented in these regions. Through the integrated approaches of the Rubber Board with appropriate research and development back up, rubber cultivation in India was extended to about 52,000 ha spreading over 13 states and union territories in the non-traditional regions.

Other activities

In addition to initiatives in the spheres of rubber cultivation and production, active encouragement was also extended for processing of raw rubber and marketing of processed forms. Since the establishment of Department of Rubber Processing in 1977, the Rubber Board gave active support to processing of rubber with the objective of quality upgradation and value addition. The initial target was improving processing of field coagulum into technically specified rubber (TSR). The Pilot Crumb Rubber Factory (PCRF) at RRII was established during 1976. Subsequently six TSR factories were established during 1980 in the Co-operative sector with the active participation and technical support from the Rubber Board and many factories were established in the private sector also. The country now has 58 TSR factories of which eight are in the co-operative sector, four in government sector, three in RPS-Rubber Board joint sector, eight in estate sector and 35 in private sector. The TSR production in India during 2001-02 was 62845 tonnes, about 10% of the total NR production.

Since 1956-57, the Rubber Board has been implementing various labour welfare schemes, covering four broad areas of education, housing & sanitation, health and insurance to secure better working conditions and provisions for improvement of amenities and incentives for rubber plantation workers. At present there are seven such schemes and the target group is mainly workers attached to the small and marginal holdings.

The Rubber Board through the Department of Training and Technical Consultancy imparts specialised training in various aspects of rubber cultivation, primary processing and product manufacture besides provides assistance to new entrepreneurs for setting up small-scale rubber product manufacturing units. Board gathers basic statistics from growers, processors, dealers and manufactures and compiles analyses and disseminates the information. It monitors demand, supply,

Table 2. Area, production and productivity of NR in India

Year	Area (ha)	Production (t)	Productivity (kg/ha)
1902-03	200	-	-
1910-11	11900	80	-
1925-26	30886	6400	-
1930-31	48000	6500	-
1940-41	47200	16100	-
1947-48	71336	15000	300
1950-51	74915	15800	284
1960-61	143905	25697	365
1970-71	217198	92171	653
1980-81	284166	153100	788
1990-91	475083	329615	1076
2000-01	562670	630405	1576
2001-02	566558	634000	1576

stock, price etc. of raw rubber and renders advice to the Government on international developments.

The achievements in the rubber production sector, which are mainly the outcome of well coordinated efforts initiated by the Rubber Board are really commendable especially increase in area under NR cultivation (689%) production (4100%) and productivity (425%) during the period between 1947 and 2002.

Structural Changes

From the very beginning, expansion in the area under rubber was steady with a hike of 60 times during the mid-1920s. By 1947-48, the country's area under rubber recorded 71336 ha and the production 15000 tonnes (Table 2). Though the progress in expansion of area was more pronounced during the 1950s and 1960s, the period 1970-77 suffered major set back in this process due to the frequent price fluctuations. However, the situation changed during the late 1970s with a new boom in the planting activity. The pace of growth continued during 1980s and in spite of short-term fluctuations, by 2000-01 the total area under the crop reached 565580 ha. with more than 4 lakhs ha under tapping.

One of the most noteworthy developments in the NR plantation industry since independence was the preponderance of the smallholding sector. The growth of this sector was more pronounced during the late 1950s. A host of policy initiatives, socio-political and other reasons have contributed to this transition. The main policy initiatives are promulgation of Plantation Labour Act in 1951, the financial incentives of the Rubber Board, the land reforms initiated in Kerala and exempting of all the plantation crops from land ceiling. The division of properties under the prevailing land ownership system also resulted in fragmentation of units. Consequently the relative share of area under smallholdings increased from 33 per cent in 1947 to about 88 per cent in 2002 (Table 3).

Historically, the dominance of the estate sector, which revolved around large plantation companies owned and promoted by the British during the colonial rule, gradually declined and the rate of growth was marginal over time. However, the entry of public sector corporations in rubber cultivation since 1960s h. resulted in significant changes in th.. estate sector. Public sector plantations were started in Kerala, Karnataka, Tamil Nadu, Tripura, Assam, Meghalaya, Mizoram, West Bengal and Orissa. The changes in the ownership pattern in the estate sector are basically routed in the conversion of forest land into rubber by public sector companies and the significant reduction in the operational size of the area under proprietary concerns through fragmentation during the course of time (Table 3).

Table 3. Structural changes

Sector	31st December 1946		31st March 2002	
	Numbe	Area (ha)	Numbe	Area (ha)
Estate	402(02.49)	42306(66.76)	307(00.03)	67594(11.03)
Smallholding	15757(97.51)	21064(33.24)	997871(99.97)	498964(88.07)
Total	16159(100.00)	63370(100.00)	998178(100.00)	5366558(100.00)

Table 4. Size-classification of holdings and estates (31 March 2002)

Size-class	No. of units	Area (ha)	Average size (ha)
Holdings			
2 ha and below	974200	414149	
Above 2 ha and up to 4 ha	18141	45803	
Above 4 ha and up to 20 ha	5530	39012	
Total	997871	498964	0.50
Estates			
Above 20 ha and up to 40 ha	98	2917	
Above 40 ha and up to 200 ha	136	11547	
Above 200 ha and up to 400 ha	24	7548	
Above 400 ha and up to 600 ha	21	10721	
Above 600 ha and up to 800 ha	9	5872	
Above 800 ha	19	28989	
Total	307	67594	
Grand Total	998178	566558	0.57

Currently 88.07 per cent of the area comes under smallholdings sector, which is composed of 997871 units and the respective figures of large estates are 11.93 per cent and 307 units. The average size of the holdings in the country is half a hectare (Table 4).

Another unique

Table 5. Rubber cultivation (ha) in the traditional regions (31st March 2002)

State	Smallholdings	Estates	Total (% share)
Kerala	434457	40582	475039(92.29)
Tamil Nadu	12262	6442	18704(03.64)
Karnataka	14052	5965	20017(03.89)
Andaman & Nicobar	115	845	960(00.19)
Total	460886	53834	514720(100.00)

feature of the Indian NR plantation industry is the regional concentration of area under the crop. The traditional area consisting of Kerala, Kanyakumari district of Tamil Nadu and Dakshina Kannada district of Karnataka accounts for about 91.30 per cent in 2000-01 (Table 5). A shift in geographical composition of area has stemmed from the Government policies implemented through Rubber Board for the introduction and promotion of rubber cultivation in non-traditional areas. Currently rubber is successfully cultivated in about 51838 ha in the non-traditional regions of India, the relative share being 8.70 per cent (Table 6).

Table 6. Rubber cultivation (ha) in non -traditional regions (31st March 2002)

	Smallholding	Estates	Total
North Eastern States			
Tripura	19122	8825	27947
Assam	11133	1673	12806
Meghalaya	2510	1844	4354
Nagaland	1833	191	2024
Manipur	1221	477	1698
Mizoram	566	53	619
Arunachal Pradesh	286	37	323
Sub total (a)	36671	13100	49771
Eastern states			
Orissa	429	88	517
West Bengal	327	103	430
Andhra Pradesh	109	-	109
Sub total (b)	865	191	1056
Northern West coast			
Goa	432	411	843
Maharashtra	107	58	165
Gujarat	3	-	3
Sub total (c)	542	469	1011
Total (a+b+c)	38078	13760	51838

Fig7: Hundred Years of Indian NR Industry

Conclusion

The dynamic growth achieved by the rubber plantation industry during the past century and its salient features have been unique in many respects. The agro-climatic suitability and certain other factors prevailing in the traditional rubber growing tracts, particularly in Kerala and the colonial patronage provided necessary impetus for its initial growth whereas institutional support and other government initiatives at the level of production, processing and marketing have been the driving forces for the sustained development during the post-independence era.

The structural devolution, leading to the dominance of the Indian smallholding sector since 1950s has been in tandem with similar changes in all major NR producing countries. The steady improvements in yield and consequent enhancement in production are the logical outcome of the adoption of appropriate agro-management practices by the highly responsive planting community comprising about 10 lakhs smallholders who possess more than 88 per cent of the area under rubber. The NR production sector had a high degree of regional concentration in the traditional tracts comprising Kerala, Kanyakumari district of Tamil Nadu and Dakshina Kannada district of Karnataka, which together account for about 98 per cent of production and 91per cent of area. The growth in area under rubber in the traditional belt has been maintained by smallholdings whereas in the non-traditional tracts mainly in the North-Eastern states public sector corporations provided necessary initiative. In the course of development, the Indian rubber plantation industry has achieved great strides in terms of expansion in area, production and productivity (Fig. 7). The area increased from 75,000 ha in 1950–51 to 5,66,558 ha at the end of 2001-02. The production increased from 15,830 tonnes to 6,34,000 tonnes and the average productivity from 284 kg to 1576 kg per ha, the highest in the world. Currently, India is the third largest producer of natural rubber in the world, next only to Thailand and Indonesia. (Part II : Sept-Oct IRJ)