

# Contamination in Australian cotton

By Marinus H. J. van der Sluijs, Cotton Textile Research Unit, CSIRO Textile and Fibre Technology

Contamination, even if it is a single foreign fibre, can lead to the downgrading of yarn, fabric or garments or even the total rejection of an entire batch and can cause irreparable harm to the relationship between growers, ginners, merchants and textile and clothing mills. An ITMF study in 2001 reported that claims due to contamination amounted to between 1.4 and 3.2 per cent of total sales of cotton and cotton blended yarns.

Most contamination arises from impurities being incorporated into the bale as a result of human interaction during harvesting, ginning and baling. Contamination represents a significant cost to spinning mills and this has led them to implement a range of costly methods to cope with contamination.

The installation of foreign matter detectors has cost the spinning industry over \$US150 million over the past 10 to 12

years and these detectors inspect approximately 30–35 per cent of global cotton consumption.

Detection methods reduce the risk of claims due to contamination but do not guarantee that the yarn or fabric produced will be 100 per cent free of foreign matter. And there are no international standards for acceptable levels and size of contaminants in fabrics.

## ITMF Contamination Survey

The International Textile Manufacturers Federation (ITMF) has surveyed cotton users (spinners) on the amount of contamination found in world growths every two years since 1989. Spinners are asked to rate the degree of contamination in cotton lint according to 16 categories of foreign materials.

The degree of serious or moderate contamination in all growths steadily increased from 14 per cent in 1989 to 26 per cent in 2003, although it decreased in 2005 to 22 per cent.

The major source of contamination continues to be organic matter such as leaves, feathers, paper, leather, etc. The next most prevalent contaminant is fabrics and string made from cotton, woven plastic, plastic film and jute/hessian. There has been a general reduction in the incidence of oily substances/chemicals and inorganic matter since 1989.

## Australian cotton

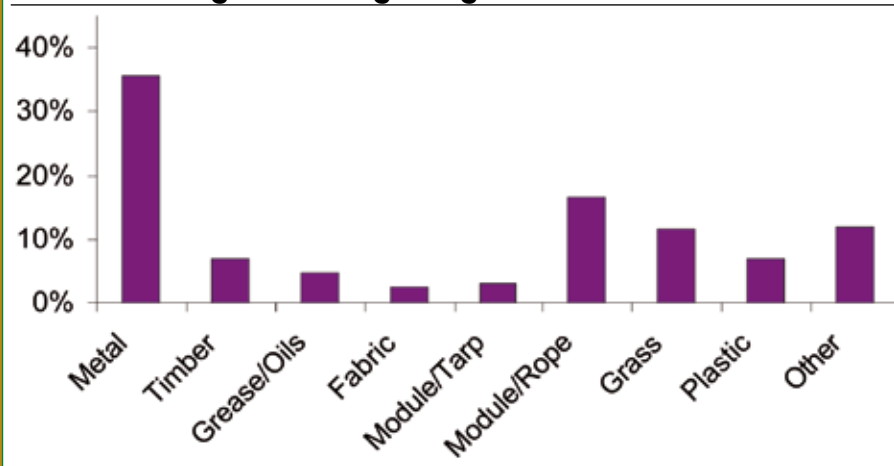
A survey conducted by CSIRO Textile and Fibre Technology (CTFT) of mills that use Australian cotton, indicated that although contamination has been rated as one of the most favourable properties of Australian cotton, there were concerns that some contaminants are increasing. This supports the results of the ITMF contamination survey, which show that, as is the case world wide, contamination of Australian cotton is also on the increase — from five per cent in 1989 to 13 per cent in 2003 and the same level in 2005.

## Measuring contamination in Australian cotton

The aims of a project entitled 'Measuring contamination in Australian cotton', sponsored by the CCC CRC and CSIRO are to:

- Survey local ginners to determine the

**FIGURE 1: Breakdown of types of contamination found in modules during the 2006 ginning season**



Contaminants collected at gins during the 2006 harvest season. (Photo courtesy of Mike Kimball)

degree and type of contamination found in modules delivered to the gin yards. A survey of this kind has not been conducted before and is needed to get a complete understanding of the magnitude of foreign matter in Australian cotton and a better sense of how contamination events occur in the field and gin.

- Cooperate with a large overseas spinning mill (Apac Inti Corpora) that uses a sizeable proportion of Australian cotton in its mill laydowns — to accurately assess the extent and amount of contamination being sent in Australian cotton bales.
- Brief growers and ginning companies on survey outcomes and together identify and prioritise actions to minimise or eradicate contamination.
- Include contamination prevention in Best Management Practice (BMP) for growers and ginners.

### Contaminants in modules

During the 2006 ginning season members of the Australian Cotton Ginners Association recorded information on contaminants collected at gins. Information was collected from 23 gins that processed 81,121 modules during 2006. A total of 350 contaminant events were recorded — Figure 1 shows a breakdown of contaminants found in modules. The incidences of rocks were not recorded, although they are also one of the major contaminants found in modules.

The majority of contaminants were metallic pieces from harvesters, module builders and from transportation of modules to the gins. This was followed by module



**Manual removal of contaminants from cotton before release to spinning mill.**  
(Photo courtesy Apac Inti)

ropes and covers and a category 'other', which included items such as mobile phones, shotgun shells, beer cans, oil cans, two-way radios, hats and rubber mats.

The gins also recorded costs and downtime due to contaminants. The cost for damage caused by contaminants (fires and breakages) was \$46,420 and resulted in 76 hours of downtime. It is hoped that more gins will participate during the 2007 ginning season with improved accuracy of recording of contaminants and losses due to contaminants.

### P.T. Apac Inti Corpora

Apac Inti Corpora is a large cotton spinning mill situated near the central Javanese city of Semarang in Indonesia. A unique process is performed at this mill — every bale of cotton is manually inspected before processing and any contaminants, even single human hairs, are removed and collated. This allows for a direct measurement by weight and by type of contaminants exported with Australian cotton.

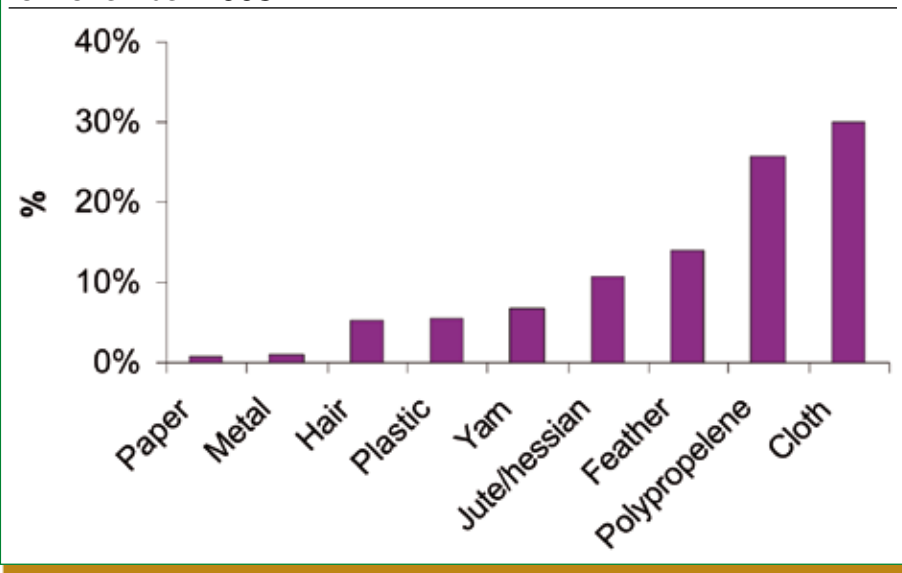
Since 2000 Apac Inti has cleaned (decontaminated) some 200,000 tonnes of cotton sourced from around the world and has generated a large and accurate database on the levels of contaminants found in a wide range of growths. In 2004–05, 20 per cent of Australian cotton bales delivered to the mill had some contamination — up from 14 per cent in 1999–00.

A single foreign fibre constitutes a contaminated bale. For the same period Apac Inti found that 23 per cent of Chinese, 27 per cent of Brazilian, 28–32 per cent of US and 66 per cent of West African cotton bales were contaminated.

Apac Inti has sent the details to CTFT along with the actual contaminants removed from three shipments (2662 tonnes) of Australian cotton into its mill from December 2005. Further analysis of the contaminants has involved identifying the exact chemical composition of the contaminants with a view to accurately identifying their source. The total weight

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**FIGURE 2: Breakdown of types of contamination found in Australian cotton shipments to Apac Inti from December 2005 to November 2006**



of contaminants amounted to 395 grams or 1.9 grams per ton. Although the level of contamination found in Australian cotton is the lowest of all growths imported by Apac Inti, there has been an increase from 1.4 grams per ton in 1999–00 to 1.9 grams per ton in 2004–05, while contaminants found in our major competitors such as Brazil and some growths from the US have decreased over the same period (see Table 1).

**TABLE 1: Contaminants by country in grams per ton found in bales shipped to Apac Inti**

Country	1999–00 grams/tonne	2004–05 grams/tonne
Australia	1.4	1.9
China	2.2	3.0
Brazil	3.2	2.7
US	2.8	2.0

Figure 2 shows the breakdown of the contaminants found in all of the shipments. The largest contaminants found in bales delivered were pieces of cloth from either rags or clothing made from either cotton or polyester or blends thereof. This was followed by polypropylene yarn in various colours, bird feathers, jute/hessian yarn, yarn made from either cotton or polyester or blends thereof, plastics (low and high density polyethylene including shopping bag, lolly paper and garbage bag frag-



**Contaminants collected by Apac Inti for three consignments of Australian cotton since December 2005. (Photo courtesy of CSIRO Textile and Fibre Technology)**

ments), human hair, metallic pieces (such as nuts, bolts and wire) and paper from newsprint and notepads.

Considering that the majority of Australian cotton is processed through two lint cleaners it is surprising that a large amount of vegetable plant material, mainly from stems and branches is still present in bales delivered to Apac Inti. There is also a large amount of stained cotton present in the bales — most likely due to moisture. The

data also suggests that jute/hessian is not such an issue if bale coverings are removed with care.

**TO SUM UP...**

At stake is Australian cotton’s low contamination reputation and the danger is that spinners may switch to purchasing cotton elsewhere — from countries that can guarantee 100 per cent contaminant-free cotton. Worse still, they may switch to producing yarns made from man-made fibres.

Although the amount of foreign matter found in Australian cotton bales is small relative to other growths, any contamination can lead to quality and production problems. During yarn formation, cotton is processed through a large number of machines which can lead to further disintegration of the contaminants which will subsequently lead to quality and production issues.

Further information will be collected and used to produce guidelines for Best Management Practices (BMP) to reduce and possibly eliminate foreign matter from modules delivered to the gin yard and bales delivered to the spinner.

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**Yarn clearer to remove foreign matter from yarn in winding and open end spinning. (Photo courtesy of CSIRO Textile and Fibre Technology)**