FACT SHEET THE DYEABILITY OF AUSTRALIAN COTTON

Dye uptake is a key factor in the production of cotton fabrics for apparel and homewares with recently updated research showing Australian cotton performs better in this aspect than most other cotton origins. This research confirms anecdotal feedback collected over many years from spinning mills and dyehouses that Australian cotton produces more vibrant and consistent colouration than cotton from other origins.

The Australian cotton industry, through the Cotton Research and Development Corporation, has invested in research and development to better understand the factors affecting Australian cotton's dyeability since 1992, particularly in relation to those that can be managed at farm level.

In summary, this research found:

- > Dyeing is influenced by complex chemical and physical interactions between the dyestuff, the dyebath and the substrate (the cotton fibre) These factors can contribute to shade variation and they must be carefully managed to ensure the repeatability of colour shades between yarn and textile batches.
- > The most important fibre properties in relation to cotton's dyed fabric appearance are its micronaire (the fineness and maturity of the fibre) and its colour, and the consistency of these two properties in the raw cotton delivered to a mill.
- > Micronaire can also be related to neps, which are small fibre entanglements that occur in all ginned cotton. The propensity for neps to form is largely dependent on the micronaire, or maturity of the cotton and the mechanical action it receives in the gin. Because neps contain immature fibres they do not take-up, or take-up less dye and appear as white or lighter shaded 'pills' in dyed fabric. The more mature the cotton, the less neppy and more even and brighter the dye uptake.

- > In terms of colour, whiter, brighter cotton is better for dyeing and final fabric appearance. At farm level, discolouration of cotton can arise from numerous causes. For example, rain during picking time facilitates fungal growth in the seed-cotton, which can affect the final colour grade of the classed fibre. 'Grey' or Strict Low Middling (SLM) cotton is often rain affected, with fungal growth on the fibre affecting the dyeing ability of the yarn and/or fabric from that cotton.
- > The natural wax content of the cotton fibre also contributes to dye uptake, especially if it's not properly removed by scouring or bleaching before dyeing. Low-micronaire cotton often has an increased wax content, which can affect scouring efficiency before dyeing, and lead to dye uptake variation.

AUSTRALIAN COTTON:

- \checkmark Less prone to fabric pilling
- ✓ Strong and long fibre with a thick cell wall capable of taking up more dye
- \checkmark Exceeds brightness scale
- Very low levels of dust and trash, resulting in high reflectance



Discolouration can arise from numerous causes, for example rain during pick time.

HIGHER QUALITY COTTON'S PRODUCE BETTER DYE RESULTS

Australia's cotton growers consistently produce some of the highest quality Upland cotton in the world. Australian cotton is contamination-free and whiter, longer and stronger than most other cottons in the world. Our farmers work hard to maximise the quality of the fibre from the moment the seed is planted, to the way it's cared for while it grows and at picking time. They use state-of-the-art harvesting and ginning technology to preserve fibre quality. Australian cotton is wrapped in cotton fabric for shipping to avoid contamination. All of these factors contribute to the superior dyeability of Australian cotton including better dye uptake, brighter colour and less pilling.





Research in 2016 conducted by Australia's leading science agency, the CSIRO showed Australian cotton had better dye uptake than equivalent cottons from other cotton export countries, and dyed consistently brighter shades. This research was updated with an additional trial in 2019 that compared Australian cotton against six other cotton exporting countries: India, Brazil, China, West Africa, Uzbekistan and the United States.

Bales of Middling grade cotton with base grade length and microniare values were sourced from each of these countries and supplied to CSIRO by the Australian Cotton Shippers Association. Each bale was spun at CSIRO's industry-scale pilot spinning mill into carded and combed medium-fine count yarn for evaluation.

The research concluded:

- 1. Australian cotton fibre, yarns and fabric were overall superior in quality.
- Australian cotton was whiter (brighter) and produced cleaner, stronger and more even yarn.
- These properties translated into brighter, cleaner fabrics with more even colour uptake and better pilling resistance when compared to cotton from the other countries.

According to lead researcher Dr Stuart Gordon, Australian cotton performed the best in terms of its cumulative ranking of fibre properties, despite other countries samples sometimes having better individual results.

"Australian cotton really dominated because it had slightly better length, strength and fineness in combination compared to the other cottons. Yarn quality and the resulting dye uptake is determined by how all of these factors integrate," Dr Gordon said.



MORE INFORMATION www.australiacotton.com.au cotton2market@cotton.org.au





DYED (BLUE) FABRIC COLOUR (CIELAB)

