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Study of Tinctorial Behaviour of Curaua and Banana Fibres

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INTRODUCTION

The ecological benefits of renewable raw materials are clear: they save valuable resources, are environmentally sound and do not cause health problems. Natural fibres have already established a track record in several different areas such as, civil, automobiles, architecture, medicine among others. Numerous investigations are carried out in order to create added value to natural fibre materials such as the stem of the banana tree that are usually discarded in the environment. Curaua, another important natural substrate, is an Amazon-forest plant (*Ananas erectifolius*) that resembles a pineapple plant. Curaua leaf fibres display a low-production cost and offer a relatively high tensile strength level. Despite these naturals fibres are well established as reinforce in composite materials, the dyeing properties of curaua and banana fibres are not well studied yet.

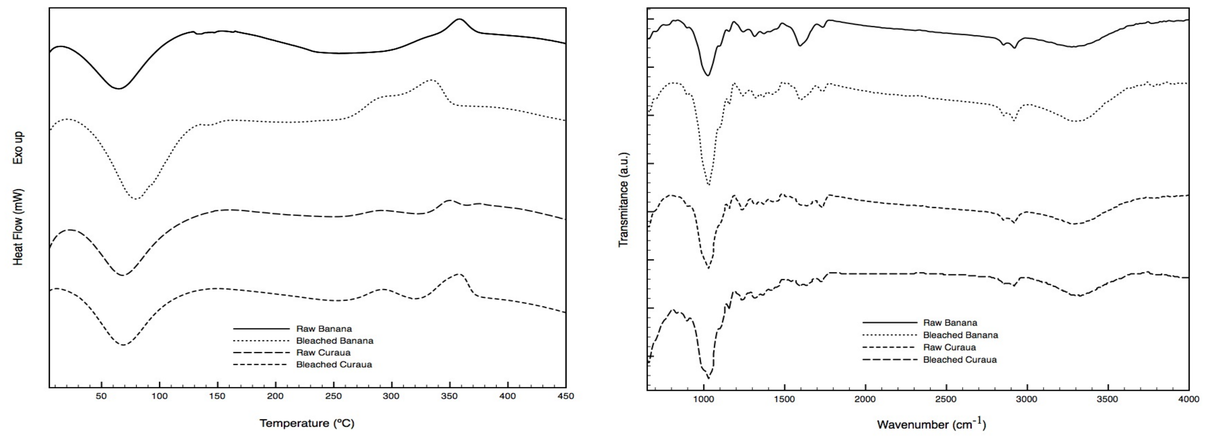
EXPERIMENTAL

Curaua and banana fibres were initially treated by bleaching oxidation method. The dyeing process, using three different Reactive dyes (R.B. Yellow 160, R. Blue 220 and R. Red 198) with concentration of 1%, 2% and 3% o.w.f, was carried out in a laboratorial machine equipped with infra-red heating with a liquor ratio of 1:20. The colour strength (K/S) was studied by using of spectrophotometer machine. The washing fastness was evaluated in accordance to the stipulated in standard ISO 105 C06. Other several techniques were used to characterize the samples, such as: DSC , FTIR and SEM.

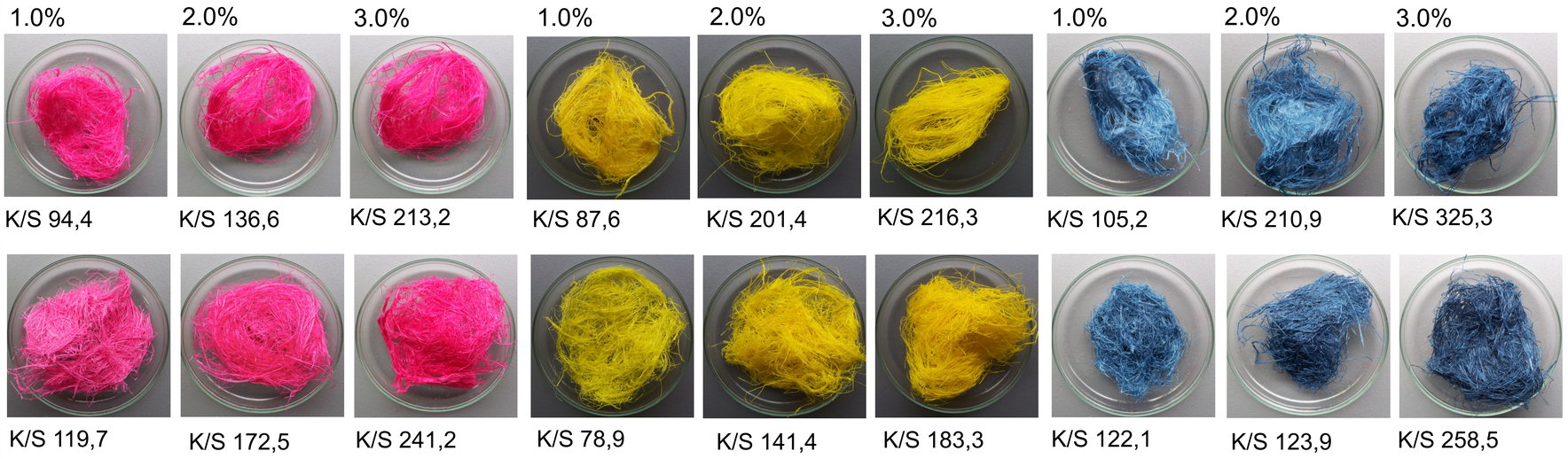
RESULTS AND DISCUSSION

Curaua and banana plants, before fibres extraction.

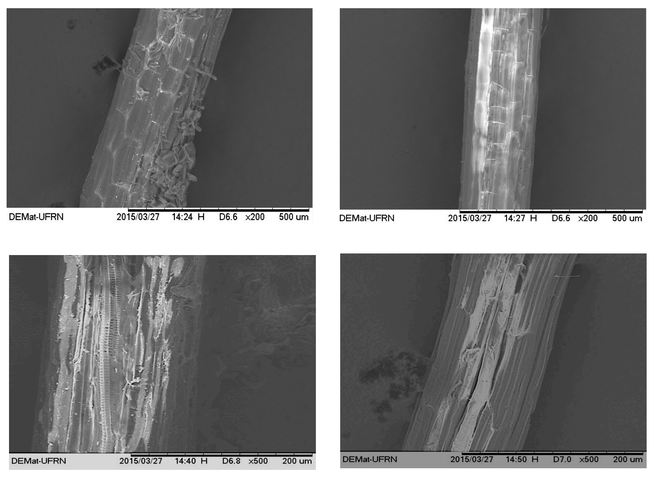
Curaua (above) and banana fibres extracted, before and after bleaching.



DSC, and FTIR results of Curaua and banana fibres before and after bleaching process.



Curaua fibre (above) and Banana fibres dyed with 3 diferent concentrations (1%, 2% and 3% o.w.f) using reactive dyes.



SEM images of banana (above) and curaua (below) fibres before and after bleaching process

CONCLUSIONS

SEM analysis of bleached fibres showed an increase in roughness due to defibrillation. Lignin and hemicellulose present in the fibres-outer surface were dissolved exposing the inner fibrillar surface. DSC analysis showed for all the samples an endothermic peak between 50 and 100 ºC due to the loss of adsorbed/absorbed water and a well-defined exothermic peak at 340-360 °C attributed to decomposition of α-cellulose. Alkali-treated fibres showed a second peak around 290 °C attributed to the degradation of hemicellulose. The FTIR spectra of the studied fibres can be mainly attributed to the main components of cellulose based materials. Alkali pre-treated curaua and banana fibres showed excellent dyeing ability for all the tested dyes. The results of washing fastness was classified as excellent with values between 4/5 and 5 in gray scale for all dyed samples.

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