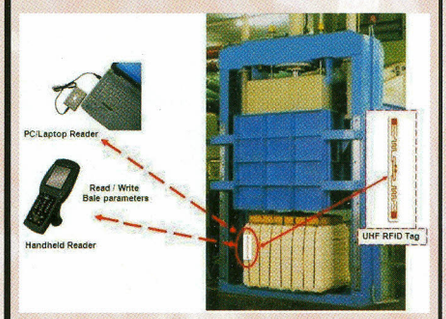
CIRCOT Leaflet No.71

# Cotton Bale Tagging Using Barcode and RFID Technologies

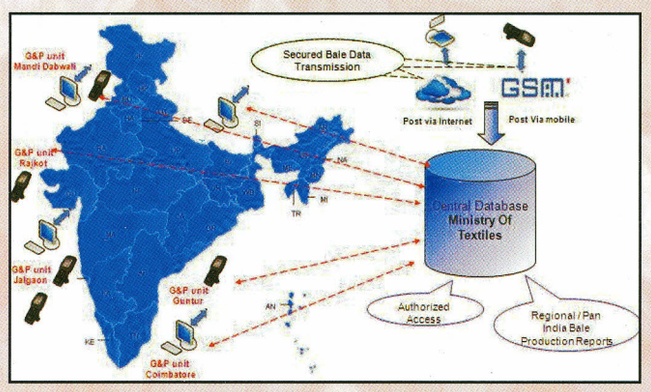
## A Unique Identification System for Management of Cotton Bales at Ginneries and Trade

### Barcoded Cotton Bale Labelling


### RFID Tagging of Cotton Bales




### Centralized Bale Information Storage and Access Across India




**Central Institute for Research on Cotton Technology**
(Indian Council of Agricultural Research)
Adenwala Road, Matunga
Mumbai - 400 019

## Introduction

The cotton industry worldwide has rapidly adopted improvements in information technology such as high volume instrumentation (HVI) quality testing, electronic warehouse receipts and barcode-based permanent bale identification systems. HVI data for every bale is a prerequisite as it greatly reduces risks related to unexpected reductions in mill and product performance.

In India about 347 lakh bales of cotton are produced last year in more than 4000 ginneries. A ginnery processes about five thousand to one lakh bales in a year depending on its size. Manual method of bale marking and record keeping is followed in India which is very tedious and cumbersome work. Fibre quality is likely to be affected due to spreading of ink used for bale marking. Also after prolonged storage, readability of markings on bales becomes difficult due to ink fading. Further marking of fibre quality parameter on bale is not practiced in India because of limitations of manual bale marking method. Ginners have started adopting printed bale labels but a uniform practice need to be enforced for streamlining bale management and trading in the country as per requirement worldwide.

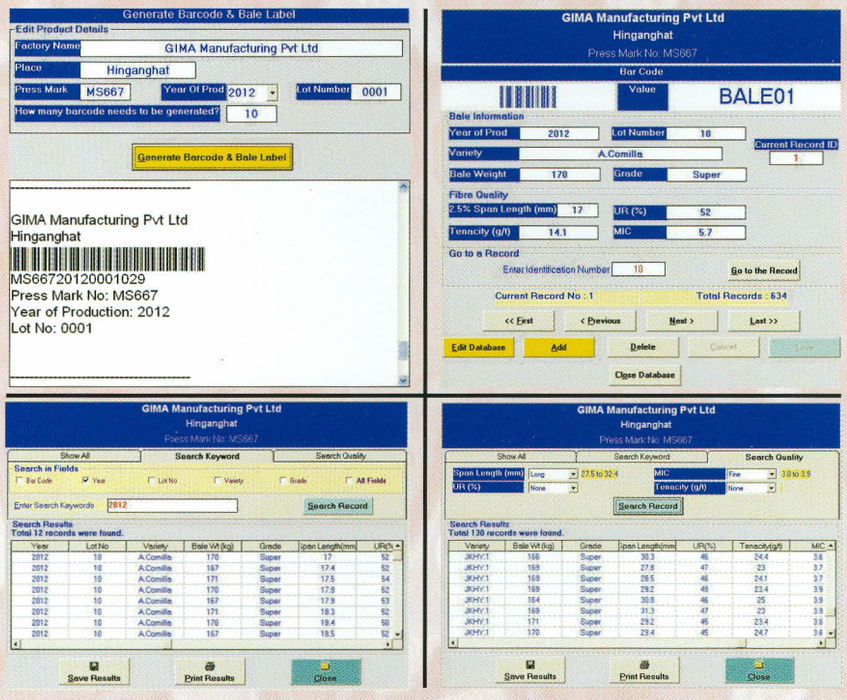
To overcome these lacunae and to have co-ordination among supplier and buyer while trading of bales – A cotton bale tagging system has been developed using Barcode and RFID technologies.

## Barcoded Bale Label Generation

A software 'Cotton Bale Manager' has been developed to generate unique barcoded labels for cotton bales which is integrated with bale production information along with its fibre properties. User can generate a sequence of customized labels with 16 bit barcoded bale ID. Each bale label includes information on factory name, press mark number, year of

production, lot number and barcoded bale ID. User can edit, save, and print designed labels along with search facility to access information on previously designed labels. Barcoded tags could be easily affixed over the bales. Cotton Bale Manager also assists in computerized management of bale information viz. grade, variety, bale weight, fibre length, micronaire, tenacity, uniformity ratio etc.

A fully functional query based database has been integrated with bale information for easy retrieval of vital information. The barcoded labels of 100 x 75 mm size were prepared with plastic stickers. Application of 'Cotton Bale Manager' for generation of barcoded labels would be a better alternative to conventional bale marking system and it would aid in record keeping of bales at ginnery and for efficient marketing of bales in domestic and export market.




Cotton Bale Manager Software for Barcoded Bale Label Generation and Bale Database Management

## RFID Cotton Bale Tagging

Cotton Bale Manager assists G&P units for record keeping of bale information and sharing the same while bale trading. Barcoding is a cheapest identification system but has its own limitations. It is not remotely accessible and its readability is affected by dust. Given application has been enhanced by implementing RFID tags in addition to barcoded labels. RFID has remote accessibility, readability not impaired by dust, information can be written / read from a distance of few centimetres to 8 meters.

## RFID Bale Tagging System requires

- UHF Radio frequency tags
- UHF Desktop readers/writers
- Desktop software for Ginners
- Server software for central logging of bale data and thereby enabling pairing of information

## Features

Mechanism to uniquely identify and track cotton bales will have

❖ A unique RFID tag attached to each bale during the packing operation after a bale is pressed.

❖ RFID software and RFID reader and writer hardware will make available the following tag parameters:

➢ Mandatory Parameters :
Mandatory parameters (Press mark No, Year of manufacture, Lot number, Bale number and Weight) will be written during the tagging of bale.

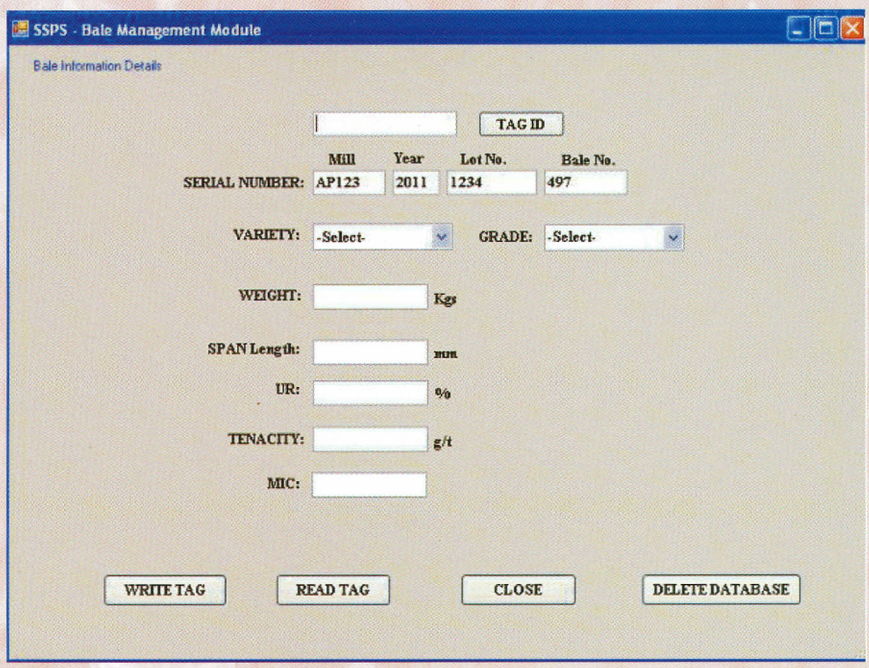
- Optional Quality Parameters :
  Optional parameters (Grade, Variety, Fibre Length, Micronaire, %UR, Trash and Moisture) can be updated at the online centralized database by G & P units after the bale is tagged and dispatched.

- The centralized online database of bales produced in the country will be made available for statistical analysis. Authorized access mechanism will be provided to obtain reports such as "Total number of bales produced in given year" and "Bales produced in a particular region" etc. The centralized online database consists of all confirmed entries made by individual ginners using RFID hardware and software system provided for bale tagging application.

## Benefits of RFID Bale Tagging and Management

Bale tagging and tracking is not yet practiced by the cotton industry in India. This is to initiate the standard bale tagging practices followed in other leading cotton-producing countries. Mills randomly draw samples and check fibre qualities of few bales from a lot. HVI data for every bale is a prerequisite as it greatly reduces risks related to unexpected reductions in mill and product performance. Hence implementing trading of bales with fibre quality information will be very much useful to its end users. Also it is difficult to draw accurate figure on the total bale production in the country. Implementing bale tagging and centralized online record keeping will ease bale transactions and assist in organizing bale production information. It will give first hand information to the policy making authority of the country.

# RFID Tagging and Record Keeping of Bale Information at G & P Units




| Tag_Id | Year | Mill | LotNo | BaleNo | Variety | Weight | Grade | SpanLength | UR | MIC | Tenacity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 49573B43 | 2011 | AP123 | 1234 | 284 | BRAHMA | 170.00 | Super | 32.00 | 43 | 4.00 | 27.20 |
| A717F643 | 2011 | AP123 | 1234 | 299 | A.Comilla | 171.00 | Super | 32.50 | 44 | 3.90 | 22.00 |
| 700FAB2B | 2011 | AP123 | 1234 | 290 | A.Comilla | 156.00 | Super | 23.00 | 47 | 3.00 | 25.00 |
| B4CB2683 | 2011 | AP123 | 1234 | 303 | DCH32 | 170.00 | FAQ | 32.20 | 47 | 3.30 | 23.00 |
| 7409CF9B | 2011 | AP123 | 1234 | 297 | DCH32 | 171.00 | Fair | 32.40 | 47 | 4.10 | 23.10 |
| 740740BB | 2011 | AP123 | 1234 | 294 | BANNI | 171.00 | FAQ | 32.40 | 47 | 4.40 | 23.50 |
| 7405B61B | 2011 | AP123 | 1234 | 293 | AKH4 | 170.55 | Fair | 31.10 | 44 | 3.90 | 26.40 |
| 7409A52B | 2011 | AP123 | 1234 | 296 | BRAHMA | 170.00 | Fair | 29.40 | 42 | 4.70 | 26.80 |
| 7409A24B | 2011 | AP123 | 1234 | 295 | AGETI | 170.00 | FAQ | 30.00 | 41 | 4.00 | 26.00 |
| 5E88A37B | 2011 | AP123 | 1234 | 288 | BRAHMA | 171.22 | Kawadi | 32.00 | 42 | 6.00 | 24.00 |
| 70149EFB | 2011 | AP123 | 1234 | 292 | AKH4 | 170.98 | Fair | 30.00 | 44 | 4.00 | 28.00 |
| 701308CB | 2011 | AP123 | 1234 | 291 | AKH4 | 172.00 | Fair | 31.10 | 42 | 4.00 | 26.00 |
| B4CBD2... | 2011 | AP123 | 1234 | 304 | AKH4 | 171.00 | Fair | 20.10 | 46 | 5.00 | 20.10 |
| A5BC4326 | 2011 | AP123 | 1234 | 298 | A.Comilla | 165.50 | Super | 22.20 | 44 | 4.50 | 22.50 |
| B4537DC5 | 2011 | AP123 | 1234 | 302 | A.Comilla | 169.20 | Fair | 21.50 | 43 | 4.25 | 22.70 |
| C34567A6 | 2011 | AP123 | 1234 | 305 | A.Comilla | 166.30 | Kawadi | 24.50 | 43 | 5.00 | 22.90 |
| 53421AB4 | 2011 | AP123 | 1234 | 285 | A.Comilla | 169.45 | Kawadi | 23.75 | 42 | 3.95 | 23.10 |
| 2678CA42 | 2011 | AP123 | 1234 | 277 | A.Comilla | 167.60 | Super | 24.57 | 46 | 4.25 | 24.20 |
| 42367BC0 | 2011 | AP123 | 1234 | 282 | BRAHMA | 170.20 | Super | 25.20 | 44 | 4.15 | 22.25 |
| 6543ECA7 | 2011 | Ap123 | 1234 | 289 | BRAHMA | 168.40 | Fair | 26.75 | 43 | 5.15 | 23.45 |
| 5E88A37B | 2011 | AP123 | 1234 | 287 | A.Comilla | 165.00 | Super | 23.00 | 47 | 6.10 | 22.00 |

# Online Login and Search for Cotton Bale Production and Availability

**Search Criteria**

Mill AP123 Tag Id Year Lot Number

Variety DCH32 Grade ALL Span Length(mm) None UR(%) None Tenacity(g/t) None

Search results

| SerialNo | Tag Id | Mill | Year | LotNo | BaleNo | Variety | Weight | Grade | SpanLength | UR | MIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 491 | 197AC140 | AP123 | 2011 | 1234 | 496 | DCH32 | 170.40 | FAQ | 23.50 | 43 | 4.25 |
| 490 | A978C140 | AP123 | 2011 | 1234 | 495 | DCH32 | 167.60 | Super | 24.57 | 46 | 4.25 |
| 489 | 1A421AC4 | AP123 | 2011 | 1234 | 494 | DCH32 | 169.45 | Kawadi | 23.75 | 40 | 3.95 |
| 488 | 2610CA42 | AP123 | 2011 | 1234 | 493 | DCH32 | 171.60 | Super | 24.57 | 46 | 4.25 |
| 487 | 53001AB4 | AP123 | 2011 | 1234 | 492 | DCH32 | 169.45 | Kawadi | 23.75 | 42 | 3.95 |
| 486 | C345B1A6 | AP123 | 2011 | 1234 | 491 | DCH32 | 170.30 | FAQ | 24.50 | 43 | 5.10 |
| 485 | B4512DC5 | AP123 | 2011 | 1234 | 490 | DCH32 | 168.20 | Fair | 21.60 | 41 | 4.25 |
| 426 | 469BD56B | AP123 | 2011 | 1234 | 431 | DCH32 | 169.10 | Super | 27.15 | 46 | 3.10 |
| 425 | 457AD56A | AP123 | 2011 | 1234 | 430 | DCH32 | 170.80 | Super | 27.25 | 45 | 3.00 |
| 424 | 447CD34A | AP123 | 2011 | 1234 | 429 | DCH32 | 169.25 | Super | 33.00 | 48 | 2.90 |
| 423 | 4367AD91 | AP123 | 2011 | 1234 | 428 | DCH32 | 170.10 | FAQ | 27.25 | 42 | 5.20 |
| 422 | 4262CD90 | AP123 | 2011 | 1234 | 427 | DCH32 | 171.50 | Fair | 26.25 | 45 | 4.20 |
| 421 | 4167CD36 | AP123 | 2011 | 1234 | 426 | DCH32 | 168.60 | Super | 27.45 | 46 | 5.10 |
| 420 | 407ACD51 | AP123 | 2011 | 1234 | 425 | DCH32 | 170.20 | Kawadi | 27.25 | 43 | 5.00 |
| 419 | 56A7CD54 | AP123 | 2011 | 1234 | 424 | DCH32 | 169.20 | FAQ | 28.25 | 44 | 4.00 |
| 418 | 576ACD87 | AP123 | 2011 | 1234 | 423 | DCH32 | 170.70 | Fair | 27.25 | 46 | 3.00 |

***Developed in collaboration with***

**Sai Surya Professional Services,**
Suite 408, HUDA - Maitrivanam, Ameerpet,
Hyderabad - 500 038, India.
Ph: +91-040-39183681; Fax: +91-040-39183680
Email: info@saisurya.net; sailesh@saisurya.net
Website: www.saisurya.net

---

**Published by:**
Dr. S. K. Chattopadhyay
Director (Acting), CIRCOT, Mumbai

---

**Compiled by:**
Dr. Jyoti Nath, Scientist (Sr. Scale), GTC of CIRCOT, Nagpur.
Er. V.G. Arude, Scientist (Sr. Scale), CIRCOT, Mumbai.
Dr. S. K. Shukla, Scientist (Sr. Scale) & Officer In-charge,
GTC of CIRCOT, Nagpur.

---

**Edited by:**
Dr. P. G. Patil, Principal Scientist & Head TOTD,
CIRCOT, Mumbai.

---

***For further details contact:***
The Director
**Central Institute for Research on Cotton Technology**
*(Indian Council of Agricultural Research)*
Adenwala Raod, Matunga,
Mumbai-400 019.
Phone: 022 24127273/76
Fax: 022 24130935
Email: circot@vsnl.com

---



---

**September, 2012**