Control of RNA Level and of RNA Ratios in the Latex of *Hevea brasiliensis* MÜLL. ARG.
Effect of Latex Tapping and of Growth Regulators

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Abstract. The association between latex RNA and latex production was examined using MAK column chromatography techniques. In young untapped trees the introduction of tapping or the treatment of bark with growth regulators resulted in an increase of RNA level and of rRNA/tRNA ratio in the latex. In regularly tapped trees an increase in rRNA but not in tRNA was brought about by increasing the tapping frequency. Treatment with growth regulators had the same effect but essentially only through the related enhancement of latex export from latex vessels. During latex flow, the highest RNA level was registered in latex fractions originating from the most heavily drained areas of bark. Using 32P labeling, evidence was obtained that the export of latex results in an enhancement of rRNA migration into the inner latex containing space of the vessels. This is considered as the reason of the generally observed association of high RNA level and of high rRNA/tRNA ratio with high latex yield. It is proposed that in controlling the RNA level and RNA proportions in the latex an important role is played by changes in turgor pressure associated with the loss of latex which may influence the export of RNA from the nucleus through related induction of pressure disequilibrium between the nucleoplasm and the latex cytoplasm.

The latex of *Hevea* is a specialised fluid cytoplasm (ARCHER et al. 1963, DICKENSON 1965) which is expelled from latex vessels when they are wounded. The level of RNA in the latex was shown to be directly related to latex production. This relationship concerns mainly high molecular weight RNA (rRNA), the proportion of which with respect to low molecular weight RNA (tRNA and 5S RNA) is higher in latex of high-yielding trees than in low yielders (TUPÝ 1969a). An increased ratio of rRNA to tRNA is also reported to be associated with rapidly dividing cells in pea root, soybean callus and *Chlorella* (VANDERHOEF and KEY 1971) and in germinating onion (MELERA 1971). In bacteria, the association of higher proportions of rRNA relative to sRNA with rapidly dividing cells has been known longer (KJELDGAARD and KURLAND 1963). The physiological cause and significance of this general

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relationship are not known. Our present work, the primary aim of which was to investigate the importance of latex RNA for latex production, is related to this problem. Some of the results have already been briefly reported (Tupy 1969b).

Material and Methods

Plant Material

The experimental trees were selected in regular rubber plantations of the clone PR 107. If not otherwise stated, the trees were about 19 years old and they were tapped on a full-spiral on virgin bark twice a week (third-fourth daily frequency). The latex was collected after normal opening of the tapping cut into flasks placed in an ice bath.

Growth Regulators

The butyl ester of 2,4-dichlorophenoxyacetic acid (2,4-D) or the methyl ester of 1-naphtylacetic acid (NAA) were diluted in a carrier of petrolatum grease (Shell Otina Compound C) and palm oil (1:2 w/v). The preparations were applied thinly to a band of bark after scraping of the outer corky bark layer.

RNA Determination

Quantitative determination, isolation and chromatography of latex RNA on MAK columns were as described earlier (Tupy 1969a).

32P Application

The technique of application of 32P on the bark is illustrated and described in Fig. 1. Measurements of radioactivity were carried out in a Packard Tri-Carb model 3320-02 spectrometer. The total radioactivity of latex samples taken for RNA isolation varied between 40 and 120 thousands of counts per minute per ml of latex serum. To eliminate the factor of this variability, correction of measurements of RNA fractions from MAK columns was made on the total radioactivity of latex serum in 60 thousand counts (per minute per ml).

![Fig. 1. Illustration of 32P labeling of latex in latex vessels. At each point of 32P application a hole was bored into the bark by means of an auger until small droplets of latex appeared. In about 15 min the latex was coagulated, the rubber coagulum was removed and 30 μCi (50 μl) of carrier free solution of K2HPO4 was applied in the hole by means of a microsyringe. Then the tapping cut was opened and the latex flowing from the incision was taken per fractions of 20 ml. The distance between two points of 32P application was about 13 cm.](image-url)