



Cotton Growth Management

- Closely monitoring cotton growth helps growers determine when to apply a plant growth regulator (PGR), which can help increase cotton fiber quality and yield potential.
- Understanding the growth habit and PGR response of a cotton variety is important for developing a growth management strategy.

Cotton is a perennial plant with varying levels of indeterminacy that are independent of maturity group. Understanding the degree of indeterminacy can help with placement and management of a cotton variety. Varieties with a more indeterminate growth habit can sustain terminal growth longer than less indeterminate varieties. Although node counts may be similar prior to bloom, more indeterminate varieties can continue to produce nodes while less indeterminate varieties advance toward cutout. Cotton varieties that are more indeterminate may produce nodes and fruit even in stressed growing conditions, but maturity can be delayed for late-set bolls. Cotton specialists recommend monitoring cotton plant growth and applying plant growth regulators (PGRs) to help prevent excessive growth, especially for more indeterminate varieties.

Cotton Growth Monitoring

Several measurements can be used to help monitor cotton growth (Table 1). Using a combination of these measurements can provide a more accurate evaluation of crop growth. During bloom, record plant height, mainstem node growth rate, nodes above white flower (NAWF) counts, square retention, and maximum internode distance on a weekly basis.

Table 1. Recommendations for growth control according to cotton growth measurements at first bloom and field conditions.		
Measurement at first bloom	Growth control measures may be needed	Growth control measures may not be needed
Height	> 28 inches	< 24 inches
Growth rate per day	> 1 inch	< 0.7 inch
Mainstem node growth	< 3 days/node	> 3 days/node
Mid	> 3 inches/node	< 2 inches/node
Vegetative nodes	> 7.0	< 5.5
Bottom five retention	< 60%	> 90%
Top five retention	< 80%	--
NAWF at first bloom	> 8.5	< 7
Weather	Cloudy/Rain	Sunny/Warm
Water relations	Excessive	Droughty

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Plant height. Mainstem height is one of the most common cotton measurements and is useful in making management decisions when combined with other information. Generally, at first bloom or shortly thereafter, cotton is growing at its maximum rate. A growth rate of about 1 inch per day is the upper limit of acceptable growth.

Mainstem nodes. Development of mainstem nodes is also close to its maximum rate near first bloom. There should be a new mainstem node about once every 2.5 to 3 days, or approximately one every 40 to 50 DD60s. Water availability and carbohydrate production are the main influencers of mainstem node development.

Squaring nodes. The maximum number of fruiting branches prior to bloom, or the maximum NAWF, is an excellent indication of vigor. Measurement of NAWF is effective because it directly corresponds to energy absorption by the reproductive and vegetative demands of the plant. This measurement monitors the difference between the rate at which squares reach bloom and the rate that new mainstem nodes are produced.

As NAWF declines, nodes are being produced slower than first fruiting position squares reach bloom. This value ranges from 5 to 10, with 8 and 10 nodes being most common if stress has not been a significant factor. Values of 7 or less at first bloom indicate low vigor and using a PGR is not recommended until the stress is alleviated. If the value is closer to 10 and/or does not decline at a rate of about 1 node per week, vigor is high and using a PGR may be beneficial. NAWF of 5 indicates the plant is entering cutout.

Maximum internode distance (MID). The distance between the 4th and 5th nodes from the terminal is the most sensitive measurement of current vigor. It encompasses the effects current inputs are having on growth and the relationship between carbohydrate supply and demand. After first bloom, if this distance exceeds approximately 3 inches, current growth is vigorous and needs control. If it is less than 2 inches, growth is limited and may need investigation. In some situations, cotton with a MID under 2 inches may be a normal response to retention, PGRs, and environment. Mepiquat chloride rate and timing sticks (Figure 1) are available to provide recommendations according to the average internode length of the top five nodes of the plant. The longer the internode length, the higher the recommended rate.

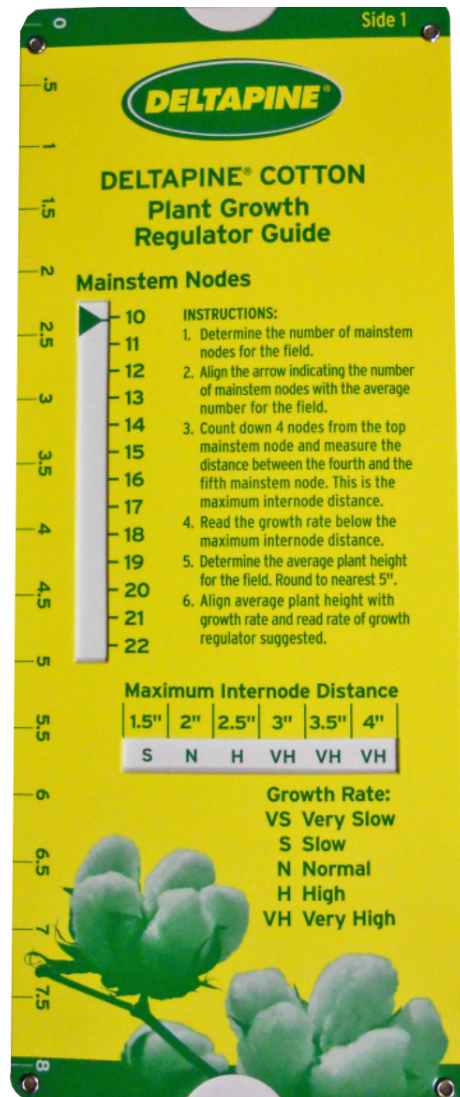


Figure 1. A mepiquat chloride rate and timing stick can help provide recommendations based on internode length.

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Table 2. Response of Deltapine® brand cotton varieties to growth management with mepiquat.

Very Responsive	Responsive	Moderately Responsive	Least Responsive
DP 2115 B3XF	DP 2335 B3XF	DP 2317 B3TXF	DP 2349NR B3XF
DP 2239 B3XF	DP 2012 B3XF	DP 2328 B3XTF	DP 2055 B3XF
DP 2123 B3XF	DP 2020 B3XF	DP 2333 B3XF	DP 1851 B3XF
DP 1908 B3XF	DP 2022 B3XF	DP 2211 B3TXF	DP 1840 B3XF
DP 1820 B3XF	DP 1909 XF	DP 2131 B3TXF	
DP 1822 XF	DP 1916 B3XF	DP 2127 B3XF	
		DP 2141NR B3XF	
		DP 2143NR B3XF	
		DP 2038 B3XF	
		DP 2044 B3XF	
		DP 1948 B3XF	
		DP 1845 B3XF	
		DP 1646 B2XF	

Cotton varieties are categorized by percent growth reduction based on height measurements in untreated, passive, and aggressive PGR systems.

Managing Growth with PGRs

Mepiquat chloride and mepiquat pentaborate both contain mepiquat which is an anti-gibberellin growth retardant that reduces plant cell enlargement to help balance vegetative and reproductive growth. When applied to cotton, it can help control rank growth by reducing stem elongation at newly formed internodes. The application of PGRs can help increase fruit retention and promote earlier maturity, reducing the crop's risk of late-season insect damage, boll rots, and harvest losses. Mepiquat applications have been linked to increased cotton yield potential when applied at the optimum rate and timing for the variety and field planted.

Understanding the growth habit of a variety is important to manage vegetative growth. Certain varieties can have a more aggressive growth pattern and PGR rates and timing must be managed accordingly. The projected response of Deltapine® cotton varieties to the application of mepiquat is provided in Table 2. Varieties that are most responsive

may need lower rates or fewer applications of mepiquat, whereas varieties that are least responsive may require timely early-season applications at higher rates or multiple applications to control vegetative growth.

For cotton varieties in the moderately and least responsive categories, growers should plan to apply mepiquat at 8 to 10 nodes (match-head square) and aggressively apply mepiquat if there is a history of rank growth, if the crop received early rainfall, or was planted behind a crop where a high nitrogen rate was applied. Mismanagement of PGRs can have a negative effect on yield potential, especially when applied too early, when cotton is stressed, or when applied to a less indeterminate cotton variety.

In-season cotton plant monitoring provides the best information to determine application rate and timing of growth control measures. Every cotton field is under different conditions so growth management strategies should be tailored to each field situation.



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Sources

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