Optimum Planting Conditions and Seed Placement for Cotton - LA

Cotton is very sensitive to cool temperatures during germination, which makes planting a critical time for cotton production. Planting cotton before conditions are favorable can have a negative impact on emergence, early growth, and in some situations yield potential. Farmers can give the cotton crop the best start possible by planting according to soil temperature and conditions rather than the calendar.

**Optimum Temperatures**

Soil must be given time to warm up before cotton is planted. For optimum cotton germination, the soil temperature where the seed will be planted (.5 to 1.5 inches deep depending on soil type and water availability) should be at least 65°F. Cotton seed germination can be sporadic at soil temperatures less than 58°F.

Along with warm soil temperatures, it is important to plant cotton when there is a favorable five-day weather forecast for warm temperatures. If cotton seed does not receive favorable conditions in the first five days after planting, the potential for delayed emergence increases which can lead to reduced stands, yield loss, and an increased risk of seedling diseases.

Different tillage systems can alter how fast soils warm up in the spring. Soil in no-till and reduced tillage systems typically do not warm up as fast as convention-till fields. The speed at which the soil warms up will depend on soil texture, color, moisture, and ground cover. The same rule applies for cotton planted in both conservation tillage systems and conventional: do not plant until soil temperature reaches the ideal temperature of at least 65°F.

**Saturated and Flooded Soils**

Along with soil temperature, adequate soil moisture and high soil oxygen concentration are favorable for germination and plant growth. In this region, planting is often driven by soil moisture content. Saturated soils, which may include flooded or ponded soils, can have a negative impact on emergence. The main side effects include plant growth restriction and decreased oxygen availability to the plant. For instance, saturated soils can inhibit root growth, leaf area expansion, and the photosynthetic process. Young plants may develop yellow leaves due to slowing of photosynthesis and plant growth. A prolonged period of saturated soil can reduce germination and emergence due to lack of oxygen. In addition, portions of roots may die as a result of no oxygen. However, there is still a chance for survival unless the growing point is damaged.

The longer an area remains saturated, the higher the risk of plant death. In cotton, the radical tip is easily damaged by chilling, lack of oxygen in the soil, or too much moisture during the first 60 to 100 hours of germination. If the tip is killed, a shallow secondary root system develops that makes the plant more subject to moisture stress later in the season.

**Soil Compaction**

Soil compaction takes place when soil particles are pressed together resulting in decreased pore space and increased soil density. Compaction can result in yield reductions due to decreases in seedling germination, root and plant growth, and nutrient uptake. It is important to realize the majority of soil compaction happens on the first pass, while subsequent passes cause additional, but progressively less, compaction. The best form of management is prevention. That means staying out of the field until conditions for field work have improved. If mud sticks to the tires and ruts are deeper than an inch, it is too wet to be in the field.

**Soil Crusting**

Soil crusting can occur when a crust layer forms on the soil surface as wet soils dry. The crust layer can delay or prevent seedling emergence. In addition, cotton hypocotyls can easily be broken when trying to push through the crust. Crusting may be more common in fields with fine textured soils, low organic matter, and little surface residue, especially where excessive tillage has taken place. A rotary hoe can break up the crust and aid seedling emergence. Timing is essential and breaking the crust as soon as possible is most beneficial. Cooler soils allow seedlings infected with disease to survive longer when trying to break through the crust.
Cotton Planting

Louisiana State University reports that in general, mid-April to mid-May is the first favorable planting window for cotton across the majority of Louisiana. Cotton seed planting depth is typically driven by moisture and soil type. Cotton seed should be planted around a 0.5 to 1.5 inch depth into adequate moisture. Planting deeper than one inch can cause emergence problems. Cotton emerges as the hypocotyl straightens and carries the cotyledons to the surface. The plant requires a lot of energy to complete this process. Therefore, planting too deep can burn energy that could be used during root and leaf area development by the seedling plant. In addition, planting too deep can inhibit emergence in stressful situations, such as soil crust ing and compaction. When dry soils require planting deeper than 1 inch, plant cotton varieties that are more vigorous, typically larger-seeded with greater amounts of stored energy. If soils tend to crust, planting at or close to the 0.5 inch depth is recommended.

University recommendations for final plant stands range from 40,000—55,000 plants per acre, in 38 inch rows, or 2 to 4 seeds per foot. However, a demonstration trial at the Monsanto Learning Center at Scott, MS that evaluated seeding rate by Deltapine® cotton variety by plant growth regulator (PGR) regime indicated yields were similar across all varieties and PGR regimes at seeding rates of 27,000 seeds/acre and above (Figure 1). Planting at lower seed drop rates increase the risk for unacceptable skips (greater than 3 or 4 feet) and delayed maturity due to more bolls set on vegetative (monopodial) branches and distal (3rd and 4th or greater) positions on fruiting branches. Optimum plant population density can vary depending on variety characters.

Summary

Planting when soil temperature and conditions are favorable at the proper depth and seeding rate is very important to give the crop the best chance of emerging properly and getting off to a good start. Waiting for good soil temperatures and conditions may help avoid disease, lack of oxygen to the seeds, and plant growth restrictions. However in some instances, such as a late spring frost, injury may be unavoidable. Although it is important to plant within the acceptable planting window, rushing to plant in cold, wet conditions can lead to yield reducing problems later.

Sources:
5. MSU Cares. What is the recommended seedling rate for cotton. Cotton Production in Mississippi;

For additional agronomic information, please contact your Asgrow®, DEKALB® and Deltapine® Brands Seed Representative.

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Figure 1. Average cotton yield by seeding rate.
Source: Monsanto Learning Center Scott, MS 2012