CHAPTER 6
SUMMARY AND FUTURE PROSPECTS
6. Summary and future prospects

Natural rubber is one of the most important raw materials of plant origin. Statistics reveal that during 1992 the country's consumption was 414,105 metric tons of NR, while the production was only 393,490 metric tons, creating a gap which demanded import. The only species cultivated for NR is *Hevea brasiliensis*, a tree native to the Amazon rain forests. Scarcity of suitable land and the peculiar agro-climatic preference of the species limits its cultivation. Moreover the crop is being threatened by various diseases and environmental stresses.

Under such a situation, the search for a potential alternative source was carried out and *Manihot glaziovii*, a species belonging to Euphorbiaceae has been sorted out after screening a number of laticiferous species and detailed observations were carried out on its potentialities as an alternative source of NR.

The main reasons for the selection of *M. glaziovii* (Ceara rubber) for this study are its (1) early introduction (1902) and acclimatisation, (2) adaptability to the most harsh drought affected marginal lands, (3) simple and inexpensive cultivation
and maintenance, (4) easy exploitation facility, (5) cis-poly isoprene rubber content in the latex, (6) afforestation and biomass deposits, (7) xerothermic habit and (8) it fulfills the requirements for a 'life support species' for para rubber.

The yield data collected from the ceara rubber trees selected for the study, showed that the intrinsic potential is about 310 kg per hectare per year. This is comparable to the yield of H. brasiliensis of the pre-crop improvement stage of 250 kg per hectare. Rubber yield has increased ten times during the last 35 years. The studies on M. glaziovii reveal that the species is amenable to genetic improvement for various yield contributing factors.

The thermotolerance of M. glaziovii is the most attractive character to propose it for the semi-arid regions. Even under such environment the tree retains life saving moisture and produces latex.

The biomass production of the species through its shoot and leaf shedding habit enriches the degraded soil.

The bark of M. glaziovii is smooth and soft and thereby exploitation can be done easily. The number, density and diameter, etc. of laticifers have
influence on yield and can be improved through breeding.

The waxy analogue of the hard and peelable periderm and flaky rhytidome, large and elongated lenticells, high bark moisture percentage, etc. in *M. glaziovii* are certain important characters revealing its xerothermic habit.

Investigations on the yield influencing factors have revealed that *M. glaziovii* has high plugging of latex vessels, short duration flow, high magnesium content in the latex, lesser number of latex vessels, slightly higher level of non-rubber constituents in the latex etc. These characters show genetic variability and offer scope for genetic improvement.

The species can be propagated both through seeds and by vegetative means. Pests and diseases are comparatively few that it warrants no expensive plant protection operations.

Exploitation of the tree also is comparatively easy, that no mechano-chemical methods are needed. By simple tools latex can be collected.

Rubber obtained from *M. glaziovii* is structurally comparable to the rubber from *H.*
brasiliensis. Appearance of the rubber also is very similar to that of Hevea rubber. The main differences are the higher non-rubber constituents and the consequent influence on properties like modulus, resilience and heat build-up. The rubber does not undergo any significant level of hardening during storage and in this respect it is found to be similar to the viscosity stabilised grades of Hevea rubber. Latex of M. glaziovii is found to undergo coagulation on dilution with water. This could be advantageously used for the production of sheet rubber. In general it is revealed that the rubber from M. glaziovii could very well be used as a substitute for Hevea rubber.

M. glaziovii being a species which thrives well under semi-arid and marginal situation, is particularly important for a country like India. One third of the area in the country is subjected to characteristic features of aridity (Fig. 25) and it is (CAZRI, 1979) estimated that 956,750 sq. km. enjoys semi-arid conditions (Bhandari, 1991). Quite a good portion of this area could be brought under crops specifically adapted to these zones with appropriate package of practices. Even then a substantial portion could be left uncovered. Even if it is assumed that only one percent of this could be brought under ceara...
Fig. 25. Extent of semi arid zones in India
rubber, the extent is enormous being 9,567.5 sq. km or over 9.5 lakh hectares. This is substantial considering that the present area under the para rubber in the country is only just 5 lakh hectares (Rubber Board, 1994).

It is possible that *M. glaziovii* could be bred for improved rubber yields and quality. If this were done using the available genetic resources, ceara rubber could provide a part of the country's rubber requirement, without encroaching the fertile land occupied by other crops or causing any change in the land use pattern.

A major source of hydrocarbon whether it is low molecular weight or high molecular, is petroleum, which is now widely believed to run out within few decades. Exploitation of this source also affects the environment in different ways. So a plant, that produces hydrocarbon warrants immediate attention.

As an alternative source of natural rubber *M. glaziovii* thus holds bright potential in view of its adaptability to semi-arid and marginal situations, easy exploitation, non-cumbersome post harvest technology and immense scope for genetic improvement in yield and yield contributing factors.