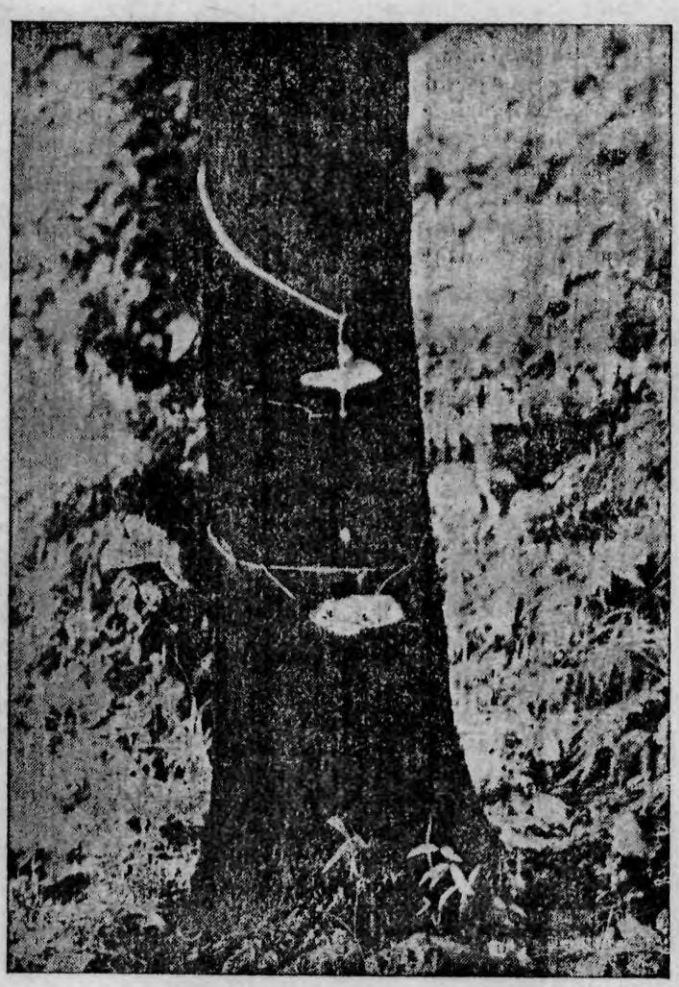
NATURAL RUBBER : CROP IMPROVEMENT IN INDIA

Joseph G. Marathukalam*

Natural rubber is commercially obtained mostly from the para Rubber trees. Thts tree, **Hevea brasiliensis**, is a native of South America. Commercial cultivation of **Hevea** was commenced in our country at the beginning of the present century. However, growth of the rubber plantation industry was very slow both in area and production till the middle of the century (7). Subsequently tremendous progress was achieved in this field. During the period 1950 — '84 annual production of natural rubber increased by more than 11 times while the increase in area was about four fold (3). Production and productivity indices of this crop are the highest among the plantation crops of our country (2). This spectacular growth in production was mainly due to the development and popularisation of improved planting materials of high production potential (6). Since rubber tree is propagated through budgrafts and seeds, attempts were being made to evolve better clones and seed materials. However, more emphasis was given to the former which is the most commonly utilised planting material for the propagation of improved cultivators.

Improvement of clones

Several methods are being adopted for developing improved clones (4). Foremost among them is hybridization involving crossing between desirable clones. Though a large number of clones are available none possesses all the desirable traits to the required extent. The purpose of hybridization is, primarily, to pool all these advantages into the clone which can thus become ideal. Exploitation of hybrid vigour also is achieved through this technique. The methodology followed is to select male and female parent clones having the desired characters and crossing them artificially. The hybrid seeds thus obtained are collected and used for raising seedlings in nurseries. When the plants are about one year old clones are established from them by budding. These clones are planted in the field for small scale experimentation. All the important characters such as yield, vigour, trunk and crown characteristics, resistance to wind and tolerance to diseases are studied for 10-12 years. The promising



A high yielding tree of clone RRII 105

clones are selected for further testing in statistically laid out large scale trials. To assess the response of the clones to varying agroclimatic conditions such trials are taken up in appropriate localities. Clones which are found outstanding in these trials during the initial stages are later tested under commercial conditions. Clones which come out successful from all these three stages of evaluation are declared proven

*Botanist, Rubber Research Institute of India Kottayam 686 009.

clones and released for unrestricted planting. Clones which are found suitable only in a particular locality are recommended for such areas alone.

The second method employed for evolving improved clones is identifyting elite trees which posses desirable attributes and multiplying them vegetatively (5) Seedling populations, by virtue of their genetic diversity, exhibit wide variations in their characters. Those trees which possess desirable characters are selected, marked out and observed for two or three years, to ascertain whether these characters are reliable. If so found they are multiplied by budding and new clones are established from them. These clones in turn are subjected to detailed experimentation as in the case of clones produced by hybridization.

Inducing genetic variations in the existing plants and developing new clones from those which exhibit desirable traits is another method employed in evolving improved planting materials. Genetic changes are brought about by inducing mutations and polyploidy. Mutations are caused either by the application of chemicals like EMS for ionising radiations like Gamma rays. Polyploidy is induced by treating the plants with chemicals such as Colchicine.

As a result of various attempts made a large number of promising clones were evolved indigenously. They are named after the Rubber Research Institute of India (RRII) which developed them. Some of these clones are outstanding for their yield potential and secondary characters. Four of them have been registered with the "International Registration Authority for Hevea cultivars" for distribution among other rubber growing countries. At present major share of the planting in India is being carried out with these clones.

Improved planting materials have been introduced from other rubber growing countries. This is often necessary because developing of new desirable clones is a difficult process of very long duration (about 30 years) requiring very high investment. On the basis of a careful study of the reported characters of all the foreign clones those which appear to be promising are selected and introduced into our country. They are then multiplied and tested to ascertain their performance under the local agroclimatic conditions. While testing them, preliminary trials are often skipped as these are adequately covered in their countries of origin. Only large scale and commercial trials are taken up in different agro-edaphic — climatic conditions. Clones which shows satisfactory performance in these trials are finally released for commercial use.

Improved seeds

Use of seeds for commercial cultivation of rubber is currently restricted to hybrid seeds, popularly known as polyclonal seeds. They are obtained from certain specially designed rubber plantations known as polyclonal seed gardens. These gardens are planted with clones of high production potential and other desirable characters which are usually transmitted to the offspring (1). The clones are planted in such a design that maximum cross pollination occurs among them under natural conditions. Adequate care is taken to prevent pollination by undesirable material from elsewhere. The hybrid seeds, thus obtained, are generally, found to be of superior genetic constitution. Several polyclonal seed gardens have so far been established in our country.

Even though profound improvement has been made in the quality of planting materials used in our country there is still scope for much more progress in this line. On theoretical considerations the yield limit of the crop is estimated to be around 5000/kg/ha/annum (8). It may be recalled that the average productivity in India is only 860 kg/ha during 198[illegible] This emphasises the importance of intensified management efforts aimed at still higher productivity.

References

1. Anonymous 1965. Seed gardens for estates. Plrs' Bull. Rubb. Res. Inst. Malaya 81: 257-260.
2. Anonymous 1983. Indian Rubber Statistics 17. Rubber Board. P. 115.
3. Anonymous 1985. Rubber Growers' Companion, Rubber Board P. 103.
4. Joseph, G. Marattukalam 1977. Methods of preparing improved clones. Rubber 136: 5-7.
5. Joseph, G. Marattukalam, Saraswathyamm, C.K. and George, P. J. 1980. Crop improvement of *Hevea* through ortet selection in India. International rubber conference India 1980 (In Press).
6. Mukundan Menon, P. 1983. Natural Rubber Prod the challenges ahead. National seminor on rubber
7. Nair, C.K.N., Bhaskaran Nair, V.K., Radhakrishna Pillai, P.N George C.M., and Thomas E.V. 1977. Natural Rubber Research in India. Rubber 135: 9-10.
8. Sethuraj, M.R. 1981. Yield components in *Hevea brasiliensis* Theoretical considerations. Plant Cell Environ. 4: 81-83.