Crop Profile for Cotton in Georgia

Prepared: July 2006

General Production Information

Production Statistics in 2004

- Georgia ranked 2nd in the U.S. in cotton planted acres and 4th in number of bales produced.
- Cotton is the most widely grown row crop in Georgia.
- Georgia had 1.29 million cotton acres planted and produced an average yield of 675 lb/A.
- Georgia produced 1.8 million bales of cotton.
- Market value of production reached $406.08 million in.
- Georgia ranked 5th in the U.S. for cotton market value in.
Production Regions

The highlighted counties in this Georgia state map represent the leading cotton producing counties within the state.
There are many different soil types in the state of Georgia. The map below is separated into seven different areas representing the dominant soil types throughout each region. The dominant soil order overall within Georgia are Ultisols. Ultisols are made up of weathered material and are acidic soils that are rich in aluminum (Al) and iron (Fe). These soils form in humid subtropical climates with high rainfall and are very commonly found in the southeastern United States. Ultisols have a subsurface horizon of accumulated clays that have distinct colors. The reddish color more commonly known as the Georgia red clay is caused mostly by the presence of iron oxides in the soil. With high rainfall some nutrients (calcium, magnesium, and potassium) have been leached from these soils. The recommended target pH for maximum production in Georigacotton is 6.0. Therefore, the acidic depleted soils found throughout the Southeast are most productive for agriculture when fertilizer and lime are applied. Other nutrients that are managed are phosphorous, nitrogen, sulfur, boron, and zinc.
The Southern Coastal Plain region supports the largest portion of cotton grown in Georgia. It is dominated by the Tifton soil series which typically consists of 11 inch loamy sand. The subsoil consists of a fine sandy loam and sandy clay loam. Twenty-seven percent of the farm land in Georgia is composed of the Tifton soil series and is located throughout the highest cotton producing region in the state of Georgia. The top producing counties lie within the Southern Coastal Plain region.
Cotton Varieties

Cotton variety selection has changed dramatically in the last ten years due to genetic engineering. Variety selection has shifted to herbicide and insect resistant traits that have had a profound shift in production systems. Variety selection favors transgenic technology. The most widely planted varieties include traits which confer significant control or suppression of key pests and/or resistance to the herbicide glyphosate.

The top five cotton varieties planted in Georgia in 2004 are listed in the table below.

<table>
<thead>
<tr>
<th>The Top 5 Varieties Planted (%) in Georgia in 2004, by Technology</th>
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<tbody>
<tr>
<td>Bollgard/Roundup Ready</td>
</tr>
<tr>
<td>DP 555 BG/RR (55.7)</td>
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<tr>
<td>DP 458 BG/RR (4.3)</td>
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<tr>
<td>DP 444 BG/FF (4.2)</td>
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<tr>
<td>DP 449 BG/RR (3.9)</td>
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<tr>
<td>DP 5690 RR (5.0)</td>
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</tbody>
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Percent of total plantings by technology:

<table>
<thead>
<tr>
<th>Bollgard/Roundup Ready</th>
<th>Roundup Ready</th>
<th>Conventional</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>80.9</td>
<td>13.7</td>
<td>4.0</td>
<td>1.1</td>
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Transgenic cotton planted in Georgia accounts for 95 percent of the total cotton grown. The graph below shows transgenic cotton use within the state of Georgia.
Insect Scouting: Scouting for insects and weeds and monitoring plant development are the primary activities requiring pedestrian workers to enter cotton fields during the growing season. Scouting is performed by professional crop consultants and summer scouts (usually high school or college aged individuals) sometimes employed by these consultants and sometimes self-employed, as well as by producers and industry field men. Full time cotton scouts often work in excess of 40 hours per week, and much of this time is spent walking through cotton fields, counting insects and assessing damage and collecting information on plant development. Cotton is scouted heavily from mid-June until late August or early September; each field would routinely be checked once or twice each week. Full time cotton scouts are in direct contact with plants for a large portion of each workday.

Irrigation: Approximately 45 percent of the cotton in Georgia is irrigated via center pivot or towable overhead guns. Irrigation activities require minimum presence of workers in the actual crop field, though there would be time in field roads and irrigation rows. Workers performing such irrigation procedures have limited direct contact with plants.
**Hand Weeding:** Hand weeding is almost non-existent in Georgia.

**Tillage, Spraying, and Harvest:** Individuals performing cultivation, spraying and/or during harvesting are operating motorized equipment, usually from an enclosed cab. Occasionally, it is necessary for equipment operators to dismount in the field to perform minor repairs, such as adjusting cultivators or unclogging spray nozzles. Workers are in direct contact with plants during the time that they are dismounted, but this represents only a small portion of the workday.

### Diseases

The USDA-NASS regularly surveys pesticide usage in Georgia cotton. Their web site includes the most current information about [pesticide usage in Georgia cotton](#).

#### Seedling Diseases

Seedling diseases are caused by many soil borne fungi and can have significant effects on Georgia cotton growth and development. The environmental and cultural practices influence greatly these seedling diseases. Fungi favor early season cool, wet conditions, and are more prevalent in sandy, low organic soils, such as the Tifton soil series. Other factors such as compacted soil, planting depth, seed bed conditions, and nematode or insect infestations all have an impact on diseases. Seedling diseases are caused by fungi that survive on the seed or in the soil infecting seeds or seedlings.

*Rhizoctonia solani*
The most common cause of seedling disease found in Georgia is the fungus *Rhizoctonia solani*. The fungi *Pythium spp.* and *Fusarium spp.* can also cause damage to seedling plants.

*Fusarium ssp.*

Post-emergence damping-off is caused by the fungus *Rhizoctonia solani*. This disease is identified by a brown lesion located at or just below the soil line. The lesion will enlarge and form all the way around the stem, causing the seedling plant to shrivel and die. This disease is known as sore shin and is the most common seedling disease in the state of Georgia. *Pythium spp.* is less common but is characterized by a water-soaked root rot, either before or after emergence.

Seedling diseases are controlled by pre-treating seeds with fungicides before they are planted. In-furrow fungicides in granular or liquid form for additional control of seedling diseases are used on a limited basis. More commonly growers can also control these diseases by avoiding favorable conditions for disease infestation. Good management practices such as planting into warm, moist soils at an appropriate depth using a high quality seed will reduce the incidence and effect of disease infestations.

Fungicides for seedling disease are used only on a limited basis in Georgia because the crop is typically planted in warm soils and long term research has demonstrated only occasional benefits of at-plant fungicides. Approximately 5 percent of the acreage is treated with in-furrow fungicide, primarily PCNB (Terraclor, etc.) or azoxystrobin (Quadris). In 2006, the introduction of the Avicta Complete Pak, an insecticide/nematicide/fungicide seed treatment, includes azoxystrobin and is expected to be used on 15 to 20 percent of the Georgia acreage. For more information please refer to the annual University of Georgia Cotton Production Guide.

**Other Diseases**

An estimated 60 to 70 percent of Georgia's cotton fields are infested with at least one species of
potentially damaging nematodes. Approximately 69 percent are infested with damaging levels of root-knot nematodes, 5 percent with damaging levels of reniform nematodes, and 3 percent with damaging levels of Columbia lance nematodes. Nematodes increase in severity in continuously grown cotton (cotton planted behind cotton). Rotation with crops such as peanuts and others that are not hosts for these specific nematodes reduces nematode problems in cotton. Other management practices such as nematicide applications will help suppress the nematode population within a field. Soil sampling and plant symptomology (root galls, stunting) are used to determine nematode pressure and is the basis for nematicide applications. Also, cotton cultivars with nematode resistance are currently under development.

Some common nematode symptoms are stunting of the plants and/or visual expression of nutrient deficiencies. Some nematodes may also be identified by observing their symptoms associated with the crops roots. For example, root knot nematodes are identified by the characteristic root knots or galls produced as a result of their infestation.

The most aggressive nematicide program, which is used on about 5 percent of the acreage, includes preplant in-furrow fumigation with 1,3-dichloropropene (Telone II) and an insecticidal rate (0.5 lb/A) of aldicarb (Temik). More commonly, growers used elevated rates (0.75 lb/A) of aldicarb for suppression of nematodes and control of insects such as thrips that attack seedlings. Approximately 35 percent of the acreage receives nematicidal rates of aldicarb. The 2006 introduction of Avicta Complete Pak, an insecticide/nematicide/fungicide seed treatment which includes abamectin as the nematicide, will likely impact aldicarb use. The Avicta seed treatment is expected to be planted on 15 to 20 percent of the acres in Georgia in 2006. Compared to the standard in-furrow application of aldicarb, seed treatment has the advantage of reduced applicator exposure. For more information please refer to the University of Georgia Cotton Production Guide.

Bronze Wilt

Bronze wilt is a plant condition that is related to specific cotton genetic background. In 1998 thousands of acres were affected by bronze wilt in Georgia. Bronze wilt has numerous symptoms which come include reddish bronze discoloration in the upper canopy, reddening of plant stems, and loss of fruit.
Tops of the diseased plants first become chlorotic, and then leaf reddening follows. Affected plants are also warmer to the touch in comparison to the normal leaves. Avoidance requires not planting cultivars known to be susceptible has proven to be an effective remedy for bronze wilt.

**Insects**

**Thrips**

Thrips are 1 mm in length and vary in color from yellow, brown, or black depending on the specific species. Thrips are early season pests that feed primarily on the terminal bud and leaves of cotton seedlings. Thrips damage the plant by shredding the plant tissue with their mouth parts and feeding on the plant sap. This feeding then results in crinkled or shriveled leaves and damaged terminals.

**The Bollworm complex**

The bollworm complex is the combination of the corn earworm and tobacco budworm. These two species are very similar in appearance and feeding habits. The larva color varies from green, yellow, pink and brown. Small worms less than 1/8 of an inch long focus on the terminal tissue while the larger worms may cause damage to squares and bolls. Prior to the commercial introduction of Bt cotton in 1996, these pests were among the most frequent and troublesome in Georgia.

Resistance to synthetic pyrethroid insecticides in tobacco budworm is now common in Georgia.
The Two-Spotted Spider Mite

The Two-Spotted Spider Mite is an arthropod and not an insect. There are two distinct dots on the spider mite that correctly identify this very small specie. Spider mite damage results in a leaf with a lighter color while heavy infestations will eventually turn the leaf a reddish color. Control measures are implemented for spider mites only infrequently in Georgia.

Stink Bug

Stink bug populations have become a key pest in Georgia since boll weevil eradication and the introduction of Bt technology. At least three species occur in Georgia, brown, green, and Southern green stink bug. Stink bugs have a distinct shield shape. They feed on developing seeds of many hosts such as cotton. Stink bugs pierce plants with their needlelike mouthparts and feed on sap from seeds, blossoms, and pods. Seeds may become deformed from stink bug feeding during development.

The Tarnished Plant Bug

The Tarnished plant bug is oval in shape and brownish-yellow in color. Tarnished plant bugs have many host plants including cotton. They pierce the plant with their mouth parts and feed on the plant sap. They commonly feed on small floral buds in cotton which the plant will then abort. Excessive floral bud abortion in cotton is commonly associated with heavy plant bug infestation.
**Cutworms**

Cutworms tend to attack plants in their seedling stage. When approached or disturbed, the worm curls up into a ball. This pest favors no till cropping systems in a higher organic soil or following a legume cover. Cutworms seem to be more active at night and will literally cut seedlings down. They also feed on foliage, roots and stems.

**Fall Armyworms**

Fall armyworms are primarily foliage feeders. Their eggs are found in gray masses and the larvae have a distinct Y-shaped mark on the head. Fall armyworms have a wide range of hosts including grasses, grain sorghum, soybeans, tobacco, peanuts, and corn. They are also known to feed on cotton floral buds, blooms, and bolls.

**Beet Armyworms**

Beet armyworms may be identified by the dark stripes along their sides. The young larvae feed on foliage but also feed on blooms, floral buds and bolls. Their favorite host is pigweed but may also be found on soybean, cocklebur, and morningglory. Beet armyworms deposit their eggs on plant foliage and when hatched eat gregariously, and then disperse.
Aphids

Aphids are soft-bodied insects that are dark to light green or even yellow in color. Aphids reside on the underside of cotton leaves and reproduction seems to be almost constant. When feeding, aphids leave sticky honeydew on leaves or other parts of the plant. Damage includes black mold on leaves or exposed lint. Under severe infestations floral bud or boll abortion may occur. A natural occurring fungus, Neozygites fresenii, provides effective control of aphids in most fields in Georgia.

For additional information on any insects in cotton please refer to this link: http://www.gaipm.org/cotton/index.html

The Boll Weevil Eradication Program in Georgia is currently in the containment phase. Boll weevil traps are set-up throughout the state to monitor re-infestations. All cotton fields are monitored to avoid re-entry into Georgia.

Insects in cotton can have a detrimental affect on crop yield when not properly managed. Monitoring insect pests will determine if a threshold has been reached. Thresholds are the pest density levels at which action must be taken to prevent economic damage. Proper scouting allows growers to determine when a threshold has been reached for timely applications of pesticides.

Beneficial insects are an excellent way of controlling specific insect pests. These natural controls are the most economical pest management tools in any agronomic crop. The presence of beneficial insects may delay the need for some pesticide applications. It is crucial to maximize these beneficial insects to reduce production costs. This emphasizes the importance of good scouting and timely pesticide applications.

Because Bollgard technology provides season long control of lepidopteran pests resistance management is a priority. Management practices to slow resistance development include a refuge (i.e. area planted to non-Bollgard technology). Multiple genes have also been developed to provide multiple modes of action in lepidopteran control, which is also useful for resistance management.

The success of the Boll Weevil Eradication Program and the widespread adoption of Bt cotton have had dramatic effects on insect management in cotton. The introduction of the pyrethroid insecticides in the late 1970s reduced the number of in-season insecticide applications from 15 to 20 per year to 10 to 12. Eradication of the boll weevil by 1992 and increased reliance on beneficial insects in IPM programs
further reduced the number of insecticide applications to 4 or 5 per season. Bt cotton occupied 89 percent of the acreage in 2005. The success of Bt cotton initially lowered the average number of in-season insecticides treatments to less than 2, but with the resurgence of stink bugs as a key pest, that number has increased to 3 per year. In 2005, Georgia producers treated cotton 3.1 times with insecticides, primarily for stink bugs and also for corn earworms. Most widely use insecticides included dicrotophos (Bidrin), methyl parathion, and pyrethroid compounds for stink bugs and pyrethroids and spinosad (Tracer) for larval pests. Documentation of pyrethroid resistance in tobacco budworms has existed for several years, and there is growing concern about the response of corn earworms to pyrethroids. Insecticide applications are made routinely with enclosed high clearance sprayers or spray planes. For information on chemicals and rates used to control insects in Georgia cotton please refer to the University of Georgia Cotton Production Guide.

Weeds

Weeds always have been and always will be an issue in production agriculture. Effective weed management is one of the critical parts of successful cotton production as cotton does not compete well with weeds. Cultivation has been important in weed management programs in the past. However, as better weed management technology has become available the need for cultivation has decreased. Many growers have adopted reduced-till technology.

Roundup Ready cotton is one of the major technological advancements that have greatly impacted Georgia. Roundup Ready cotton is resistant to the herbicide glyphosate, a non-selective herbicide effective on a variety of weed species. In Georgia, 95 percent of the cotton grown is resistant to glyphosate. There are also Roundup Ready soybean and corn planted throughout the state. Unfortunately, glyphosate resistant weeds have been identified in a few states.

Over utilization and mismanagement of glyphosate may expedite the development of other glyphosate resistant weeds. A key component in establishing a resistance management strategy is to mix different herbicides to provide multiple modes of action in a production system. The use of other herbicides during the growing season will also delay resistance development.

Due to the extensive use of glyphosate in Georgia cotton weed shifts have occurred. Weed shifts are caused by extensive use of one product allowing weeds that previously were not present to populate an area. Thus, most noxious weeds in cotton production are difficult to control with Roundup.

Tropical spiderwort has recently become the most troublesome weed in Georgia cotton. Use of conservation tillage and Roundup Ready technology has led to dramatic increase in tropical spiderwort. Tropical spiderwort is very difficult to control because of its ability to tolerate glyphosate. Research has shown this plant has a season-long pattern of emergence and the ability to flower below ground.
Yellow and purple nutsedge (nutgrass) are perennial species that have 3-angled stems and produce rhizomes and tubers beneath the ground. Nutgrass is able to produce hundreds or several thousand seeds in a given year. Both are common in cotton throughout Georgia.

Johnsongrass has long been known for its ability to grow and reproduce within production systems. Johnsongrass has the ability to reproduce from underground seeds and stems. This weed specie seems to thrive in warm conditions and is commonly found in moist soil.

Morningglory is an annual vine with heart shaped leaves that is most commonly found climbing in most agronomic crops. Morningglory is found in cultivated fields, gardens, waste places, and roadsides. Seeds are the only source of reproduction.

Pigweed is an erect summer annual that can reach 6 feet tall. Seeds are the only source of reproduction and are commonly found in cultivated fields, gardens, waste places, and roadsides.

Florida pusley is an erect to prostrate annual. This weed is typically a problem in most Georgia sandy fields. It is also found on roadsides, turf, and waste areas. This weed is will bloom in any month that lacks frost.

Dayflower is an annual in the spiderwort family. The leaves have parallel veins and produce numerous blue flowers. Dayflower has an extended germination rate and has some tolerance to glyphosate.

In 2005, UGA scientists documented the occurrence of glyphosate-resistant palmer amaranth in cotton
in central Georgia. Field and greenhouse studies have confirmed an 8-fold resistance. Work is on-going
to determine the distribution of this biotype but early indications are that the resistant biotypes occur
over at least a three county area.

With the extensive plantings of Roundup Ready cotton in Georgia, glyphosate is heavily used both as a
preplant burndown treatments in conservation tillage systems (which are employed on about 45 percent
of the acreage) and in crop as over-the-top and directed treatments. Glyphosate use rates range from 0.5
to 0.75 ae/A and many fields are treated at least three times per season. To improve cool season
broadleaf weed control in reduced tillage systems, 2,4-D is used in February to March. The spread of
tropical spiderwort and the occurrence of glyphosate-resistant pigweed prompts a return to greater use of
residual herbicides, including pendimethalin (Prowl), diuron (Direx), pyrithiobac (Staple) and
metolachlor (Dual, etc.). In the spring of 2006, a Section 18 Crisis Exemption was issued for the use of
fomesafen (Reflex) as a preemergence treatment for control of glyphosate-resistant palmer amaranth;
full registration (Section 3) is expected by mid-summer. As with insecticides, high clearance sprayers
are used extensively for herbicide applications. For more information on weed control please refer to the
University of Georgia Cotton Production Guide.

**Plant Growth Regulators**

The plant growth regulator mepiquat is used extensively in Georgia. Use has increased significantly in
recent years due to the cessation of a prolonged drought (1998-2002) and due to the widespread planting
of a very vigorous, full maturity variety which requires aggressive height management. Applications
would typically be initiated at the early square stage and continue through mid-bloom. Mepiquat rates
vary considerably, both in a single application and total season use.

Standard application rates of mepiquat range from 6 to 16 oz/A. In dry years on non-irrigated cotton,
growers would be very conservative, using none to perhaps as much as 1 pint. In irrigated culture,
standard programs might be 8 to 12 oz/A at early square stage followed by 16 oz/A and sometimes by
another treatment. Common total use probably is 30 to 50 oz/A per season. Because of rank growth of
DP 555 BG/RR, the most widely planted variety in the state (73% of acreage in 2005), some growers
use in excess of 50 oz/A attempting to modify its growth.

**Harvest Aid Products**

Harvest aids are used extensively to defoliate plants, open bolls, and inhibit regrowth. A myriad of tank
mixtures are used, including products such as tribufos (DEF), thidiazuron (Dropp, etc.), ethephon,
carfentrazone (Aim), pyraflufen (ET), and others. At least 95 percent of the acres are treated with
harvest aid products. Harvest aid products are applied by air or with a hi-clearance sprayer.

A small percentage of the acreage (about 5 percent) would involve a two step defoliation program, a preconditioning treatment followed by standard defoliant/boll opener treatment. Another small percentage (again, perhaps 5 percent) would necessitate retreatment because of failure of the initial treatment. Such failures might occur because of excessive rainfall, rapid temperature changes, underestimation of regrowth potential, etc.

Contact

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