

**NEW EVIDENCE ON COTTON STICKINESS PART I:
THERMAL AND HYGROSCOPIC PROPERTIES OF
INDIVIDUAL SUGAR PRESENTS ON STICKY COTTON**

**N. Abidi and E. Hequet
International Textile Center
Texas Tech University
Lubbock, TX**

Abstract

In spinning mills the cottons contaminated with stickiness are causing serious problems. The honeydew present on the cotton lint contaminates all the mechanical instruments used in the transformation process from fiber to yarn; i.e., opening, carding, drawing, roving and spinning operations. These contaminants are mainly sugar deposits produced either by the cotton plant itself (physiological sugars) or by feeding insects (entomological sugars), the latter being the most common source of contamination.

The analysis of honeydew from *Aphis gossypii* and *Bemisia tabaci* has shown that the aphid honeydew contains around 40% of melezitose while the white fly honeydew contains 40% of trehalulose plus 17% of melezitose.

In order to elucidate the causes of sticky deposits accumulation on textile equipment, High Performance Liquid Chromatography tests were achieved on fiber and on the sticky deposits collected during the processing of the contaminated cotton. It was shown that among the sugar presents on the contaminated cotton, only trehalulose has the tendency to accumulate.

The accumulation of trehalulose could be related to the changes in the properties of the sugars during fiber processing. This hypothesis is based on the fact that the frictional forces involved in the textile processing lead to a significant increase of the temperature, affecting therefore the sugar properties. Differential Scanning Calorimetry (DSC) profiles were recorded and among the sugars tested, trehalulose is the only one having a low melting point (around 48°C).

In addition, trehalulose is a highly hygroscopic sugar. After passive conditioning of dehydrated trehalulose at 65% relative humidity and 70 °C during 24 hours, the quantity of adsorbed water at equilibrium was about 15% corresponding to 3 molecules of water adsorbed for each molecule of trehalulose.

The combination of low melting point and high hygroscopicity is probably the cause of the selective accumulation of trehalulose on the textile equipment during the processing of cotton contaminated with white fly honeydew.

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