CEARA RUBBER (Manihot glaziovii Muell. Arg.): A DROUGHT RESISTANT TREE FOR SEMI ARID AND MARGINAL AREAS

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The Ceara rubber tree (*Manihot glaziovii* Muell. Arg.), a native of the Brazilian province Ceara, was one of the sources of natural rubber in the early part of the Century. The tree was exploited in Brazil as wild rubber for a long period, even before it was botanically identified.[14] The species was discovered by Dr. glaziovii, a French Botanist, in the neighbourhood of Rio de Janeiro, and was described and named after him by Mueller.

M. glaziovii is a member of the family Euphorbiaceae to which the *Hevea* rubber tree belongs. Though the origin of the genus *Manihot* is in the Ceara Province and the nearly Piaui and Bahia provinces of north-East Brazil, its geographical distribution extends from California Bay up to Peru [15]. The best known species of the genus is *Manihot esculenta*, otherwise known as Cassava or tapioca. Though the earlier investigators, reported that there are 200 species under the genus 12, Rogers and Appan (1970) reported that there are only 98 species under the genus *Manihot*.

The certain regions of the north-east Brazil, to which *Manihot* belongs are characterised by irregular rainfall and very harsh climate. The annual average rainfall of this regions is 600-700mm with the

Ceara Rubber Trees

extremes ranging from 0-1400mm. The altitude goes up to 1000 mm.sl.

Manihot grows well in dry rocky ground, and so can be cultivated in areas unsuitable for most other crops [5]. In the province of Ceara, it is reported that the plant thrives well in semi arid regions and even in granitic rocky areas. The plant resists the driest weather, and when every other form of vegetation is destroyed under the influence of the scorching wind, it thrives and yields generously a profitable quantity of latex [14].

Manihot glaziovii has been introduced to India during 1877-78. It was brought to Kew in 1876 by Robert Cross, and later in 1877 and plants were sent to Singapore, Calcutta and Ceylon. Again in 1878, planting materials were brought from Kew to Madras and Calcutta [15]. The quick growth and easy propagation of Ceara rubber attracted the attention of many. The only literature available on its cultivation in India is the reports appeared in the Bulletin of the Imperial Institute 1. The report contains the analytical results of ceara rubber samples collected from Kallar and Burliar Estates in the Nilgiris.

Certain drawbacks of ceara rubber compared to the advantages of para rubber pushed aside its cultivation and caused gradual disappearance from the scene. Though the plant thrives well, humid climate is unfavourable for rubber production, while under the same climate *Hevea* gives more rubber. The spontaneous coagulation of the latex is another drawback. In this context, it is worth mentioning the opinion of sir Henry Wickham, "the Ceara, named after the Brazilian province of that name, is a tree of quite different character. Its native locality is high, stony, arid and in places almost semi desert, "scrub" covered country. The latex from ceara rubber tree is like that of *Hevea*, and if property cured, the rubber resultant there from is remarkable for its strength and tenacity. In the East it has never,as yet, I think, had justice done by it. It has too often been set out on land, and under rainfall, totally unsuited to it. In Ceylon especially, there are large areas of dry forest lands, which should be admirably adapted to this tree, and considering the high quality of the rubber when well cured, it would surely, better planted out in such districts, closely resembling as thereby do the natural requirements and conditions of this tree, rather than try to plant the *Hevea*, a tree native to the heavy rainfall of the Amazon Valley" [17].

Experimental Tapping of Ceara Rubber Tree

During 1903 to 1912 a considerable quality of ceara rubber had been exported from Brazil. This was mainly due to the attention given to ceara rubber, when the Hevea plantations were badly affected by SALB (South American leaf Blight).

Manihot glaziovii, Muell. Arg. is a tall tree attains a height of 10 to 15 m, with a ramified branches and branchlets. The leaves are palmately lobbed with three lobes, rarely 2-7 lobes of oblong oval shape, glabrous and light green in colour. It produces profuse flowers in about 1 1/2 years. Flowering is usually seen after the prolonged wintering period. Flowering commences by june, after the full refoliation. Flowers are unisexual with the male flowers clustered at the top of the panicle. The fruit is a three lobed globular capsule distinguished by six grooves. The seeds are comparatively small, oval plano-convex about 12-15 mm long and 7-8 mm broad, with a tough, brilliant mottled integument. 100 gm of seeds contains about 175 nos. of fresh seeds. *Manihot* can be propagated through seeds and vegetative cuttings.

A medium size tree of *Manihot* is commonly used in Kerala as a share tree, is known as 'tree cassava' which is hybrid of *M. Glaziovii* and *m. esculenta*.

The tree attains an average girth of about 50 cm within a period of around 4 years. The bark of the mature trunk is covered by a peelable Rhytidome, which is thin and leathery. Beneath the rhytidome, the smooth and soft bark appears which scattered lenticells.

The rhytidome helps the tree to retains moisture in the bark, even during the hottest weather. The bark is sufficiently thick that tapping cut can be done easily. Though the trees were exploited longback, there is no record of a proper tapping system followed for ceara rubber. However it withstands a half spiral alternate daily tapping and gives a quick flow of latex but coagulates within few minutes. The response of the tree to different tapping intensities and stimulation is yet to be studied in detail.

The latex is white, thick with an average drc of 27. For processing, no need of adding acid. Just bulk the latex with sufficient water and keep in a dish for overnight, and the latex coagulates perfectly. Preliminary studies and previous reports. 1,8 showed that the dry rubber is exactly similar to *Hevea* rubber in its properties, except for its slightly higher percentage of resin content.

M. glaziovii gives only a very low quantity of latex per tree per tapping. The earlier report gives an indication that its potential is 415Kg, per hectare per year. Unlike in *Hevea* and Guayule, there are only wild trees in *Manihot*. No high yielding strain is developed through breeding and selection for as vitroplants.

During our exploration to the Mettur forests, we came across wild trees with yield variation from 8gm to 10gm dry rubber per tap. This preliminary survey indicates that there are genetic materials having a potential of around 500kg/h/year. Five hundred kilograms potential exhibited by stray trees growing in a drought affected granitic hill of 3500ft., with scanty rain fall, without undergoing any crop improvement attempts, points to the chances of giving more economic yield if proper crop improvement programmes are attempted.

Besides rubber, the wood also is good for similar use as that of *Hevea*. The seeds contain more than 40% oil, which was once used as fuel for the Brazilian motor vehicles. The leaves of ceara rubber contain 25-30% protein in dry matter, which after the removal of hydrocyanic acid, is considered to be a good cattle fodder [15].

M. glaziovii is now being used in India by the Tuber Crops Scientists as a sources of Cassava Mossaic Virus (CMV) resistance [6,11] and as an alternate host-plant for honey-bee, at the Rubber Research Institute of India [10].

The once discarded guayule (*Parthenium argentatum*) with all its low production potential and cumbersome process of extraction is now gaining attention in USA, with huge research backing 3, as an alternative source of natural rubber. Why not we too have an alternative source for NR? The accidental introduction of a spore of *Microcyclus ulei* (SALB) can easily bring down our rubber production from Hevea plantations 2, 16 to the lowest level. This is evident from the report that the *Hevea* plantations of the Amzon basin, even up to 1978 gave only 250kg/ha due to the infection of SALB [15]. We have not reserved any life support plant to overcome such situations [4].

The xerothermic character of M. glaziovii is well evident from reports and from the experience we had during out exploration. If one could pinpoint the gene responsible for the 'xerothermic' character in such plant species, it may be valuable tool for the genetic engineering in the field of gene transfer technology to synthesise transgenic plants adapted to environmental stress including green house effect 9

The tree needs the immediate attention of the rubber researchers to investigates the possibilities in the following fields:

1. Selection of plus trees from the available semi-wild seedling population located in Tamilnadu.

2. Breeding value of the plant and its multiplication techniques.

3. Suitable tapping method and stimulants.

4. Investigations to overcome the problems of spontaneous coalgulation and low rubber synthesis etc.

5. Testing the selected genotypes in the drought prone marginal lands.

6. Technological properties of rubber.

7. Economic utilisation of the bye-products like wood and seed oil.

The vast stretches of semi-arid barren land with its thousands of starving human population, is waiting for a suitable parasol. It may be rewarding if selected strains of M.glaziovii are planted and evaluated in such locations

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Killer mat for fungus

Malaysia's Kuala Lumpur airport is using a killer welcome mat in a bid to stop fungus which can destroy rubber trees.

Arriving passengers from the American tropics must now pass over a large rubber mat treated with chemicals to disinfect their shoes.

Baggage is also being treated for 15 minutes by fungus-killing ultraviolet rays. These precautions are aimed at stopping South American Leaf Blight, which is rampant in Brazil, from reaching the country.

(Contd. from Page 4)

exploitation. Some efforts in these lines are being taken by the Association of Natural Rubber Producing Countries (ANRPC).

Strict Quality Requirements of Consumers

Importing countries in the West have becoming highly quality conscious and some of the measures appear to be protectionist in nature. Products exported to the USA should meet FDA regulations- and those exported to Europe should conform to ISO 9000 systems of certification. Manufacturers in some of the producing countries have already risen to the occasion and strengthened their quality certification base. India has adopted the ISO 9000 series of standards as IS 14000 series of standards. The Bureau of Indian Standards (BIS) is also helping manufacturers in getting certification under IS 14000/ISO 9000. The expertise available in this area with BIS can be shared by other rubber producing countries also. Very recently some reports of allergic effects of proteins present in natural rubber based products are finding place in specification drafted by some countries. It is surprising to note that products which were successfully used for several decades with the proteins in them are suddenly becoming source for allergic reactions. But producers have to make very effort to supply products as per consumer expectations. When International standards are evolved the producing countries have to adhere to them. They should impress upon the standards body the producer capability. Thus the standards evolved should be a compromise of consumer requirement and producer capability. Very often these are finalised for ideal conditions of consumer requirements.

Need for Scientific Market Assessment

Rubber goods manufacturing industry is comparatively a new activity in many natural rubber producing countries. A study was recently conducted by the ANRPC to evolve strategies for modernising rubber based manufacturing industries in these countries. From the study it become clear that all rubber producing countries together account for only 12 percent of world natural rubber consumption although 85 percent of natural rubber is produced in their territory. So the manufacturers in these countries will have to compete with their counterparts in other areas for successful marketing operations. So, successful producing countries are always associating their manufacturing activities with major multinational product manufacturers. Such collaborations will ensure not only production of articles as per needs of users but also guaranteed market. Producing countries also will have to asses market requirements and changes occurring in markets at various intervals for making modifications in their production operations. Natural rubber producing countries other than India have no good market within their territory for the rubber products. Although free market economy will help all countries to produce goods and market anywere, tariff protection and other trade barriers will exist at various consuming points in different countries. There should be a data bank giving details of trade regulations in different consuming countries.

Rubber industry in natural rubber producing countries has very bright future. Some of the industries in Taiwan and Korea are getting relocated to countries like Thailand, Indonesia and Malaysia. But these small countries were only exporters and had no good market for the products within their territory. The position is different for the major rubber product manufacturers in the USA, Europe and Japan. For them rubber product from other countries are not welcome materials. They cannot also stop their business as is being done by manufacturers in Taiwan or Korea. But the cost of manufacture of products in developed countries is becoming prohibitively high. Table 9 shows the cost of tyre manufacture in the USA.

TABLE 9 COST OF TYRE MANUFACTURE IN THE USA (US $ PER TYRE)

ITEM	CAR TYRE	TRUCK TYRE
Natural Rubber	0.9 (3.4%)	9.5 (6.1%)
Other Inputs	9.3	43.4
Energy	1.0	3.7
Labour	8.4	57.1
Capital Changes	6.9	41.4
Total	26.5	155.1

From the table it is clear that the labour component in cost of production of tyre in developed countries is several times the cost of rubber used in it. So the manufacturers in these countries are eager to shift their fatories to low wage countries. This will be a slow process and the countries who move last in accepting industries thus getting shifted will be benefited. All the rubber producing countries in South-East Asia are eager to welcome industries from the developed world and in that process the multi-national companies are able to extract attractive terms from

the host countries. There are several areas where the rubber producing countries should evolved common strategies for healthy and viable growth of rubber industry in their area.

CONCLUSION

There is a need, on the part of natural rubber producing countries to accelerate the pace of utilizing the wonder raw material, namely natural rubber, for the manufacture of value added rubber products for internal consumption as well as for exports. While aiming for exports it has to be well understood that goods for export must be produced with consistency in quality and in conformity with the international standards and specifications. It has to be borne in mind that exporting is not a causal business and that international markets are not places to get rid of occasional surplus. The enormous wealth of information available on rubber goods manufacture and marketing in different natural rubber producing countries can be pooled for mutual gains. The natural rubber industry had passed through troubles and struggles in the past but had always emerges successful and it will continue to overcome any challenge it may have to encounter through co-operation among the natural rubber producing countries. ●

ANRPC Meeting at Goa.

Smt. J. Lalithambika addressing the delegates Along side is sitting Mr. Sucharit Prom Dej secretary general ANRPC.

The fifth meeting of ANRPC (Association of Natural Rubber Producing Countries) Committee on NR statistics was held at Goa from 18th to 21st August 1993. The aim of the meeting was to exchange the methods adopted in improving NR statistics in different natural rubber producing countries.

Smt. J. Lalithambia IAS Chairman Rubber Board presided over the meeting. Mr. R.G. Unni Joint Director Mr. G. Subbarayalu Deputy Director, Mr. G. Mohana Chandran Asst. Statistican and Mr. Joseph Alexander, Statistical Inspector attended the meeting. Thirteen delegates including Mr. Sucharit Prom Dej, Secretary General of ANRPC also participated in the discussion.

Addressing the delegates Smt. J. Lalithambika explained the primary objective of the ANRPC in bringing Co-ordination in production and marketing of natural rubber in different countries.