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Sensitivity of the Shirley Developments Ltd. Micromat Tester to Operators and Sample Preparations

Authors: Joseph G. Montalvo, Jr., Sherman E. Faught, and Steven M. Buco
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Protocols were developed to identify operator and preparation effects in the analysis of cotton (*Gossypium hirsutum* L.) samples by the Micromat model of the Shirley Developments Fineness and Maturity Tester. The instrument measures fineness and maturity based on air permeability through a fixed mass of compressed fibers. Differential pressures are the quantities measured, and are related to maturity and fineness by appropriate equations. The specimens are placed manually into the sample chamber so there is the potential for sensitivity to different operators. Mechanically cleaned cottons are analyzed so there is also the potential for sensitivity to different mechanical cleaners. Operator effects lead to random outliers in the data, while preparation effects give rise to persistent biases. Three cottons that span the range of micronaires were analyzed by three operators, and cleaned on six cleaners at four laboratories. There was a negative correlation between operator experience with the instrument and number of outliers. A negative correlation was also found between micronaire and the number of outliers. After removing operator outliers from the data sets, differences in mean values between operators compared with the most experienced operator was $< \pm 2\%$. After correction of operator effects, preparation differences in mean values for the Microdust and Trash Monitor relative to the card were $> \pm 2\%$.