

REPORT ON SOCIO-ECONOMIC STUDIES ON NATURAL RUBBER SECTOR IN INDIA

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Introduction:

The research and development (R&D) priorities across products and countries at any given point of time will be closely related to the product or sector-specific issues conceived in the broad macro economic policy framework of individual countries. However, aberrations from the perceived relationship between R&D priorities and the macro economic policy framework could be due to a variety of factors ranging from strategic commercial importance of the concerned product, extent of economically dependent population on the sector, potential benefits arising from self-sufficiency in production or export earnings, compatibility of the perceived objectives with financial implications etc. Generally, R&D policies in agriculture or individual crops in particular, are designed to achieve certain specific objectives from a long-term perspective. The objectives of such policies vary across crops and countries depending on the specific features of the crop, socio-economic characteristics encompassing the production sector and both domestic and external market dimensions. The policy priorities and the resultant R&D initiatives with regard to natural rubber (NR) sector in India over time have been unique for specific reasons, and therefore, any attempt to highlight the research programmes on the socio-economic aspects of NR in India have to be viewed in the broad conceptual background of the evolutionary dynamics of the NR sector in the country and the R&D priorities of the RRII.

Evolution of the NR sector and R&D policy priorities in India

As in the case of other 'rubber plantation enclaves' developed in European colonies of Asia, the initial structure and organization of production of the rubber plantations in India

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were also characterised by an estate system of export-oriented production backed by British capital and technology and immigrant or indentured labour. However, the salient features of the demarcation line were the regional concentration of NR cultivation in the state of Kerala from the very beginning and certain region-specific factors which were conducive to the subsequent dynamic transformation of the NR sector. Even in 2000-01, the state of Kerala accounted for more than 85 per cent of area under the crop and about 92 per cent of the production in the country. Another important dimension of the NR sector in India is the sectoral concentration characterised by the dominance of smallholdings with a share of 88 per cent in the total area under the crop and production in the country. The prominence attained by the small and marginal holdings below the size-group of 2 ha over time is evident from its shares in total number of producing units (98%) and area (73%).

The widely applauded performance of the smallholder dominated NR production sector in India has been due to the cumulative effect of various historical, regional, linkage and policy related factors. The large scale entry of rich peasantry of the state of Kerala along with the British firms in opening up virgin areas for NR cultivation since the first quarter of the 20th century had been unique compared to the involvement of native peasants in other major NR producing countries. During the inter-war years due to certain specific economic and political developments, the domestic consumption of NR in India grew at an annual rate of 47.45 per cent and by 1934 it surpassed the domestic consumption of the two largest producers of NR, viz., Malaya and Netherlands East Indies. Subsequently, in 1947 India's domestic consumption outstripped its production, underlining the graduation of the country from its initial position of an exporter of NR to the status of a net importer of the raw material with a large manufacturing base. Today, India is the fourth largest consumer of NR in the world with an estimated total value of output of more than US\$ 3125 million and its export earnings of value added rubber products is estimated to be more than US\$ 345 million in 2000-01. (see appendix table 1).

The achievements in the NR production and rubber products manufacturing sectors have been the result of a well co-coordinated comprehensive policy packages targeted at the

stages of cultivation, processing, primary marketing and rubber products manufacturing since 1947. The genesis of the packages has been the sustained R&D efforts basically to cater to the requirements of a growing captive domestic market with the primary objective of achieving self-sufficiency in NR production. Accordingly, since independence the focus of the research programmes in the Rubber Research Institute of India has been on crop improvement, development of region specific agro-technologies, improved cultural practices and quality up gradation of raw rubber. The cumulative effect of the broad R&D priorities on crop improvement, integrated approaches on cost reducing measures and quality competitiveness, product development and marketing has been the development of a sustainable rubber sector with strong inter-sectoral linkages under a protected policy regime. The cardinal feature of the policy priorities rooted in import substituting regime had been an overtly articulated commitment to maintain harmonious relationship between the producing and consuming sectors. However, the launching of economic reforms (especially external trade reforms) in the country since 1991 posed serious challenges to the prevailing equations between the sectors which in turn highlighted the need for strategic shifts in the R&D priorities. The Economics Division which is one among the eight constituent Divisions of the RRII has been responsive to the ongoing process of changes in the rubber sector both at the national and international levels. In this report, a summary of the research programmes undertaken by the Economics Division from 1992 to 2002 and the highlights of the completed studies are presented.

Research Priorities of the Economics Division (1992- 2002)

Thrust areas:

The Economics Division under the RRII was established in 1986. The Division has been primarily concerned with the studies relating to economic aspects of natural rubber (NR) cultivation, processing, marketing and end uses. Due emphasis is also given to studies pertaining to ancillary sources of income from inter-crops and by-products. Collaborative studies are also undertaken with the other Divisions of the RRII to assess the economic

viability of various recommendations. The research projects undertaken in the division can be broadly classified into five categories, viz.,

1. Farm management
2. Primary processing and marketing of NR
3. Rubber products manufacturing industry and foreign trade
4. Inter-crops and by-products
5. Inter-divisional collaborative projects.

Farm management

The various issues confronting at the farm level have been the major focus of the division. The nature of studies vary from continuous, comprehensive to short-term evaluation studies. During the period under review, fourteen research programmes were completed and six projects are at different stages of progress. The highlights include continuous studies on adoption of planting materials and comparative yield performance, labour in the smallholdings, impact of the input subsidy schemes and operational efficiency of rubber plantations at different levels of management. (See appendix tables 2-4).

Primary processing and marketing of NR

The direct market intervention schemes in the primary marketing of NR in India since 1947 till 1992 have been unique for historical and structural factors. The focus of studies in this area has been on issues related to primary marketing. During the period under review, six research programmes were completed and one comprehensive project is in progress. The highlights include a time series analysis of domestic price movements, role of rubber marketing co-operatives, stockholding practices by the small growers and new forms of discrimination in the primary market in the context of uncertainty. (see appendix tables 5 and 6).

Rubber products industry and foreign trade

Among the major NR producing countries, India has the unique position of a captive domestic market arising from a large and wide manufacturing base. During the period under review, six research programmes were completed and one programme is in progress. The highlights of the studies include a time series analysis of foreign trade in rubber products, resource base and rubber based industrialisation, WTO Agreement and its implications on external trade. (see appendix tables 7 and 8).

Inter-crops and by-products

Studies on the ancillary sources of income from rubber plantations have been given due emphasis in the context of the changing dimensions of the NR production sector. During the period under review, eleven projects were completed and three continuous programmes are in progress. The highlights include the relative performance of various inter-crops during the immature phase, issues related to commercial utilization of rubber wood, honey from rubber plantations and rubber seed. (see appendix tables 9 and 10).

Inter-divisional collaborative projects

The growing realization of the validity of an economic evaluation of the research programmes undertaken in other constituent divisions of the RRII has led to the involvement in inter-divisional collaborative programmes. During the period under review, three such assessments have been completed with the Agronomy and Rubber Technology Divisions. The highlights include assessment of the commercial application of latex sludge, comparative evaluation of the quality parameters of ISNR 20 *vis-à-vis* RSS and comparative analysis of polybag *vs* budded stumps.

A Summary View

Table 1 : Composition of completed and ongoing research projects (1992 –2002)

| Area of work | Number of projects | | |
|---|--------------------|---------|-------|
| | Completed | Ongoing | Total |
| 1. Farm management | 14 | 6 | 20 |
| 2. Primary processing and marketing | 6 | 1 | 7 |
| 3. Rubber products industry and foreign trade | 6 | 1 | 7 |
| 4. Inter-crops and by-products | 11 | 3 | 14 |
| 5. Inter-divisional collaborative projects | 3 | Nil | 3 |
| Total | 40 | 11 | 51 |

Table 2: Composition of publications (1992 - 2002)

| Type of publications (1992- 2002) | Number |
|-----------------------------------|--------|
| 1. Book chapters | 10 |
| 2. Research papers/articles | 31 |
| 3. Conference papers | 24 |
| 4. Monographs | 5 |
| 5. Mimco/Technical reports | 6 |
| 6. Popular articles | 21 |
| Total | 97 |

Table 3: Major achievements

1. A comprehensive database on yield performance of major planting materials, foreign trade of rubber products, rubber wood and honey.
2. Comprehensive studies on the dominant smallholdings sector such as resource use efficiency, impact of input subsidy scheme, labour management, primary marketing, *etc.*
3. Pioneering in-house study on the operational efficiency of rubber plantations at different levels of management in the smallholdings sector.
4. First crop-specific study on the implications of WTO Agreement.

Appendix Table 1

Basic indicators of rubber sector in India (2000-01)

| | |
|--|--------|
| Total area under NR cultivation (ha) | 562670 |
| Share of smallholdings in total area (%) | 88.04 |
| Total NR production (tonnes) | 630405 |
| Average yield (kg/ha) | 1576 |
| Share of smallholdings in total NR production (%) | 87.84 |
| Share of dry rubber in total NR production (%) | 89.53 |
| Total SR production (tonnes) | 65460 |
| Total consumption of NR and SR (tonnes) | 802145 |
| Share of dry rubber products in total NR consumption (%) | 89 |
| NR-SR consumption ratio | 79:21 |
| Total rubber imports as a percentage of consumption (%) | 14.45 |
| Estimated value of output of rubber products (US \$ million) | 3125 |
| Balance of trade in rubber products (US \$ million) | 214.13 |
| Net balance of trade (US \$ million) | 75.76 |

Appendix Table: 2

Trends in the adoption of planting materials in the estate and
smallholding sectors during the 1990s

| Clones | Relative share in area (%) | |
|----------------------|----------------------------|---------|
| | Smallholdings | Estates |
| RRII 105 | 85.75 | 47.80 |
| GT 1 | 0.04 | 8.53 |
| PB 217 | 0.02 | 6.15 |
| RRIM 600 | 0.19 | 5.79 |
| PB 260 | 0.24 | 5.06 |
| PB 28/59 | 0.16 | 2.66 |
| PB 235 | 0.04 | 0.38 |
| Mix with RRII 105 | 13.09 | 11.95 |
| Mix without RRII 105 | 0.42 | 5.16 |
| Other RRII | 0 | 0.05 |
| Other PB | 0.05 | 1.11 |
| Others | 0 | 5.36 |
| Area (ha) | 7145.65 | 10439 |

Appendix Table: 3

**Commercial yield performance in the estate sector during
1-10 phase**

| Clone | Yield* (kg/ha) | Yield/tree (kg) | Share of FC (%) | Tappable stand (No/ha) | Tapping intensity (%) |
|----------|-------------------|--------------------|-----------------------|------------------------------|-----------------------------|
| RRII 105 | 1703 (1) | 4.71 | 23.5 | 361 | 70 |
| GT 1 | 1351 (7) | 4.25 | 24.9 | 318 | 82 |
| LCB 1320 | 953 (19) | 3.17 | 31.1 | 301 | 89 |
| GI 1 | 1109 (14) | 3.31 | 30.9 | 336 | 86 |
| PB 217 | 1510 (4) | 4.89 | 20.1 | 309 | 84 |
| PB 235 | 1426 (5) | 4.47 | 28.2 | 319 | 77 |
| PB 252 | 1386 (6) | 4.63 | 37.8 | 296 | 86 |
| PB 260 | 1607 (2) | 4.79 | 28.6 | 235 | 77 |
| PB 28/59 | 1522 (3) | 4.53 | 29.0 | 333 | 75 |
| PB 5/139 | 1306 (10) | 3.34 | 23.3 | 391 | 92 |
| PB 5/51 | 1336 (9) | 4.23 | 27.6 | 312 | 82 |
| PB 5/63 | 1088 (18) | 4.20 | 37.1 | 259 | 77 |
| PB 6/9 | 1216 (11) | 3.27 | 20.6 | 372 | 67 |
| PB 85 | 1105 (16) | 3.34 | 25.9 | 331 | 84 |
| RRIM 600 | 1337 (8) | 4.28 | 28.3 | 312 | 84 |
| RRIM 605 | 1144 (13) | 3.59 | 30.0 | 319 | 84 |
| RRIM 623 | 1106 (15) | 3.16 | 30.4 | 320 | 85 |
| RRIM 628 | 1093 (17) | 3.84 | 37.9 | 285 | 70 |
| RRIM 701 | 1186 (12) | 3.95 | 35.6 | 300 | 85 |
| Mean | 1334 | 4.02 | 27.7 | 329 | 82 |

* Rankings are given in parentheses

• Appendix Table: 4

Yield and related information in the smallholding sector

| Category | Yield/ha (kg) | Stand/ha (No) | Yield/tree (kg) | Tapping days (No) | Yield/tap/ha (Kg) |
|--------------------|------------------|------------------|--------------------|----------------------|----------------------|
| 0-2 ha | 2053 | 430 | 4.77 | 136 | 15.1 |
| 2-4 ha | 1936 | 419 | 4.62 | 131 | 14.7 |
| >=4 ha | 1736 | 430 | 4.04 | 149 | 11.7 |
| With subsidy | 1959 | 426 | 4.59 | 136 | 14.4 |
| Without subsidy | 1866 | 428 | 4.36 | 143 | 13.1 |
| RRII 105 | 2007 | 432 | 4.65 | 132 | 15.3 |
| Other clones | 1820 | 421 | 4.32 | 147 | 12.4 |
| Mean | 1922 | 427 | 4.50 | 139 | 13.9 |

Appendix Table: 5

Stockholding practices under different phases of price expectations: Changes in duration and stock share

| Size class | Average duration of stocking (weeks) | | | Stock share (%)* | |
|------------|--------------------------------------|----------|------------|------------------|----------|
| | Phase I | Phase II | Change (%) | Phase I | Phase II |
| < 1 ha | 10 | 6 | (-) 40 | 27.49 | 13.72 |
| 1-2 ha | 10 | 5 | (-) 50 | 25.73 | 12.90 |
| >= 2 ha | 15 | 8 | (-) 47 | 27.08 | 20.52 |
| Total | 11 | 6 | (-) 45 | 26.77 | 15.71 |

* Stock as a percentage of annual production

Appendix Table 6

Ratio of Indian price to world price

| Year | Ratio | Year | Ratio |
|------|-------|------|-------|
| 1980 | 1.07 | 1991 | 1.18 |
| 1981 | 1.63 | 1992 | 1.00 |
| 1982 | 1.99 | 1993 | 1.00 |
| 1983 | 1.60 | 1994 | 0.90 |
| 1984 | 1.62 | 1995 | 1.01 |
| 1985 | 1.90 | 1996 | 1.08 |
| 1986 | 1.69 | 1997 | 1.10 |
| 1987 | 1.45 | 1998 | 1.04 |
| 1988 | 1.13 | 1999 | 1.13 |
| 1989 | 1.38 | 2000 | 1.04 |
| 1990 | 1.51 | 2001 | 1.14 |

Appendix Table 7

Value and share of rubber and rubber products exported from India

| Products | 1990-91 | | 2000-01 |
|---|------------------------|--------------|------------------------|
| | Value (Million Rs.) | Share (%) | Value (Million Rs.) |
| Natural Rubber, balata, gutta-percha, guayule, and similar natural gums, in primary forms or in plates, sheets or strip. | 0.28 | 0.01 | 144.68 |
| Synthetic rubber and factice derived from oils, in primary forms or in plates, sheets or strip; Mixtures of any product of heading no 4001 with any product of this heading, in primary forms or in plates, sheets or strips. | 5.41 | 0.22 | 171.43 |
| Reclaimed rubber in primary forms or in plates, sheets/strips | 19.26 | 0.77 | 62.82 |
| Waste, parings & scrap of rubber (other than hard rubber) and powders and granules obtained there from | 0.70 | 0.03 | 17.73 |
| Compounded rubber, unvulcanised, in primary forms or in plates sheets or strip. | 10.28 | 0.41 | 115.90 |
| Other forms (for eg., rods, tubes and profile shapes) and articles (for eg, discs and rings), of vulcanised rubber. | 8.05 | 0.32 | 52.22 |
| Vulcanised rubber thread and cord | 3.34 | 0.13 | 73.65 |
| Plates, sheets, strip, rod and profile shapes, of vulcanised rubber other than hard rubber | 48.79 | 1.96 | 456.59 |
| Tubes pipes and hoses of vulcanised rubber other than hard rubber, with or with out their fittings (eg. joints, elbows etc) | 44.47 | 1.79 | 182.06 |
| Conveyor or transmissions belts or belting, of vulcanized rubber | 254.36 | 10.23 | 894.87 |
| Pneumatic tyres of rubber | 1758.64 | 70.75 | 9185.79 |
| Retreaded or used pneumatic tyres of rubber; solid or cushion tyres, tyre treads and tyre flaps of rubber | 80.08 | 3.22 | 475.64 |
| Inner tubes of rubber | 51.68 | 2.08 | 910.25 |
| Hygienic or pharmaceutical articles (gloves, mittens and mitts), of vulcanised rubber other than hard rubber, with or without fittings of hard rubber | 77.73 | 3.13 | 1381.26 |
| Articles of apparel and clothing accessories (including gloves, mittens and mitts), for all purposes, of vulcanised rubber other than hard rubber | 57.72 | 2.32 | 538.59 |
| Other articles of vulcanised rubber other than hard rubber | 57.02 | 2.29 | 1853.15 |
| Hard rubber (for eg, ebonite) in all forms, including waste and scrap; Articles of hard rubber | 7.79 | 0.31 | 69.84 |
| Total | 2485.60 | 100.00 | 16586.42 |

Appendix Table 8

Value and share of rubber and rubber products imported into India

| Products | 1990-91 | | 2000-01 | |
|--|------------------------|--------------|------------------------|--------------|
| | Value (Million Rs.) | Share (%) | Value (Million Rs.) | Share (%) |
| Natural rubber, balata, gutta-percha, guayule, and similar gums, in primary forms or in plates, sheets or strip. | 774.80 | 23.66 | 303.83 | 2.35 |
| Synthetic rubber and factice derived from oils, in primary forms or in plates, sheets or strip; Mixtures of synthetic rubber with any product of heading no 4001 with any product of heading no 4001, in primary forms or in plates, sheets or strip | 1488.21 | 45.45 | 6654.16 | 51.38 |
| Latex rubber in primary forms or in plates, sheets or strip | 0.34 | 0.01 | 0.69 | 0.01 |
| Rings & scrap of rubber (other than hard rubber) and powders and granules obtained there from | 0.39 | 0.01 | 9.53 | 0.07 |
| Unvulcanised rubber, in primary forms or in plates sheets or strip. | 18.72 | 0.57 | 78.61 | 0.61 |
| Forms (for eg., rods, tubes and profile shapes) and sheets (for eg, discs and rings), of unvulcanised rubber. | 9.60 | 0.29 | 39.97 | 0.31 |
| Vulcanised rubber thread and cord | 42.86 | 1.31 | 34.77 | 0.27 |
| Sheets, strip, rod and profile shapes, of vulcanised rubber other than hard rubber | 36.31 | 1.11 | 175.20 | 1.35 |
| Pipes and hoses, of vulcanised rubber other than hard rubber, with or without their fittings (for eg. Joints, elbows etc) | 92.40 | 2.82 | 875.85 | 6.76 |
| Motor or transmissions belts or belting, of vulcanized rubber | 107.87 | 3.29 | 552.85 | 4.27 |
| Pneumatic tyres of rubber | 129.48 | 3.95 | 561.24 | 4.33 |
| Used or used pneumatic tyres of rubber; solid tyres, tyre treads and tyre flaps, of rubber | 10.83 | 0.33 | 47.58 | 0.37 |
| Tubes of rubber | 0.39 | 0.01 | 13.57 | 0.10 |
| Technical or pharmaceutical articles (gloves, mittens and mitts), of vulcanised rubber other than hard rubber, with or without sheets of hard rubber | 58.07 | 1.77 | 37.36 | 0.29 |
| Articles of apparel and clothing accessories (including gloves, mitts and mitts), for all purposes, of vulcanised rubber other than hard rubber | 2.85 | 0.09 | 41.95 | 0.32 |
| Articles of vulcanised rubber other than hard rubber | 496.55 | 15.16 | 3437.58 | 26.55 |
| Rubber (for eg, ebonite) in all forms, including waste and Articles of hard rubber | 4.96 | 0.15 | 85.24 | 0.66 |
| | 3274.62 | 100.00 | 12949.98 | 100.00 |

Appendix Table 9

**Estimated production and consumption
of Rubber Wood (2000-01)**

| | |
|--|-----------------------------|
| Total production of rubber wood | 1602 ('000 m ³) |
| Production of timber suitable for secondary processing | 329 ('000 m ³) |
| Sector-wise shares in consumption of rubber wood (%) | |
| Packing case | 62.50 |
| Safety matches | 3.00 |
| Plywood | 22.50 |
| Processed wood | 10.00 |
| Others | 2.00 |

Appendix Table 10

**Estimated production of honey,
seed oil and seed cake (2001-02)**

| | |
|---------------------------------|---------|
| Production of honey | 4500 MT |
| Yield/ ha. | 120 Kg |
| Production of rubber seed oil * | 1600 MT |
| Production of rubber seed cake* | 2600 MT |

* Estimates for rubber seed oil and cake are for the year 2000-01