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## STUDY OF THERMAL STABILITY AND THERMAL DEGRADATION KINETICS OF WHITE AND COLORED COTTON FIBERS BY THERMOGRAVIMETRIC ANALYSIS

Elisângela Corradini (Dr), Eliangela M. Teixeira (Dr), Luiz H. C. Mattoso (Dr)

Embrapa Instrumentação Agropecuária, Address: Rua XV de Novembro, 1452, C.P. 741, 13560-970 São Carlos/SP – Brazil. elisangela@cnpdia.embrapa.br

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Brazilian researchers have used genetic breeding of cotton fibers in order to increase the production and to develop new species more appropriate to Brasil's soil and climate. Furthermore, naturally colored cotton fibers are considered potential eco-friendly materials for textile industries because they avoid the use of synthetic pigments witch in general, contains toxical chemicals such as heavy metals. In this context, some species of colored cotton with different colors were developed by Embrapa Algodão (Paraíba, Brazil), which were denominated according to their relative colors as: beige, brown, green, "safira" and ruby. Beside the use of cotton fibers in textile industries, they have potential for application as reinforcement to polymer composites<sup>1-3</sup>.

The understanding thermal behavior of these fibers is very important because several conventional techniques used in plastic processing industry are in general, carried out in high temperature. In this study, the thermal stability of white cotton fiber and the five colored cotton fibers were compared by thermogravimetriy (TG) and derivative thermogravimetriy (DTG). The TG/DTG curves were carried out under nitrogen atmosphere (60 mL min<sup>-1</sup>), using a platinum crucible, heating rates of 5, 10, 15 and 20°C min<sup>-1</sup> and mass sample of 5.0±1.0 mg, from 25°C to 800°C. The TG data were applied to the Flynn-Wall-Ozawa method to investigate the thermal decomposition kinetics of the different cotton fibers. Figure 1 shows the thermal behavior for the studied fibers at 10°C min<sup>-1</sup> (TG and DTG curves) and physical aspect of the fibers.





White fibers started to decompose at slightly higher temperature than colored fibers. However, between colored fibers, no substantially difference in the temperature at which degradation process begins was observed. The white fiber showed intermediate values in apparent activation energies (E) for main stage of thermal decomposition (250°C to 450 °C) in relation to colored cotton fibers. These differences in the thermal behavior between color and white cotton fibers can be due to the variations in the composition of different types of fibers. The colored cotton fibers have pigmentations due to flavonoids substances<sup>4</sup> and greater lignin and hemicellulose contents than white fibers.

## References

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