Executive summary

A bale is declared “sticky” if, during a particular processing step, e.g. spinning, its stickiness level disrupts the spinning process, leading to reduced performance of the spinning machines and/or poorer quality final products. To assess stickiness, a reliable and rapid measurement device is necessary, giving results that are well correlated with the efficiency and the breakage incidence in an industrial-scale spinning mill and the quality of the yarn produced. In this study, we put forward production management methodology and draw up a classification for marketing.
It should be mentioned that a classification requires a measuring tool, proper conditions for that tool, and appropriate cotton production organization. Thus, four steps were initiated to evaluate the feasibility of cotton classification for stickiness:

1. It was first necessary to determine whether any measuring devices were efficient in a classification process. Among the tools evaluated, namely Thermodetector SCT, HPLC and H2SD, H2SD seems to be the most adapted to measure stickiness in these classification conditions, since it is predictive of disruptions spinning processes (OE, RS, combed RS), it is fast and does not show an operator effect. However, the thermodetector SCT can still be used at a laboratory scale.

2. During investigations into the extend and variability of stickiness in Sudanese bales, lots, gin areas, we observed:
– A wide range of within-bale, within-lot, within-block and within-gin stickiness. Among the production zones, some production areas in Sudan could be considered as non to slightly sticky.
– The sticky points distribution does fit a agregative statistical distribution law. However, due to the production conditions in Sudan, no specific law could be deduced from the collected data.
– It was thus impossible to deduce any possible level of litigation risk between seller and purchaser.

3. A qualitative classification procedure requires a threshold above which a cotton could be considered as sticky. Thus investigations were conducted into the effect of stickiness on productivity and quality in a spinning process. It was deduced that a unique global threshold to separate non-sticky from sticky cottons for all the processing conditions in any spinning mill in the world cannot be found since knowledge, processing technologies, … are too different. This threshold will have to be negociated for each contract between seller and purchaser Economical incidence should be discussed accordingly.

4. The economical viability of a stickiness classification was studied. This qualitative classification is viable if the stickiness distribution is more centered on low percentage levels of contaminated fibers and if the assumptions we made are proven to be solid.

Two other experiments were designed to ways to reduce the consequences of stickiness.
– Decreasing relative humidity during the spinning process: this improves productivity and quality with a greater improvement in productivity. However, at lower humidities, other problems could appear.
– A binary mix of non-sticky cotton with contaminated cotton: this reduces the level of stickiness for spinning as seen from stickiness measurement on H2SD. The stickiness of a mix was deduced to be the mean of the stickiness levels shown by each constituent weighted by their proportion in the mix, if the sticky cotton has no more than 50 H2SD sticky points.

Combating stickiness requires a global approach where improvements in breeding, agronomy, pest control and technology have to be made in a parallel manner. Classification is one of the tools to combat stickiness. Measurement results through mapping, can help in other ways to reduce stickiness, such as breeding new varieties, developing new ways to manage the crops through integrated pest management programs, managing the seed-cotton flow, etc.

On a long-term basis, the classification tool should be economically viable, and should improve the image of Sudanese cotton.