

Harvesting & delivering uncontaminated cotton

By JAMES HILL

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Contract cotton picking

Due to the expansion of the cotton industry this season there may be a shortage of contract harvest machines. The first decision to be made is to either pick the cotton yourself or use an experienced contractor. There are advantages and disadvantages with both options.

Advantages of using a contractor

- Do not have to pay for machinery only utilised for short period of time.
- Picking (traditional basket machines) is labour intensive.
- Generally contractors are professional and therefore should be more efficient.

Disadvantages of using a contractor

- May be hard to source contractors due to the expansion in area.

BE AWARE OF

- Regular maintenance and correct set up of pickers is conducted for a clean and effective harvest.
- Farm hygiene practices are in place to avoid contamination, especially when constructing modules.
- Ensure a picking contractor is organised prior to planting crop if not using own machines!
- Budget for the plastic wrap for round bales to avoid shortages.
- Ensure picker is maintained early ready for harvest.
- Ensure all staff aware of OH&S issues associated with harvest.

FIGURE 1.

Spindle pickers require regular maintenance to operate at high efficiency.



- Contractors may be delayed at previous farm therefore exposing your crop to potential downgrades due to weather.
- May be more costly yet this will depend on area and a number of other factors.
- Might only have a small area mature yet a contractor will not want to move until there is continuity of work.
- Risk of weed and disease spread unless machinery is cleaned thoroughly.
- Contractors may not be set up for your row space.

OH&S

It is vital that all contractors and own farm staff go through a safety induction in cotton harvest. A good starting point is the CRDC safe harvesting DVD.

Use of a properly maintained picker that is setup correctly

The two types of mechanical harvesting equipment are:

- The Spindle picker which is a selective-type harvester that uses tapered, barbed spindles (Figure 1) to pick seed-cotton from bolls; and,
- The cotton stripper which is a non-selective, once-over harvester that removes not only the mature opened bolls but also the cracked and unopened bolls along with the burrs (carpel walls), plant sticks, bark and other foreign matter – stripper harvesting can increase ginning costs and result in lower grades.

Generally agronomic practices that produce high quality uniform crops contribute to harvesting efficiency. Soil should be relatively dry in order to support the weight of the harvesting machinery and avoid unnecessary soil compaction. Row ends should be free of weeds and grass

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and should have a field border for turning and aligning the harvesters with the rows. Banks in drains should not be too steep an angle. Plant height should not exceed about 1.2 m for cotton that is to be picked and about 1.4 m for cotton that is to be stripped.

Spindle pickers are complex machines that require proper maintenance and adjustments to operate at high efficiency. Special care should be given to the spindles, moistener pads, doffers, bearings, bushings, and the cam track. Proper maintenance and correct setup of pickers will help to ensure a clean and effective pick. Your best source of information about picker maintenance and setup is your picker operator's manual.

Moisture is added to the spindles to keep them clean and to enhance the adherence of the fibre to the spindle and allow for its removal by the doffer. Spindles generally require less moisture in the morning than in the afternoon.

Pre season maintenance includes

- Replacing bent, broken or worn spindles. As a rule of thumb a sharp spindle will draw blood if you were to run your hand over it.
- Doffers need to be ground and reset properly each year. Replace if damaged.
- Check moisture pads, bar heights, grid bars. Moisture pads should wipe each spindle clean to remove plant secretions that may cause spindle twist.
- Check pressure doors for wear, bends and alignment.
- Clean picker basket.
- Check hydraulic and air hoses for leaks.
- Ensure drive belts and universal joints in the drive train are in good condition.

Daily setup and checks include

- Greasing picker heads – recommended when picker heads are warm. Some systems also require light greasing every two to four hours throughout the day. Spin heads to remove excess grease and wash down if excess still remains.
- Ensure head heights are set correctly (too high bolls are not harvested, too low soil and trash are collected).
- Ensure correct setting of pressure doors for crop conditions. Dented or worn doors cause inefficient picking. Adjust doors to allow efficient removal of lint but avoids excessive bark removal.
- Doffers need to be checked daily and throughout operations. Too much clearance leads to improper doffing and spindle twist while lack of adequate clearance leads to abrasion of doffer plates by the spindles leading to presence of rubber specks (often not detected until textile manufacture).
- Picking units should be inspected on a regular basis when a basket is dumped or for a round baler perhaps every 4 round modules. This will help detect spindles that have not been wiped or are dirty (causing spindle wrap). If problems occur check water system and



Picker and boll buggy.

- doffers. Remove any build-up of trash to prevent excessive accumulation before the unit chokes.
- Use a recommended spindle cleaner with the correct nozzles (especially if there is green leaf present on the plants).
- Perform regular cleaning of the picking basket (fly cotton causes quality problems and is also a fire hazard). Dispose of fly cotton where it cannot contaminate the module.
- Adjust water rates correctly according to the time of day and picking conditions. Higher rates are usually needed in the middle of the day when conditions are drier.
- To avoid picking green bolls, pressure doors should be set to light to medium and all grid bars should be in position.
- Avoid picking areas that are extremely grassy that have the potential to contaminate cotton and reduce grades.

Templates are available in the Fibre Quality module in *myBMP* to help with pre-season and daily picker checks.

Avoiding harvest operations when cotton is wet

Cotton that is picked wet will result in cotton being twisted on the spindle (spindle twist – roping that occurs when spindles are partially doffed) which may lead to seed cotton being more difficult to process in the gin. Moist cotton during the ginning process can also mean that excessive drying is needed which also causes fibre damage. The harvesting operation itself is also interrupted as picker doors are blocked more often when cotton is too moist and efficiency declines as a result of poor doffing efficiency, i.e. no flow out of the basket. Doffers and moisture pads on pickers can also be damaged.

Typically cotton is too moist for harvest at dawn in Australia but cotton can be picked well into the night provided relative humidity remains low. 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 abruptly from 4% to 6% within 10



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minutes as night and dew point temperature fall rapidly. Harvesting seed-cotton in excess of 12% moisture is not recommended.

If wet cotton is processed into a module in the field it will also increase the risk of the module self combusting or lowering the grade due to yellowing or spotting associated with fungal contamination.

Modules during storage on-farm and in the gin should be monitored every five to seven days for temperature rises. A rapid temperature rise of approximately 8 to 11°C or more in 5 to 7 days signifies a high moisture problem and that module should be ginned as soon as possible. Modules that have temperatures rising to 43°C need to be ginned immediately. The temperature of modules harvested at safe storage moistures will not increase more than 5.5 to 8°C in 5 to 7 days and will level off and cool down as storage period is extended.

Some rules of thumb to consider relating to moisture on cotton to be harvested include:

- If moisture is present on vehicles while harvesting it is most likely that the cotton is too wet.
- The seed should feel hard (cracks in your teeth)
- If you can feel moisture on the cotton it is too wet. Seed cotton measured on a moisture meter should be less than 12%.
- Consider that machine picking can also add 2% moisture to seed cotton.
- A symptom of moist cotton is frequent blocked doors, throwing cotton out the front of the picking heads.
- If cotton is being expelled into the basket in dense blobs and is not fluffy it may be too moist.
- Suitable picking conditions late into the night are rare.
- Notify your ginner of modules that may be moist so that they may be ginned first, or at least monitored in the module yard.

Guidelines for module placement, construction, tarping and transport

Key considerations for module production to maintain quality are module placement, construction, tarping, storage and transportation to the gin. Another important consideration is ensuring personnel involved in module building are instructed and observe a sanitary workplace in terms of contamination. Workers should abide by the dictum that no unworn clothing, rags, papers, tools, non-cotton ropes, tarps (with exception of the module tarp), lunch bags etc. be left in and around the module making work site. In addition cotton is highly flammable and it is essential that workers do not smoke near cotton modules.

Bale pickers

The introduction of on board module building capacity on pickers (Figure 2) has offered opportunities to growers to undertake non-stop harvesting and eliminate in-field unloading to boll buggies and processing in module builders. This picking process may potentially save time, fuel, and labour and maybe allow simpler segregation of

FIGURE 2.

Round modules and small modules automatically made and discharged from pickers avoid to a large extent the problem of contamination, although contamination from tarps and coverings, which need to be removed before ginning, remains an issue. (Photo: John Deere)



cotton of differing quality. While management processes using these systems will differ and alleviate some of the issues discussed below many of the principles will, however, still apply.

Module and bale placement

Incorrect placement of modules has the potential to contribute to significant losses caused by moisture damage as well as contributing to contamination. The following guidelines should be considered when choosing a site for module placement:

- Module pads should have enough space to allow easy access for the equipment and trucks.
- Located near a well-drained field road and avoiding areas where water accumulates.
- Site free from gravel, stalks, and debris such as long grass or cotton stalks.
- Smooth, even with firm, compacted surface that allows water to drain away.
- Accessible in wet weather.
- Away from heavily travelled dusty roads, and other possible sources of fire and vandalism.
- Clear of overhead obstructions such as power lines.

Module construction

A module builder compact's seed-cotton to a density of about 190 kg/cubic m. A tighter module better sheds rainfall on the sides and less cotton is lost during storage, loading and hauling. The top of the module should be rounded to allow it to shed water when covered. In addition a well compacted module will help reduce freight costs to the gin.

Good communication is needed between module-builder operators, picker and boll buggy drivers to allow appropriate time for modules to be built and to avoid spillages. Cotton that is spilled from modules

should be carefully added back into the module avoiding contamination whilst following strict OH&S guidelines.

A constant lookout for oil leaks on both cotton pickers and the module builders is needed to prevent contamination. Oil leaks on builders should be repaired as soon as they are noticed. Oil contaminated cotton needs to be removed from the module as soon as it is identified.

Module tarping

Use of a high quality tarpaulin on modules is important to avoid moisture affecting quality as well as avoiding significant contamination of the cotton from the tarpaulin itself. Before using tarpaulins inspect them for holes and that they still repel water before use.

Tarpaulins should be chosen considering their tensile strength to avoid tearing, resisting puncturing and abrasion, adhesion of coatings, UV resistance, and cold crack temperature. If tarpaulins have seams they should be double stitched, with a minimum number of stitches. Centre seams (unless heat sealed) should be avoided as it is a potential weak point to allow water to enter the module. All these factors should be weighed up in light of the overall cost of the tarpaulin and its life expectancy.

To avoid contamination and fibre quality losses tarpaulins need to be securely fastened to the module. For best performance of tie-down type module covers use all loops and grommets provided. Cotton rope is the most appropriate fastener to limit contamination and synthetic rope should never be used. Ensure rope has enough strength to endure strong winds. Belly ropes should be avoided if possible as they may break. A tarp should be large enough to cover at least half to two thirds of the modules on the ends.

Module transportation

- Truck and trailer beds need to be cleaned prior to picking up the module (A rake should be provided).
- No loose cotton to be added to module when loading.
- All loads to be properly covered.
- Truck beds to be cleaned down after unloading.

Round module transportation

The Load Restraint Guide requires each module to be individually restrained.

On open sided semi-trailers, the round bale modules can be loaded either 'wagon wheel' or 'sausage' configuration. From the point of view of managing the risk that the sides of individual round bale modules may bulge beyond the statutory load width of 2.5 metres once restraint straps are tensioned, the 'wagon wheel' option is the preferred loading configuration.

Caution: Round bale modules loaded on open sided flat-top trailers in the 'sausage' configuration are much more likely to expand beyond the trailer sides once restraint straps are tensioned.

If any section of a round bale module extends beyond

the statutory maximum width of 2.5 metres when loaded on a flat-top trailer, then the entire load is deemed to be over-width. In this situation you may not be legally able to operate under an over-width notice due to the multiple number of round bales on the trailer determined as a 'divisible' load.

Refer to: Cotton Australia 'Module Load & Restraint Guide – 2011 Edition.

Keeping good module records

Identifying when and where each module is produced can help with producing better fibre quality outcomes as the grower can discuss with the ginner the quality of the cotton of each module and thus tailor the ginning process to suite. The grower can also use these records to better understand the variability that exists in fields to refine management practices for that particular field in subsequent seasons.

Each module should have a record (with a duplicate kept in a safe place), which includes the date and weather conditions when picked. Any records or numbers assigned to modules should be as permanent as possible. Permanent marker pens should be used on cards attached to modules in a sealable plastic bag.

If a module is suspected of having a contaminant, clearly identify it, and notify the gin when delivering the module of the potential problem.

An example module information form can be found in the Fibre Quality module in myBMP.

These guidelines have been extracted from FIBREpak – A Guide to Improving Australian Cotton Fibre Quality.

Further information:

FIBREpak – http://www.cottoncrc.org.au/content/Industry/Publications/Fibre_Quality/FIBREpak.aspx

myBMP – www.mybmp.com.au

CRDC Safe Harvest DVD phone: 0267 924088

Cotton Australia 'Module Load & Restraint Guide' 2011 Edition

Pick N Match – On Cotton Australia website if in need of a contractor

To register as a contractor email Cotton Australia on talktous@cotton.org.au