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GROWTH AND YIELD PERFORMANCE OF *HEVEA BRASILIENSIS* (CLONE GT 1) UNDER DIFFERENT AGROCLIMATIC CONDITIONS IN THE TRADITIONAL RUBBER GROWING REGIONS OF INDIA**K.U. Thomas, Visalakshi Ammal, V.K. Syamala, K.R. Vijayakumar,
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The present study reports variations in agroclimatic factors, growth, yield, major yield components and a few selected sub components in the distinct agroclimates of the traditional regions.

Five locations selected for initial observations were in Kanyakumari (Southern region), Pathanamthitta, Idukki, Trichur and Calicut (Northern region) districts. In each location one hectare of clone GT 1 planted in 1977 was selected. The soil was lateritic in all the places and the slope of selected plots were comparable. Planting density, mature stand per hectare, cultural practices etc. were also comparable. The tapping system was 1/2S d/2 6d/7 BO-1 panel.

In all locations, observation on yield and major yield components commenced from April 1986. Initial flow rate, total volume and DRC were recorded in 25 randomly selected trees in each plot. Soil and leaf samples were analysed during the initial period of study. Later from 1988 onwards the study was concentrated in Kanyakumari and Calicut regions where maximum difference in yield was noticed between locations. In these locations soil moisture depletion pattern, monthly changes in turgor pressure, solute potential and seasonal changes in latex sugars, thiols etc. were also observed.

Soil and leaf nutrient status did not show significant variation among locations. Though total rainfall in the

southern region was low when compared to northern region, its distribution was more favourable at south. During wet season sun shine hours is significantly lower in the northern region. In Calicut, North East monsoon was comparatively weak, premonsoon showers were less and the mean temperature was high. These agroclimatic conditions lead to higher annual soil moisture depletion in this region.

Highest annual yield was recorded in Kanyakumari and lowest in Calicut. In the remaining regions yield realised were comparable and ranged in between the two extremes. Annual growth increments were comparable in all the places.

Better climatic conditions in the Kanyakumari region results in maintaining higher initial flow rate, total volume, turgor pressure, DRC and higher levels of latex sugars and thiols. Osmotic potential did not show much variation.

Quantitative differences in soil, plant and climatic factors in the southern and northern locations and associated changes in yield and yield components are discussed.

The present study indicate the need for identification of more drought tolerant clones for northern region and also for better soil water conservation measures.

It thus seems possible that these particular gaseous hydrocarbons can be used directly as an effective commercial yield stimulant. The yield increase is so spectacular that the method promises a bright future for the natural rubber industry.

Patent application for this method of stimulating rubber trees and extracting latex is under consideration by the authorities in various countries. The above findings were reported in the patent application in Malaysia dated 3rd February 1990 and subsequently in those made to other countries. While patent application has been granted in some countries, in others it is still awaiting approval.

Subsequent task sized trials of 600 trees being conducted in clones GT 1 and RRIM 600 and which commenced in December 1989 and May 1990 respectively, have resulted in up to date dry rubber yields of 7,585 kg/ha and 5,723 kg/ha in 24 months and 20 months respectively. This translates to about 3,793 kg/ha/annum for GT 1 and 3,439 kg/ha/annum for RRIM 600 respectively with d/7 latex extraction.

Monitoring of physiological parameters relevant to sucrose translocation and its subsequent synthesis into isoprene containing latex in laticifers gives no indication of any detrimental effects arising from the use of Hypodermic Latex Extraction (HLE). The dry rubber content (DRC) of latex samples taken generally varies from 29% to 35%, almost never falling below 28% in our experi-

ments. Sucrose levels in freshly extracted latex generally range between 5 and 15 mm, sometimes higher. The pH of freshly collected latex ranges between 6.7 and 7.1, usually greater than 6.8.

All the above parameter levels, measured to date up to two and a half (2 1/2) years since field trials on the HLE method was first started, are quite optimal for sustained enzymatic synthesis of isoprene *in situ*.

Bark examination of trees under HLE also does not indicate any undesirable effects. Microscopic examination of stimulated bark samples indicate no decrease in the number of healthy latex vessel rings. In many cases, an increase in the number of latex vessel rings was noted.

In addition to increased yields and negligible bark consumption, the HLE method may also be used to derive the following advantages.

- i) no loss of field latex due to rain
- ii) lower labour requirement
- iii) and high purity of field latex

If a suitable latex anti-coagulant is placed in the latex collection container, the latex can be collected 48 h after extraction as pure wet latex, without any cup lumps being present.

Further commercial scale trials with different clones, and with plantings of different ages, soil and climatic conditions are currently in progress.

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RESPONSE OF SEVERAL *HEVEA* CLONES TO PERIODIC TAPPING SYSTEMS

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Periodical tapping system allows to tap the tree for some time and to rest it for another time. This system is arranged according to the farmer's custom and capacity of tree to be exploited with tapping intensity about 100 per cent.

Hevea clone was selected with conventional tapping system. We have not known its response to other tapping system. This trial was aimed to study the response of several recommended *Hevea* clones in Indonesia to periodical tapping system.

This experiment was arranged according to a randomized block design with two factors and four replications. The first factor was five kinds of *hevea* clone (GT 1, AVROS 2037, PR 261, PR 300 and RRIM 600), whilst the second factor was three kinds of tapping system. Those systems were (a) 1/2S d/3 → 1/2 S d/2, (b) 1/2S d/1 5d/7 2m/3, and (c) 1/2S d/1 6d/7 m/2. Each plot consists of 50 trees. Dry rubber production,

girth increment, thickness of renewed bark and dry bark incidence were recorded.

Yield of periodical tapping systems in gram per tree per tapping were comparable with conventional system for GT 1, AVROS 2037 and PR 261; lower for PR 300 but higher for RRIM 600. Total yield during five years of tapping for RRIM 600 is also higher with periodic system. For PR 261, only 1/2S d/1 5d/7 2m/3 has a higher yield.

Girth increment was slightly retarded in periodic systems, especially for PR 300. Growth of renewed bark was not affected, but DRC of latex was slightly lowered. Intensity of dry bark incidence depended on clone susceptibility. PR 261 seem prone to this disease.

From these results it could be concluded that periodic tapping system could be recommended as alternative to the conventional system for GT 1, AVROS 2037 and RRIM 600 clones. RRIM 600 showed the best response to periodic systems.