



THERMAL BEHAVIOUR OF NATURAL RUBBER FROM NEW CLONES (IAC 300 SERIES)

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Brazilian production of natural rubber (NR) is insufficient for the internal consumption, being necessary the importation of about 60% of the consumed NR¹. The Embrapa Agricultural Instrumentation and Agronomic Institute (IAC) have been improved and evaluated new *Hevea brasiliensis* clones (IAC 300 series) in order to increase the production and quality of the natural rubber more appropriated to the Brazilian soil and climate. The main goal of the genetic improvement program of the *H. brasiliensis* is to develop species which are resistant to diseases, more productive and which can produce high quality rubber. For the industries of the NR the thermal performance is important for the fact to be used temperatures raised in the act to process and to produce products with the vulcanized NR. Thermogravimetric data will provide information on thermal breakdown, mass loss of the material in different stage, threshold temperature, and the nature and the extent of the degradation of the material. The objective of this work was to evaluate and to monitor the thermal performance of three new clones of IAC 300 series (328, 329 and 331) and clone RRIM 600 (control). NR from latex of eight tappings were coagulated with acetic acid solution (10%) and dried for 48 h at 60°C. Thermogravimetric analysis was obtained in a TA instrument model Q500, in the temperature range from 25 °C to 600 °C, at a heating rate of 10 degree/min. in inert atmosphere (N₂), with a flow rate of 40 mL.min⁻¹. Approximately 10mg of each sample were used. Thermogravimetric data, TG-DTG curves of all clones have shown similar behavior, suggesting that the decomposition mechanism is the same. It can be seen that the TG curves have only one large plateau and the DTG curve has one degradation peak, indicating that thermal degradation of the raw natural rubber from the IAC 300 clones and the RRIM 600 is a one-stage reaction, ranging from approximately 300 °C to 450 °C. The samples of NR from the new clones IAC 300 series are quite stable up to 300 °C, below which the small mass loss observed until this temperature can be associated to the elimination of volatile substances. The temperature of the maximum mass loss rate or the peak temperature (Tp) of the DTG curves is around 380 °C. The temperature at which 50% decomposition occurs is generally considered as an index of thermal stability². Results have shown that this temperature is about 380 °C for the NR from IAC 300 clones, as well as for the control, indicating that the new clones have thermal stability comparable well-established to the Malaysian clone (RRIM 600). The NR suffered almost complete decomposition, so that no solid residue remained above 500 °C. At 800 °C, the content of residues was insignificant for all clones, about 0.3 %. Mean values of the temperatures (Ti) and Tp of IAC 300 and RRIM 600 clones did not show significance variation. From tapping 6 to 8, Ti and Tp increased for all clones, indicating that thermal stability rose; IAC 331 clone showed higher Ti than other clones, suggesting higher initial resistance of thermal degradation. The tappings from 6 to 8 were during the maximum productivity of the rubber trees, when the process of the increase in the rubber production is associated to increase in biosynthesis of the proteins, that is shown by an increase in ribosomes polymerization index. The tissues (lactiferous vessels), where occur the biosynthesis of the proteins have high content of poliribosomes. For the latex production, is necessary the synthesis of the proteins in the lactiferous cells and the synthesis of the enzymes which transform the sucrose in the natural rubber³. Therefore, the increases in non-rubber substances such as protein and amino acid that have antioxidant effect leading to an increase of the rubber thermal stability⁴ that was confirmed by the increasing in the technological properties, %N, during the period studied. Natural rubber from new IAC 300 series clones have shown good thermal performance, comparable to the RRIM 600 clone and the period of maximum productivity led to an increase in the thermal stability of the rubbers. The authors would like to express their thanks for the financial support granted by FAPESP, CNPq and CAPES.

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