Picking Considerations And Moisture

24th March, 2017

In conjunction with Rene Van Der Sluijs – CSIRO Geelong

FACTS ON FRIDAY

Picking is a good time within the cotton industry, signaling the end of another long, tough but productive season. Australian cotton has a reputation internationally for its high quality, and this begins with variety selection, is supported by attention to detail in all aspects of crop husbandry and finishes with a well planned and executed pick.

For many, it is a period of long hours, high pressure and stress but it should be remembered that the yield does not count until it has been ginned. It would be unfortunate to leave cotton on the bush unnecessarily, or impair lint fibre quality at this late stage of the season due to rushed practices, poor maintenance and management.

There are three aspects of picking that have a direct impact on cotton yield and quality.

Safety is Paramount:

This season, due to the warmer weather conditions picking is going to be compressed, with many fields being ready to pick at once. Long hours and tight schedules are going to create a lot of pressure. Cotton picking can be a dangerous operation as it involves large machinery with a lot of moving parts, in close proximity to numerous people, many of these in casual or contract employment. Injury to personnel and reduction in quality of the cotton delivered to the gin can occur if correct procedures are not followed.

Develop Your Procedures:

Having documented guidelines for staff and/or contractors for the operation of machinery and picking procedures will help minimise the potential for accidents and stress, should something go astray. Developing a set of procedures of how you would like the picking operation to progress will ensure all involved are involved are aware of correct and safe operation of equipment.

- Read and understand the operation manual and the basic safety procedures which are provided with the picker.
- Establish procedures and picking patterns and then train and re-train all staff/contractors on how picking machinery will be serviced and operated.
- Keep windows and mirrors clean for good visibility.
- Keep all lights and alarms in proper working order.
- Ensure walkways and platforms are free of tools, oil spills, debris or mud.
- Travel at safe speeds around ground staff and equipment and limit unnecessary traffic around pickers and builders
- Ensure everyone is out of danger way before emptying or moving a picker or plant.
- Emphasise 'look up and live' to avoid contact with overhead obstacles such as power lines, trees or sheds.
- Set standards and stick to them.

Timing and Moisture Considerations:

Many operators will be tempted to push picking into times when conditions are not ideal. This includes either pushing moisture limits with early starts or continuing on late into the night, or moving into a field before it is properly defoliated or mature. Please note the fact sheet on round bale moisture on the reverse of this document.

Assessing Moisture Content:

Seed cotton which contains less than 12% moisture will usually store for extended periods without significant quality loss. Green leaf and damp seed usually raise the seed cotton moisture content above 12%.

Assess the moisture content of the lint and seed before starting each morning. With the following techniques:

- Install moisture measuring equipment on the harvester, or use hand held moisture meters.
- Moisture measuring equipment should be calibrated to ensure correct readings.
- Hand held moisture meters are usually +/- 1% accurate.
- A hard seed when bitten indicates a brittle seed coat and moisture below 12%.
- When a handful of cotton collected in the palm of your hand is squeezed into a ball and then released, the moisture content is right if the seed cotton springs back to near its original size.

Excessive green plant material can stain the cotton in storage and requires ginners to use heat, which can damage fibre quality.

Picking Efficiency Losses:

The basic spindle picker design has not changed since its invention, at a time when crop yields were not as high are they are today. With crop yields increasing, the ability of picking units to handle and pick efficiently has decreased, as we have seen with some skip row crops in the past years. Setting up the picking unit correctly will assist in getting all of the cotton off the bush: Avoid:

- Row units not centered on the row (operator error or picking unit adjustment)
- Picking before defoliation / maturity complete (green leaf/bolls not open)
- Picking when crop moisture is too high
- Compressor door tension and spindle tip clearance not adjusted properly.
- Gaps in the plant stand, uniform stand assist with cotton movement through the picking head.
- Poor doffer adjustment relative to spindle position.
- Worn or dead spindles, spindle bushes or doffers.
- Poor maintenance and servicing/cleaning.
- Losses in handling systems.

COMPILED BY THE CSD EXTENSION & DEVELOPMENT TEAM, FOR MORE INFORMATION CONTACT

James Quinn	Robert Eveleigh	Bob Ford	Jorian Millyard	Chris Teague	Chris Barry	Sam Lee	Alice Devlin
0428 950 028	0427 915 921	0428 950 015	0428 950 009	0428 950 021	0491 212 705	0427 437 236	0418 818 142
jquinn@csd.net.au	roberte@csd.net.au	bford@csd.net.au	jmillyard@csd.net.au	cteague@csd.net.au	cbarry@csd.net.au	saml@csd.net.au	adevlin@csd.net.au

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Cotton Picking Moisture:

The rapid adoption and influx of Round Module Pickers into Australia has changed the landscape of the picking operation over the past couple of seasons. It is estimated that in excess of 90% of this season's crop will be harvested in this fashion. Growers welcome the cleanliness, labour and efficiency savings that these machines offer. However, these gains do not come without issues which could affect the quality of the cotton crop. Two of the issues that stand out are seed cotton moisture and wrap contamination.

Seed Cotton Moisture at Picking:

Why is it more of a problem? There are two areas of concern.

1. Newer pickers have greater horsepower, traction and fan capacity which enables them to pick cotton when field conditions traditionally have made picking difficult.
2. In many cotton growing areas rainfall will cause a couple of issues.
   a. Heighten enthusiasm to get into crops as soon as possible to harvest prior to further rainfall.
   b. Concertinaing of picking schedules where many fields will be ready at once.
   c. Raise moisture levels of the cotton lint.
   d. Provide conditions where humidity will lead to the inset of dew mid evening.
   e. Creates an environment where cotton regrowth will need to be managed.

When is cotton too wet to pick?

Apart from obvious problems associated with spindle twist and damage caused to the picking head. Cotton should not be harvested above a moisture content of 12%. At elevated moisture there is increased risk of fibre degradation, lowering grade due to yellowing or spotting associated with fungal contamination. The colour degradation seen in moist or wet seed-cotton is caused by microorganisms whose activity is increased by moisture and warmth. The rate of yellowing increases sharply at moisture levels above 13% and can increase even after the temperature of the module drops. Seed cotton harvested above 16% moisture content will suffer losses even if it is ginned immediately.

Figure 1: Cotton grade and pre-burner moisture Percentage. (Cotton Aust.)

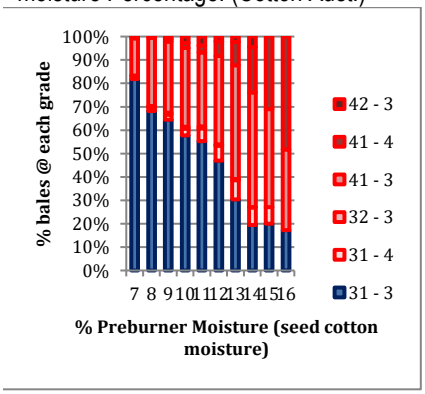

Figure 1 represents approximately 13,000 bales from traditional and round modules at one gin with pre-burner moisture monitoring equipment. Each column represents the proportion of bales by grade at each moisture percentage. Although moisture content is not the only determinant of colour and leaf grade it is clear that high moisture content can have an additional negative impact on fibre quality.

Other fibre properties such as micronaire, length, strength and elongation can also be affected. Seed cotton moisture also has a significant influence on seed quality, with an increase in moisture content resulting in a decrease in germination and vigour, due to an increase in free fatty acid content and aflatoxin level. Increased moisture content also leads to increased mechanical damage to the seed, resulting in an increase in the quantity and weight of seed coat fragments and mote. Furthermore, during ginning, increased moisture also leads to increased gas usage, reduction in production, blockages and the possibility of fires

Moisture monitoring needs to be more frequent at each end of the day as the change in moisture can be quite abrupt, e.g. moisture can increase from 4% to 6% within 10 minutes as night and dew point temperature fall rapidly.

Seed cotton moisture has always been an issue, however, there are some characteristics of the round modules which highlight the need to continually monitor seed cotton moisture.

- Round modules are smaller in size and can weigh up to 2,6 ton and produce 4-4.2 bales when compared to the conventional 12 to 16-ton module and produce 22-28 bales.
- Round modules are very compact and wrapped in plastic which limits the evaporation of moisture as there is less surface area exposed to the air to allow for moisture to evaporate.
- There will be less dilution of the cotton from across different picking times and moistures. The last round picked at night will have significantly higher moisture than those picked in theheat of the day.
- From a ginner perspective, this is an issue as they are unable to respond to rapidly changing moisture levels to gin efficiently and cleanly.

- There is also a possibility that modules will be stored in fields or gin yards for extended periods this season. Round modules clumped tight in sausage formation (see picture) will also limit airing of wet modules. If modules are staged in this formation ensure that there is a gap between rounds so modules are not touching and sunlight and air can infiltrate around bales.
- Isolation for express ginning of high moisture round modules is difficult, they can be lost in the multitude of bales produced in a shift. Cartage of several (5-6) rounds also makes isolation of these modules at the gin difficult.

- FIBREpak "A Guide to Improving Aust. Cotton Fibre Quality." CCC CRC.
- Adapted from "The Spindle-Type Cotton Harvester." Willcutt et.al, Cotton Inc. 2010
- René van der Sluijs – Fibre quality technical Specialist Cotton Info

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jquinn@csd.net.au	roberte@csd.net.au	bford@csd.net.au	jmillyard@csd.net.au	cteague@csd.net.au	cbarry@csd.net.au	saml@csd.net.au	adevlin@csd.net.au