# Reducing the Impact of Stickiness in Spinning

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## General

Cotton "*Gossypium"* is the major natural textile fibre crop worldwide. Its fibre is spun into yarn and woven into fabric. Historically cotton has been found dated back to 3500 B.C.

Now a days cotton is grown in nearly about 70% to countries in a total area of about 34 million hectares.

China (Main Land), USA, India, Pakistan and Obsekistan, known to be largest cotton producing countries. These five countries are accounted for about 70 %. of the total world production. However, one billion of people rely, in one way or another, on cotton for their living, of these a considerable, personal and workers are accounted for textile sector.

## Demand of Textile Industry

The modern textile industry witnessed recent development in spinning technology, characterized by high speeds, full automation and electronic controls. These require fibre properties of raw material different from those required by the traditional Ring Spinning. In addition to that following points are highly required:-

- Accurate information's about the quality of the raw material length, length distribution, fineness------etc).
- Low seed fragment.
- Contamination's free.

- Stickiness free.

Nevertheless, the stickiness is a limiting factor that affecting production, marketing and spinning sectors and causes considerable economic.

**Causes of stickiness contamination**

Numerous factors were found to be involved in causing cotton stickiness contamination. Honeydew secreted by whitefly and aphids, physiological sugars from plant nectaries, immature fibre and broken seeds. All these factors may directly or indirectly affect-spinning performance in both traditional (Ring Frame) and Rotor Spinning (Open End), hence, increase production costs.

In fact, honey dew deposits on cotton fibre (from whitefly and aphids) is the main source causing stickiness contamination on different parts of the spinning machines (card, rollers, draw, etc.) which causes residues to coat the surface of these parts. However, the sticky deposits known to have the following nature: -

- Hygroscopyic (absorbs water)
- Low melting point.
- The distribution of honeydew is uneven.

During spinning process and different fraction forces take place, as the result the temperature of the mechanical parts increases significantly. So the sugar deposit on lint becomes sticky due to its relatively low melting point and also because of its hygroscopic nature.

**Key factors to eliminate Stickiness in spinning**

There are some factors to eliminate or reducing the negative effects of stickiness in spinning process, these factors are:-

1. Accurate information about the row material ( its level of stickiness, free, light….etc.)
2. Reducing the relative humidity to acceptable level.
3. Mixing sticky with non-sticky.

**Accurate information**

This could be a chivied by testing the raw material (before spinning) using recommended methods and procedure e.g. Thermodetection technique. (SCT-$H_2SD$ ). By testing we can separate sticky cotton from non-sticky cotton. Here we can refer to a project in titled " Improvement of the Marketability of Cotton Produced in Zone Affected by Stickiness" This project was sponsored by the International Cotton Advisory Committee " funded by the " Common Fund of Commodities (CFC), in Sudan and France.

This project made an extraordinary information concerning separating the sticky cotton from the non-sticky. We in Sudan (for example) benefit from the results of this project.

Now we have an objective method, better information for marketing body, our local mill satisfactory from the results. (more information are available in the web site of the (ICAC).

**Reducing relative humidity**

Due to the nature of honeydew (hygroscopic) results indicated that decrease relative humidity known to have positive results, to improve the productivity. In turn some quality problems could appear (increasing of neps).

| ***Temperature(℃)*** | ***Relative humidity*** | | | | |
|---|---|---|---|---|---|
| | ***30*** | ***40*** | ***50*** | ***60*** | ***70*** |
| **22** | 0 | 0 | 0-1 | 1 | 1-2 |
| **25** | 0 | 0 | 1 | 1-2 | 2 |
| **28** | 0 | 0-1 | 1 | 1-2 | 2 |
| **31** | 0-1 | 0-1 | 1-2 | 2 | 2 |

The above table showed that the increase in both relative humidity and temperature has increased the degree of stickiness and could increase the low

potential (light degree) that means the efficiency can be improve by adjusting the relative humidity and temperature.

**Mixing Sticky cotton with non- sticky**

This is to obtain raw material below the critical spinning threshold. Results obtained, indicated that, light stickiness plus 10% - 20% with non-sticky will produced satisfactory quality of yarn. In general, result using $H_2SD$ indicated that mixing reduce the level of stickiness if the sticky cotton less than 50 points.

Problems caused by a medium degree of stickiness can be decreased, to some extent, if such cotton is blended with 40% non-sticky cotton. (*see table below*).

| **Stickiness level** | ***Stickiness degree of blended sample*** | | | |
|---|---|---|---|---|
| | ***Proportion of non-sticky*** | ***50%(R.H)*** | ***60%(R.H)*** | ***65%(R.H)*** |
| **Light(1)** | | | | |
| | 5 | 1 | 1 | 1 |
| | 10 | 0-1 | 1 | 1 |
| | 20 | 0-1 | 1-0 | 0-1 |
| | 30 | 0-1 | 0-1 | 0-1 |
| **Medium(2)** | | | | |
| | 20 | 2 | 2 | 2 |
| | 30 | 1-2 | 2 | 2 |
| | 40 | 1 | 1-2 | 1-2 |
| | 50 | 1 | 1 | 1-2 |
| **Heavy(3)** | | | | |
| | 30 | 2-3 | 2-3 | 3 |
| | 40 | 2 | 2-3 | 2-3 |
| | 50 | 1-2 | 2 | 2-3 |
| | 60 | 1 | 1-2 | 2 |

In general adjusting of temperature, relative humidity and mixing play a very important role in controlling the negative effective of sticking in spinning process.

**Conclusion:-**

Stickiness being a complex problem, its control should therefore be through multi disciplinary approach. Accordingly, switching to cultivars (okra-leaf) less favorable to the pests and more suitable for efficient pesticide (open canopy) is well underway. Hence, factors, which make a cotton variety more prone to whiteflies infestation, are bushiness, hairiness and large leaf area. Also an integrated crop management (ICM) program in which optimum planting density, proper irrigation, fertilization and targeted pest control has been adopted to dispel away the whiteflies