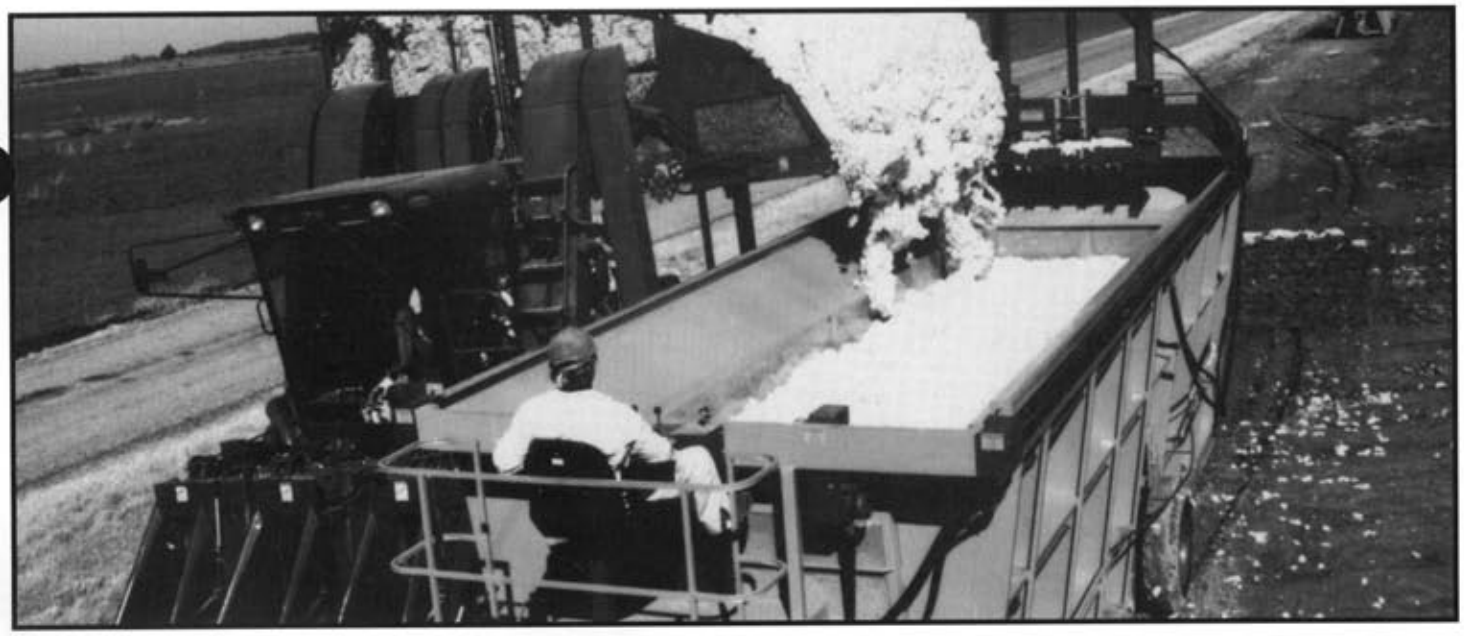

SEED-COTTON STORAGE & HANDLING IN MODULES

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Since modules were introduced in 1972, their use has steadily increased. More than seventy percent of the Texas, California, and Arizona crop has been moduled for several years. Recently, usage has increased rapidly in the Mid-South and Southeast. Fifty-seven percent of the total 1991 crop was moduled. Handling and storing seed cotton in modules can benefit both growers and ginners if their operations are large enough to justify the investment.

The primary advantage of using modules is the decoupling of the harvesting capacity from the ginning capacity. Producers can harvest their cotton when the quality is high and store it in a module rather than leaving the crop exposed to weather in the field. The module system allows gins to operate more hours per year, thus reducing gin overhead costs per bale. In areas where cotton production has increased, module equipment has been used to extend the ginning season rather than to increase ginning capacity.

Moduling Feasibility

Because module equipment is large and expensive, it requires medium-to-large producers and gins. To keep unit costs reasonable, at least 800 bales (and preferably 1,200) should be handled with each module builder. At least four rows and preferably six rows of picker-harvesting capacity should be matched with each builder. For stripper harvesting, allow six-to-eight rows of capacity for each builder. Extremely high or low yields will change this ratio.

Module hauling equipment is also large and expensive. At least 5,000 bales need to be handled in modules in a ginning community to justify a module truck. In a ginning community, five builders producing 100 modules each (6,000 bales) and one module truck can replace fifty 10-bale cotton trailers at about the same cost per bale. At this usage level, all the advantages of moduling are a bonus.

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Harvesting

To avoid damage to quality and reduced crop value, modules must be carefully managed. Losses will be minimal if cotton is dry when harvested and if modules are carefully stored.

Excess vegetative growth and late-season regrowth contribute to high levels of green trash in harvested material. Good defoliation or desiccation is essential for safe storage. High moisture content causes modules to heat and increases the frequency of light-spot (or lower) grades. Green trash contributes to the moisture content of seed cotton. Harvested material (lint, seed and trash combined) that is twelve percent moisture content or lower may be stored without deterioration of lint or seed. Fiber quality should not be expected to increase in modules, but it can be maintained with proper management.

Check seed-cotton moisture during harvest. If you don't have a meter, you can get an indication of the moisture by biting the seed; if it cracks, the seed cotton is likely safe for storage, provided that it is free of high-moisture trash. Moisture readings are particularly important for cotton harvested early and late in the day when seed-cotton moisture levels are normally higher than during the midday hours.

Moisture meters should be periodically calibrated, according to the manufacturer's instructions, to make certain they are reading correctly. To use a meter, select representative samples of machine-harvested seed cotton. Be sure the meter is clean and dry inside before using it (carry a clean rag and wipe it dry between readings). Hand work the samples (preferably while wearing rubber gloves) so any surface moisture is mixed into the seed cotton and then load the meter carefully, making sure the sample is stuffed firmly into the meter chamber. It is a good idea to read the moisture of a sample two or three times and use an average value. Each successive reading should be taken after the sample has been removed from the meter and reinserted.

Seed-Cotton Carts

In some situations, seed-cotton carts (Figure 1) will improve harvester efficiency. Harvesters should not have to wait while a module is topped off and the builder moved to a new location. Likewise, harvesters should not have to go over 200 yards to the module builder. Seed-cotton carts can permit pickers to dump on both ends of the field or allow a module to be constructed on higher ground away from the immediate turnrow without excessive picker travel. Trailers can also be used to handle overflow cotton while a module is topped off and moved.

Figure 1. Using a seed-cotton cart can improve harvesting capacity and reduce costs.

Site Selection and Preparation

Damage to moduled seed cotton caused by moisture has been a problem in high rainfall areas. Poorly drained module sites, leaking tarps, poorly shaped modules, and intense rainstorms have contributed to the losses. Seed cotton can be safely stored for several weeks, but management must be good.

Select a site by using the following guidelines:

- Well-drained turnrow or field road
- Free of gravel, stalks, and debris such as long grass
- Smooth, firm surface and near-constant grade
- Accessible in wet weather
- Away from heavily-traveled roads and other possible sources of fire and vandalism
- Clear of overhead obstructions such as utility lines

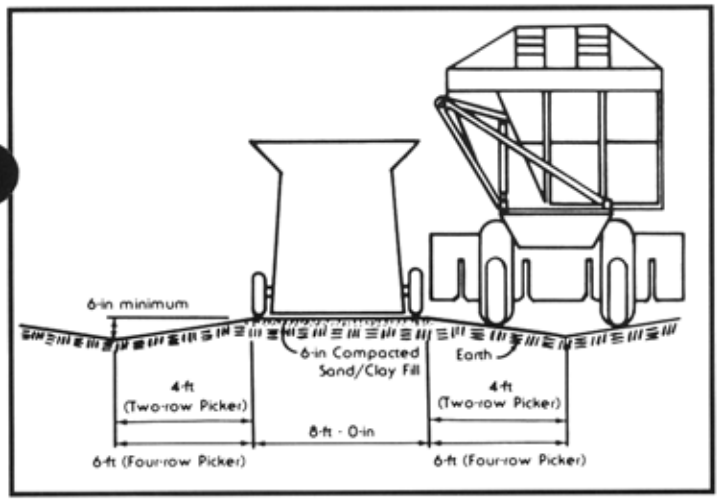


Figure 2. Turnrow profile for seed-cotton module.

Field turnrows can be improved by preparing an elevated site (Figure 2). Drainage precautions are essential for any area where modules are parked because standing water or permanently wet soil will cause a layer of seed cotton to deteriorate (Figure 3). In the rainbelt, modules should be oriented north-south so they can dry faster after rain than when oriented east-west.

Figure 3. Avoid storing modules where water accumulates.

Building a Good Module

Schedule harvesters so that only one dumps at a time. The first and second dumps should be made in opposite ends of the builder. The third dump should be made near the middle, and leveling and tramping should begin immediately and continue until the module is completed (Figure 4). The tighter the module is compacted, the better it sheds rainfall on the sides and the less seed cotton is lost during storage, loading, and hauling. Additional dumps should be made to make the module look like a giant loaf of bread. Make the top round so that when covered the tarp will shed water. Depressions in which water can collect are serious problems (Figure 5).

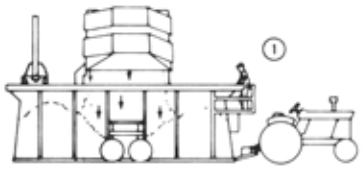
Figure 5. Make modules so that depressions (where water can accumulate) do not exist.

If harvesters have a metering unloading system, use it to spread cotton the length of the builder. This accomplishes faster unloading with less spillage, and it is easier for the operator to level and tramp the module, especially when nearing completion. Give the module-builder operator the authority to call in pickers and direct the dumping process when a partial basket is needed to top off a module.

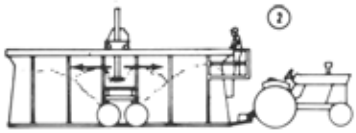
Selecting a Cover

When a module is completed, cover it with a high-quality tarpaulin. Always purchase tarps well ahead of when they are needed and select a brand that is labeled showing the manufacturer's name, phone number, date manufactured, and reference to a specification sheet for the quality of the tarp.

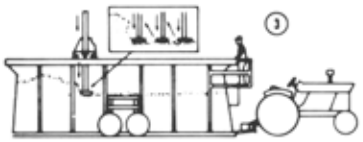
Specification sheets provided by each tarp supplier should contain information on tests for the following physical properties: tensile strength, Elmendorf tear, Spencer puncture, hydrostatic head, moisture vapor transfer rate (MVTR), abrasion resis-



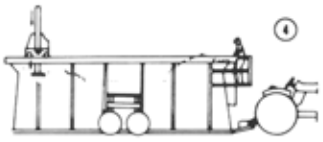
Module builder receives two or three dumps before beginning spreading and tamping operations. Operator leaves enough room to receive last dump without having to pull cotton from the picker basket by hand.



Cotton is spread into even layers by lowering the tamper foot into the cotton, then moving it to roll the cotton toward the front or the rear of the module builder.

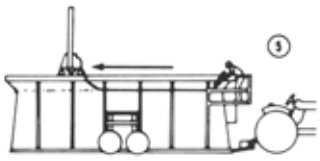


The tamper foot is raised, then lowered with full pressure to compact the cotton. Then it is raised again, moved laterally 14-16 inches, and lowered again with full pressure. The tamping action is repeated every 14-16 inches.



To ensure building a module with tight ends and no sloughing off, extra cotton is pushed into the ends of the module builder and tamped tightly, leaving space in center for last dump.

NOTE: Module must be rounded off from center to prevent water standing on tarp.



Tarp may be placed on top of module while it is still in module builder.

Figure 4. Operating diagrams from "Seed-Cotton Module Storage and Handling"

tance, adhesion of coatings, UV resistance and cold crack temperature. A notation that fabric contains heat stabilizers and antioxidants should appear. Additional information such as thread count, yarn size, polymers, coating thickness and other information could also be included at the discretion of the manufacturer, importer or fabricator.

Many factors should be used in comparing different covers. For example, a cover with coating on both sides is typically better than single-side coating. Also, the more UV resistance a material has, the longer it will resist exposure to sunlight. While not guaranteeing performance, these data will provide purchasers with information useful in deciding which cover to purchase.

Cotton tarps permit moisture vapor to escape and, therefore, are less likely to trap condensation from within the module. However, they are more expensive, heavier, and require more care before storage. Consequently, very few cotton tarps have been purchased in recent years.

Because synthetic tarps can trap moisture vapor, precautions must be taken to prevent seed cotton quality losses due to condensation. When form-fitted synthetic tarps are used, their design permits trapped moisture to be expelled with normal wind movement up the side of the module and under the tarp. Ensuring that cotton is dry enough for storage before moduling eliminates much of the condensation potential. Inspect tarps before the morning sun evaporates condensation. If condensation is occurring, the module might be overheating and in need of immediate ginning. When wind whips tarpaulins, the fabric wears quickly and can become unusable because it is no longer waterproof. Check each tarp for holes before it is used.

Securing Tarps

To avoid lint contamination, all straps necessary to secure tarps should be an integral part of the cover. If additional tie-downs are necessary, a good cotton twine (200-pound minimum breaking strength) is the preferred material. The most economical tie-down, however, is a 1/4-inch or 3/8-inch braided nylon strap. If you use any type of synthetic tie-down material, be sure that it is not allowed to become mixed with the seed cotton, either in the field or at the gin. Be especially careful when module feeders are used.

Monitoring Modules

Internal module temperatures should be checked **daily** for the first five-to-seven days. A rapid and continuing temperature rise of 15° F to 20° F or more signifies a high-moisture problem, and the module should be ginned as soon as possible. Typical temperature-rise curves for modules at various moistures are shown in Figure 6. Tests have shown that fiber yellowing and light-spot grades result from elevated module temperatures.

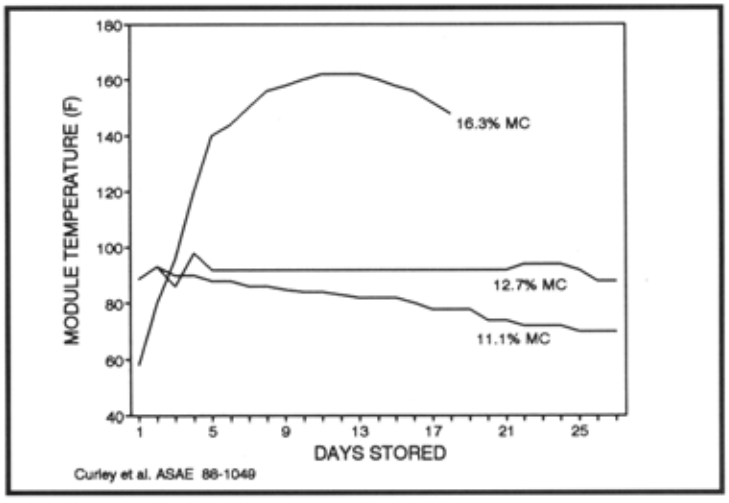


Figure 6. Internal module temperature during storage at varying moisture contents.

If a temperature of 110° F is reached, the module should be ginned immediately to avoid the possibility of major loss. All modules should be checked for high temperature twice a week after the initial five-to-seven-day storage period and after rainstorms. High-moisture modules, especially those harvested late in the season when ambient temperatures are low, may continue to increase in temperature at a slow rate over a period of several weeks. **If at any time the temperature increases by more than 20° F, gin the module immediately.** The temperature of modules that are harvested at safe storage moistures will not increase more than 10° F to 15° F and will then level off and cool down as the storage period is extended.

Record Keeping

Each module should have a record (with a duplicate kept in the office) including the date and weather conditions when picked, the approximate number of bales in the module, the ASCS identification, and monitoring records with temperature data. These records are essential to substantiate insurance claims in the event of a loss, to satisfy ASCS/CCC seed-cotton loan requirements, to provide the gin with information for preparing bale records, and to aid in decisions about ginning the module. To be covered by the gin's insurance and to comply with CCC's seed-cotton loan requirements, you must report the necessary data to the gin within twenty-four hours after building the module.

Any records or numbers assigned to modules should be as permanent as possible. Permanent marker pens should be used to write on cards that are attached to modules. The cards should be in sealable plastic bags, although this is no guarantee against leakage. Each module should be numbered successively on the cards. The modules may be marked by spray painting, provided that the approved, non-contaminating BRAND-A-BALE® spray, developed by Cotton Incorporated, is used.

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Safety

The module builder is a simple implement, but it is up to you and your managers to ensure that it is operated safely. The following is a partial list of safety items. Refer to your operator's manual for safety instructions relating to your particular module builder.

- Keep out of the machine when it is in use.
- Keep everybody away from the top of the module builder and the compactor bridge when the unit is operating. The operator's platform is the only safe place for viewing the operation.
- Do not work on the machine while it is operating or operate the machine with chain guards or hose shrouds removed.
- Be certain that people and vehicles are clear of the tailgate when it is being raised or lowered.
- Never operate the unit close to electric lines.
- Read, understand and fully follow the instructions in your operator's manual concerning preparation of the module builder for transportation from one field to another or over the road.
- Never reach under a raised module builder.
- Do not allow smoking or use welding equipment around a module builder that contains cotton.
- Check and repair damaged hydraulic hoses before they burst. Use paper, not your hand, to check for leaks in a system that is under high pressure.

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