

HIGH QUALITY COTTON PLANTING SEED -- A GUIDE TO PRODUCTION AND HANDLING

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Early stand of uniform seedlings that grow and develop rapidly is the foundation of successful cotton production. A key factor in accomplishing this goal is planting high quality seed. "High quality planting seed" refers to relatively high density cottonseed free from mechanical cuts or breaks and possessing high germination and vigor. In contrast, "low quality planting seed" refers to cottonseed with one or more of the following traits: light density; immaturity; cuts and breaks in the seed coat; low vigor; and a wide range of germination. Such seed may germinate 70 percent or higher in optimum environments, yet possess low vigor and perform poorly under field conditions. Low quality seed are more likely to support mold growth and decay during germination. Most producers have obtained erratic stands even under relatively ideal planting conditions when low quality seed were used. The chances of obtaining poor stands tend to increase with unfavorable weather following planting. Low quality seed are more sensitive to adverse weather or improper seedbed preparation or planting depths. However, high quality seed can produce adequate stands under a much wider range of weather and planting conditions with little problem from seedling diseases.

Much of the replanting associated with unfavorable weather is often caused by low quality seed. Replanting is seldom conducted during an optimum planting time, which results in a major cost factor to the producer from the reduced lint yield and quality obtained with a late crop. Also, other losses occur from more costly insect control, higher losses from late season diseases, and the expense of additional seed and planting operations which reduce growers' profits.

Quality planting seed possess certain desirable characteristics that play a vital role in cotton production. These include:

- uniform germination and seedling emergence;
- reduced incidence of seedling disease;

- better performance in cool, wet soils;
- tolerance of deeper planting depths;
- rapid development of undamaged roots;
- increased lint yields, because healthy seedlings result in the most productive plants at harvest; and
- increased efficiency in weed, insect and disease control, and increased harvesting efficiency.

Cottonseed are subjected to many conditions that affect their value for planting. In addition to weather conditions that influence seed maturity, and deterioration from field weathering after maturity and before harvest, cottonseed are now subjected to more mechanical injury from a total mechanized production. Most cotton in Texas is harvested in a "once-over" stripper operation. This exposes the open cotton to weather for longer periods and permits harvest of the immature as well as the mature seed. Rapid harvesting methods and high capacity gins tend to reduce seed quality by increasing the opportunities for breaks and cuts in the seed coat. Factors affecting seed quality influence the availability of high quality seed for planting purposes.

Factors Affecting Seed Quality

Maturity — After bloom, seed and fiber develop at a fairly rapid rate depending on temperature during the boll development period. Normally, 30 to 35 days after bloom the embryo reaches its full size within the seed coat or hull, yet seed development continues and maximum dry weight is not attained until just a few days before the bolls open. Thus, any factor that stops boll development prematurely will contribute to immature seed and fiber. Immature lint and seed both will be lightweight. Immature seed frequently have light colored seed coats. Although the seed may appear normal in size, the embryo may be small and undeveloped. Immature seed will be of low density and

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vigor. Several factors such as too early desiccation or defoliation, early frost, disease or any weather conditions that cause premature loss of leaves will delay development or maturity of seed. These seed often will germinate satisfactorily under favorable environment, but most likely will perform poorly in the field, especially if field and environmental conditions are unfavorable for germination. If possible, seed from a late, immature crop should never be saved for planting purposes. Fortunately, many of the light, immature seeds can be removed by processing on seed gravity equipment and newly developed flotation methods.

Moisture — Moisture is one of the most important factors affecting seed quality from the time seed mature in the field until they are planted. Moisture determines how long mature seed will maintain high quality. Seed deterioration can begin when open cotton is exposed to prolonged periods of wet weather in the field, or can occur when damp seed cotton is stored in trailers, ricks or modules after harvest. Moisture is equally important after the seed are processed and stored. The storage life of seed is directly associated with low moisture and temperature. Delayed harvest caused by prolonged periods of warm, wet weather is one of the major causes of reduced quality planting seed.

Temperature — Temperature determines how rapidly seed deteriorate in the presence of excess moisture, either in the field or in storage. High temperatures coupled with excess moisture can reduce seed quality in a matter of hours. Seed quality loss occurs at a slower rate under cold, wet conditions. Sufficient moisture (above 12 percent) can start the respiration process in seed which results in rapid temperature rise in seed cotton or the cottonseed mass. This is commonly referred to as "heating." Even slight heating that may not noticeably affect the seeds' ability to germinate can have an adverse effect on seed quality. Heating can occur when seed cotton contains excess moisture from green leaf trash or rain, or when it has been harvested too damp followed by storage in trailers, ricks or modules. At low moisture levels, high temperature, within limits, will not adversely affect seed quality. Low moisture cottonseed in storage exposed to brief periods of relatively high temperature can retain their high quality for 2 years or longer.

Mechanical Injury — Seed that escaped deterioration in the field or in storage may be reduced in quality by mechanical injury that occurs during harvesting, handling and ginning. Investigations have shown that pickers, and to a lesser extent strippers, cause some mechanical damage to seed. The major mechanical damage occurs primarily through the action of the saws during ginning. Poor emergence of mechanically damaged seed can be expected, especially when planting conditions are unfavorable. Seed quality of mechanically damaged seed is often reduced further during acid delinting when acid contacts embryo tissues

through breaks and cuts in the seed coat. Also, the breaks in the seed coat provide entrance for various organisms that can reduce seed quality. The storage life of these seed is often shortened; thus they have poorer carryover in storage than undamaged seed.

Chemical Treatment — Seed fungicides and insecticides can improve emergence and final stand over untreated seed, but pesticides cannot take the place of high quality seed. Stand problems can still exist, even when protectants and systemic fungicides are used on low quality seed subjected to unfavorable planting conditions. Certain chemicals such as systemic insecticides used alone or in combination with fungicides may have a toxic effect on seed. Further reduction in germination and emergence is likely to occur when weak, low quality seed are treated with systemic insecticides.

Factors in Producing Quality Planting Seed

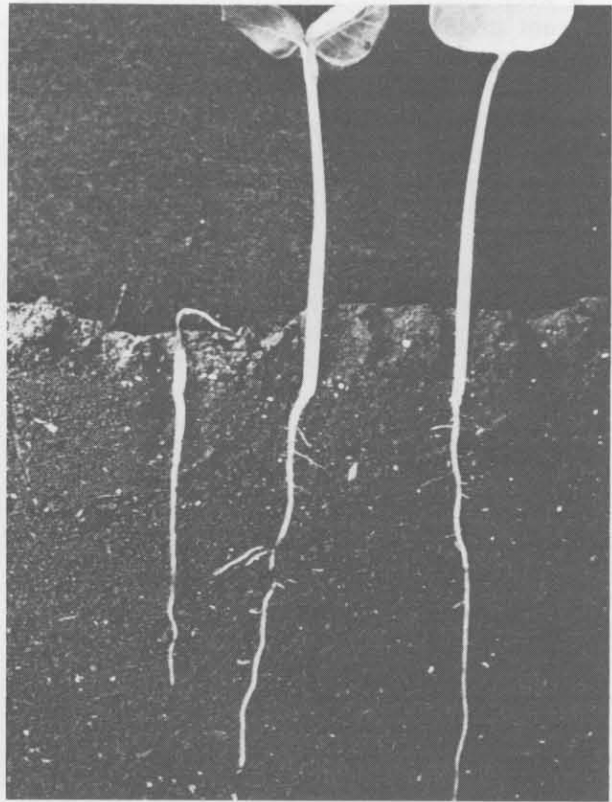
Production — All production practices that contribute to profitable yields of acceptable quality lint likewise will produce mature, high quality planting seed. Producers should consider short-season cotton production systems that hasten maturity and harvesting, thereby minimizing the field deterioration which causes low quality seed. Some important guidelines for producing high quality seed are as follows:

- Manage fertility, irrigation and insect control program to avoid excessive vegetative growth and delayed maturity. Base fertility on soil test recommendations and avoid excessive nitrogen.
- Maintain a weed-free crop. Weeds reduce yields, interfere with harvesting and contribute to excess moisture in seed cotton, resulting in heating during storage.
- Avoid harvesting areas where root rot, nematodes, boll rot and wilts contribute to a late crop and immature seed. Some diseases may be transmitted through seed.
- Seed production fields should have good drainage. Poor drainage or low spots in the field interfere with timely harvest. Delayed harvesting contributes to seed deterioration.
- Maintain good seedbed shape for efficient cultivation, post-emergence weed control, defoliation and harvesting.
- Maintain variety purity by harvesting cotton from fields that follow other crops or the same cotton variety grown the previous year.

Pre-Harvest and Harvest — Pre-harvest and harvest are the most likely times for seed to deteriorate and decline in quality. Consequently, the producer has a good opportunity to preserve seed quality during these periods. When mature bolls begin to open, seed are normally at their peak quality. Thereafter, seed



To ensure good stands like the one pictured above, high quality seed must be planted.



Strong, healthy seedling and vigorous root system on the right are associated with high quality seed. Low quality seed contribute to weak, diseased seedling as indicated on the left.

begin to decline in quality in relation to the length of exposure to heat and moisture. Producers should strive to minimize these adverse conditions. Producers should keep in mind that open cotton in the field is a poor storage site for seed. The management practices that must be conducted during the pre-harvest and harvest stages to assure high quality seed include:

- Strive for timely application of harvest-aid chemicals. Apply defoliant when 65 percent or more of the bolls are open, and desiccants at 75 percent or more open bolls. Bottom defoliation or light application may be necessary in a dense canopy to reduce seed deterioration by improving air circulation and lowering the humidity around mature bottom bolls.
- For stripping, allow time (usually 7 to 10 days) for plants to lose moisture and dry out following harvest-aid application. This conditioning period is necessary to reduce green leaf trash that may add moisture to bulk seed cotton.
- Harvest only dry cotton, preferably when the moisture content is 8 percent or below. This moisture level is normally associated with relative humidity of 60 percent or less.
- Timely harvest must be conducted to shorten the period open bolls remain in the field. Seed as well as lint is susceptible to reduction in quality when open cotton remains on the stalk for prolonged periods. Producers with picker harvesters may consider getting planting seed out when 40 to 50 percent of the bolls are open.
- Seed cotton with over 12 percent moisture should be ginned immediately and not stored in trailers, ricks or modules. Heating will occur if moisture content is above 12 percent. The rate of heating and temperature levels tends to increase as moisture content increases above 12 percent. Damp lint caused by dews, rains and green leaf trash is the major source of moisture in seed cotton.

- Keep damp cotton separate from dry cotton. Do not attempt to save planting seed from damp cotton that has been stored for 24 hours or longer.
- Keep strippers and pickers in proper adjustment and repair. Improper adjustment and operation can contribute to higher mechanical damage to seed.

Ginning and Delinting — Serious reduction in seed quality can occur during ginning and delinting following mechanical damage. Some points that should be considered to preserve seed quality during ginning include:

- Bring seed cotton to the gin at a uniform moisture level of 6 to 7 percent.
- Cover trailers, ricks and modules to keep cotton dry in rain or snow.
- Insure minimum damage to seed during ginning by: (1) keeping gin machinery in proper repair and adjustment; (2) avoiding ginning too fast, and avoiding tight seed roll by maintaining reasonable feed rate into gin stands; (3) avoiding short turns in the air conveying system; and (4) not using higher air velocities than needed.
- Keep seed variety pure by using a one variety gin to avoid mixtures. If not available, run one or two bales of the same variety through the gin. Then dump and thoroughly clean out seed rolls.

- Make sure acid delinting is done properly. Over-exposure to acid or failure to neutralize the acid can cause reduction in seed quality. Careful heat control is necessary to protect seed. The natural barrier against destructive organisms and acid is removed when the seed coat is cut or damaged. Therefore, further quality reduction is likely to occur when mechanically damaged seed are acid delinted.
- Due to variation in seed coat thickness, some varieties are more susceptible to mechanical damage than others.

Storage — After seed have been properly ginned, processed and treated with a recommended fungicide, maintaining seed quality depends on proper storage. High temperature and moisture can drastically reduce seed value for planting purposes in a matter of days, whereas high quality seed properly stored will remain viable and suitable for planting for 2 to 3 years. Major factors that insure seed quality preservation during storage include:

- Use clean bags or containers.
- Make sure seed going into storage have a moisture content of 10 percent or less.
- Store seed in a cool, dry area. Avoid high temperature and relative humidity.
- Keep seed away from pesticides and other chemicals that may have a toxic or adverse effect on seed quality.
- Protect seed from storage insects and rodents.

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