



# FINAL REPORT EXECUTIVE SUMMARY

For Public Release

## Part 1 - Summary Details

---

**CRDC ID:** CMSE1504

**Project Title:** Measuring and Managing Fibre Elongation for the Australian Cotton Industry

**Project Start Date:** 1/1/2015      **Project Completion Date:** 31/12/2016

**Research Program:** 2 Improve cotton farming sustainability and value chain competitiveness

## Part 2 – Contact Details

---

Administrator: Jo Cain

Organisation: CSIRO

Postal Address: Locked Bag 59, 21888 Kamilaroi Hwy, Narrabri, NSW 2390

Ph: 02 67991513      Fax:      E-mail: jo.cain@csiro.au

---

Principal Researcher: Shouren Yang(retired)

Organisation: CSIRO

Postal Address: 75 Pigdons Road, Waurin Ponds, VIC 3216

Supervisor: Stuart Gordon

Organisation: CSIRO

Postal Address: 75 Pigdons Road, Waurin Ponds, VIC 3216

Ph: 03 53464809

---

## Part 4 – Final Report Executive Summary

---

*Provide a one-page summary of your research that is not commercial in confidence, and that can be published on the internet. Explain the main outcomes of the research and provide contact details for more information. It is important that the Executive Summary highlights concisely the key outputs from the project and, when they are adopted, what this will mean to the cotton industry.*

Fibre elongation contributes directly to yarn elongation and toughness, which are important particularly in fine count yarn spinning and realised yarn quality. Despite the importance of fibre elongation its measurement has been neglected by industry. A key reason for this has been the lack of confidence in its measurement by high volume instruments.

It is noted that fibre elongation is currently not measured in USDA, Australian or Commercial Standardization of Instrument Testing of Cotton (CSITC) HVI laboratory check tests, nor is any calibration value provided for USDA HVI calibration cottons. Given the effect of fibre elongation on yarn quality and increasing demand for fibre that performs well in fine count yarn, there is a need to address the measurement and management of elongation for the Australian and international cotton industry.

Over 600 fibre samples were collected and measured in this project. The broad aim was to address issues around the information available on fibre elongation values in Australian cotton. The key findings were:

- Variation in elongation values across 400 of the samples controlled for variety and environment was determined more by environmental factors (65%) than genetic (varietal) (24%) factors.
- Inter-laboratory and inter-instrument variation in elongation values were significantly improved after calibration of two HVI 1000s with USDA calibration cottons of known elongation values.
- Single fibre testing showed that strong cotton has a higher elongation, than weak cotton. Contrary to this, HVI testing, because of fibre bundle interactions, e.g., between fibre length and bundle gauge length, shows the opposite, i.e., strong cotton has a lower elongation.
- Yarn elongation values of finer count yarns (>Ne 50) are ten times more sensitive to changes in fibre elongation than medium count yarns (Ne 40). A 5% change in fibre elongation gives rise to a 0.3% change in yarn elongation for Ne 40 yarns but a 3.3% change for Ne 50 and 60 yarns.
- Fibre length also had a strong effect on yarn elongation but this was similarly applicable to Ne 40, 50 and 60 counts alike. A 5% change in UHML resulted in a 1.5% (Ne 40) and 1.6% (Ne 50) change in yarn elongation.
- The relationship between micronaire and yarn elongation was negative. Finer, higher surface area fibre, i.e., low micronaire fibre, giving higher yarn elongation values. A 5% decrease in micronaire, increased yarn elongation by 1.4% (Ne 40). Similar changes were found for Ne 50 and 60 count yarns.
- Fibre breakage in lint cleaning is not affected by high or low elongation values.

Further work is required to investigate the relationship between fibre elongation, cellulose structure and environmental effects. Specifically, causal agents in the environment need to be surveyed and investigated.

Further work is also required to determine the most accurate criteria for selecting varieties (and growing environment) on the basis of elongation.