FACT SHEET

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KEYS TO HIGH QUALITY LINT AND SEED WITH A COTTON MODULE BUILDER

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Use of the cotton module builder as a storage and transport system has increased since the early 1970s. In 1982 more than 2,700 module builders were used to module over 60 percent of the Texas cotton crop. Several factors are responsible for the rapid acceptance of these machines. These include allowing the harvest operation to be independent of trailer availability and ginning capacity and permitting cotton harvest to proceed uninterrupted during favorable weather conditions.

The module builder has helped stabilize cotton acreage in areas with declining numbers of gins. This is attributed to the improved handling and transport system associated with the module builder which permits a more orderly ginning operation. Module storage allows gins to process cotton at a more constant rate even when intermittent rainy periods temporarily stop field harvest operations.

Although there are definite benefits associated with the use of the module builder, associated problems develop in moduling unprocessed cotton containing lint, seed and nonlint material as harvested by stripper or spindle picker harvester. A large portion of this problem is attributed to improper harvesting techniques which frequently result in damp seed cotton going into module storage. Further quality loss is associated with improper building and covering of modules. Reduced lint and seed quality during storage costs the industry millions of dollars each year.

Excessive moisture in seed cotton not only reduces quality after a period in storage, but it also increases the weight of seed cotton which contributes to lower gin turnout and higher ginning cost. Wet modules can reduce ginning capacity up to 50 percent. The cost involved in ginning hot, wet modules becomes prohibitive with current high energy and labor costs.

Damp seed cotton also is costly for the oil mill operator. High moisture content in seed from improperly stored cotton not only reduces the processing capacity of oil mills but also causes severe reduction in seed grade. Free fatty acid (FAA) content of seed in properly stored seed cotton normally ranges from 0.2 to 0.5 percent but may be as high as 11 to 12 percent in seed from hot, wet modules. Deteriorated seed from improperly prepared modules can result in monetary losses of $30 to $40 per ton.

Even higher losses can occur in cotton seed processed for planting purposes. Germination percent can be reduced drastically in a short time after the module temperature reaches the 110° to 120° F. range. Cotton seed that cannot be used for planting purposes are reduced in value and may result in losses of $600 to $700 per ton.

Proper cultural and harvesting techniques help increase the quantity of clean, dry seed cotton going into module storage. Lint and seed quality losses are minimized if certain key practices are followed during production, harvest and the module-building process.

This fact sheet provides information on management operations that help preserve lint and seed quality. Five key management recommendations are given below.

FIRST KEY: ***Manage cultural practices that contribute to high quality seed cotton.***

Production of clean, mature cotton starts early in the season when the crop is planted. How well cultural practices are carried out in a timely manner during the season largely determines the quality of the crop at harvest time. This requires careful attention of the following practices.

- Use high quality planting seed to obtain an early, uniform stand with a final plant population of 40 thousand to 60 thousand plants per acre.

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- Conduct early season insect control to encourage early fruiting.
- Base fertility program on soil test results and realistic yield goals. Avoid excess nitrogen that could promote rank vegetative growth and delay maturity.
- Develop sound weed control programs and production systems to help reduce grassy and barky bales.
- Plan irrigation to maximize water use efficiency for optimum yields of mature fiber and seed.

Properly managed cultural practices encourage earlier maturity which enables the crop to be prepared more easily for harvest with harvest-aid chemicals.

SECOND KEY: Harvest clean, dry cotton.

As the crop is prepared for harvest, most management decisions are directed at insuring clean, dry cotton for storage and ginning. Cotton free of green leaf trash with moisture content below 12 percent is the most important factor to insure high quality lint and seed during the module storage period. This begins after a killing frost or with a well planned harvest-aid program, making sure all plant parts are desiccated. Reducing leaf trash and drying out the plant eliminates the main source of moisture in seed cotton. Some of the major factors essential for a successful harvest-aid program are listed below.

- Treat crop during open weather when daytime temperatures are above 60° F. and the 5-day weather forecast is favorable.
- Treat when fiber is mature; 65 percent or more of the bolls should be open for defoliation, and 85 percent or more should be open before desiccation.
- Allow sufficient time after treatment to insure good leaf drop with defoliants and complete drying of leaves and stems after desiccation. Depending on weather conditions, 5 to 10 days may be required after treatment to obtain full defoliation or desiccation.
- Adjust spray equipment to insure adequate coverage.

Careful management in harvesting insures that clean, dry cotton goes into module storage. Allow morning dews to evaporate before harvesting and stop harvesting when cotton begins to collect moisture in the evenings. Seed cotton moisture should not exceed 12 percent to avoid hot modules. A moisture level of 8 to 10 percent is considered ideal for harvesting and storage.

A relative humidity of 60 percent or below in the field is associated with 8 percent or lower moisture content on seed cotton. Use a moisture meter to determine the moisture content of cotton before harvest. With experience one can also check moisture content by the squeeze test. If the seed cotton springs back or fluffs after squeezing it, it is likely dry enough to start harvesting. However, if it remains wadded up and does not spring back after the squeeze test, the cotton is probably too damp for harvest and safe storage in modules.

THIRD KEY: Build proper modules.

Much of the time and effort required to insure that high quality cotton goes into module storage can be lost later during periods of adverse weather if the module is not properly constructed. A well built module is packed uniformly with a slightly rounded top without depressions or valleys.

The ends need extra compaction to reduce handling loss. Place the last dump in the middle of the module to obtain a rounded top that can be protected better with a tarpaulin. Modules with uneven tops can collect rain or snow. Closely check each module after rain or snow to determine if moisture accumulated. Remove snow from the module before it melts. If moisture penetrates into the module, gin the wet module as soon as possible.

FOURTH KEY: Protect module from weather.

If clean, dry seed cotton goes into module storage, it can be stored for extended periods without quality loss. Proper location of modules is one of the first considerations for reducing weather damage.

Unless the module is located on an elevated site, heavy rains can cause the seed cotton to deteriorate from the bottom as moisture moves up into the cotton mass by capillary action. Do not build modules on cloddy ground or over old stalks that could increase the amount of trash and soil that gets mixed with the seed cotton during the loading operation.

Locate modules near an all-weather road to permit hauling to the gin during wet periods. This becomes especially important when gins "catch-up" during rainy periods and begin ginning modules brought in from the field. In summary, the important practices regarding module location are listed below.

- Locate module on well drained, compacted sites; prepare an elevated site if necessary; site should be free of clods and plant residue.
- Locate modules at sites that permit hauling during wet weather.
- Allow sufficient space between modules to meet insurance regulations.

A tarp is an important aid in protecting seed cotton from weather damage during storage. There are various companies that market several types of tarps, including those made from cotton ducking or various lightweight material. Tarp material and methods for applying tarps to modules are continually

being improved. Producers should check with their equipment dealers or gin suppliers before purchasing tarps. Tarps are frequently difficult to keep in place in windy, low humidity regions such as West Texas. Although the frequency of rain and snow in the West Texas area is low during the harvest season, covering modules is still recommended. Producers should at least make provisions to cover modules if snow or wet weather develops. When tarps are not used, producers in the West Texas region should use some type of netting material to reduce losses from high wind. Recommended uses of tarps on modules are listed below:

- Consider tarps as insurance against weather damage.
- Tarps are essential for maintaining seed cotton quality in higher rainfall regions.
- Check tarps after rain or snow storms to make sure moisture does not collect in pockets or valleys.
- Remove snow from uncovered module before melting occurs.
- Check closely for moisture condensation beneath tarps made from material other than cotton ducking.
- Tarps should be of adequate size to cover module (6 feet wider and 6 feet longer than the module).
- If high winds or hurricanes are anticipated, loop a wire around the module and through the tarp pins to keep tarp in place.
- To avoid lint contamination, do not use black poly twine as tie-down materials.

FIFTH KEY: Check temperature during storage.

The most important indicator of lint and seed quality preservation during the first 3 to 4 days of storage is the rise and decline in temperature within the module. To obtain a representative temperature check, make readings at three locations along the module at waist high levels. A 3-foot long, dial-type thermometer is recommended to obtain temperatures near the center of the module. Once the probe-type thermometer is inserted into the cotton mass, keep it in position until an accurate reading is obtained (3 to 5 minutes).

Even when seed cotton is below 12 percent moisture, a normal temperature rise of 10° to 20° F. can be expected during the first few days of storage, followed by a gradual decline after 48 to 72 hours. A rapid (overnight) increase in temperature of 15° to 25° F. or more indicates that seed cotton has excessive moisture and that the module is going to heat. If the temperature increases to 110° to 120° F., lint and seed quality may be reduced. Seeds are usually more subject to quality deterioration than lint. Gin hot modules immediately to prevent further quality loss. When the air temperature is high (100° F. or more) during harvest, seed cotton may go into module storage at a relatively high temperature. However, high seed cotton temperature due to high ambient air temperature during harvest does not have an adverse effect on quality. Expect a gradual temperature decline in the cotton mass after storage when the seed cotton is below 12 percent moisture.

Normally, a rapid rise in temperature during the first 2 days of storage indicates high moisture trash and/or damp seed cotton. However, any time dry seed cotton is exposed to excess moisture, a rise in temperature can be expected. Snow, rain storms or hurricanes that allow moisture to penetrate the top or sides of the module can start heating in a matter of hours. After such storms, check the temperature to ascertain if water damage has occurred. A list of important points regarding temperature checks during module storage is given below.

- Check temperature daily until the module temperature starts to decline.
- Expect a gradual temperature increase of 15° to 20° F. the first 3 to 5 days.
- A rapid overnight temperature rise of 15° to 20° F. indicates the presence of excess moisture and should be considered a warning of potential problems.
- Temperature readings over 110° F. and 120° F. can result in reduced lint and seed quality. Seed exposed to these temperature levels should not be saved for planting purpose.
- Temperature is an indicator of seed and fiber quality maintenance; unfavorably high temperatures indicate potential quality deterioration.
- Obtain temperature readings at waist-high level at three locations along the module.

SUMMARY

This publication discusses the five key management areas necessary to produce and maintain high quality seed cotton during production, harvest and module storage. Good quality can be achieved and maintained through cultural practices that contribute to an early crop of mature cotton and which help maintain a proper stalk size that facilitates effective use of defoliants and desiccants. This contributes to high harvesting efficiency and clean, dry cotton in module storage. Protect the seed cotton from wet weather during storage by selecting a well drained site on which to locate the module. Construct modules that are rounded on top and well compacted for proper covering. When these criteria are met, seed cotton can be stored indefinitely in modules with little or no reduction in quality.