

Cotton Plant Growth Regulators – Timing And Rates

DR. SAM ATWELL AND ANDREA PHILLIPS

PORTAGEVILLE, MO.

Cotton is a semiarid, subtropical, perennial plant. PGR's block some Gibberlin production in cotton. Gibberlins cause plant cells to expand and grow larger. Like some natural hormones, Pix blocks some of this activity which causes the cotton plant cells to be more compact and shorter. This causes the internode length or stem between the nodes to be more compact and shorter and the results are a shorter more compact plant. All other parts of the plant produce, grow and develop the same as the untreated. Pix is a tool that allows cotton growers to apply inputs to achieve maximum yields without fear of losing control of the vegetative stage of his crop.

Questions:

Why use a PGR?

Which PGR should I use?

When should I make the first application?

What rate per acre?

When should I make the second application?

What rate per acre?

When should I make the third application?

What rate per acre?

What about Varieties, Plant Date, Population, Soils, Fertility, Irrigation, Weather, Insects, Boll Rot, Rank Growth,

Defoliation, Harvest?

What about Cotton Morphology or Structure, Shorter Internode Length, Fruiting Nodes and Positions, Boll Set, Nodes above White Bloom, Darker Green, Cut Out, Boll Opening, Picking, Ginning and Grades?

Lots of late planted cotton in 2011.

We recommend that growers make growth management decisions on a case-by-case and field-by-field basis, as opposed to a one-size-fits-all approach, generally have similar effects on plant growth. Therefore, when applied at similar rates (except for Stance), similar results should be expected. Stance® contains a different concentration of mepiquat than other mepiquat products, and also includes cyclanilide Cotton Growth Regulators such as Mepaquat chloride (Pix) and Penta-borate (Pentia) and mepiquat cyclanilide (Stance) are used for several purposes. Due to a different formulation Stance is used at a much lower rate. PGR's blocks Gibberelin which promotes plant growth. This buffers the extreme growth habits of cotton on various soil types and conditions within a field. Regulating the growth of cotton under these conditions allows the growers and consultants to economically apply other resources for maximum yields. The cost of PGR's has decrease greatly in recent years.

PGR Trial at Lee Farm by Andrea Phillips/Rate and Timing Study 2011

Treatment dates and timing:

Rates are: Untreated, 8, 16 and 32 ounces per treatment.

June 30 Matchhead application

July 15 Application 2

July 28 Application 3

Nodes above white flower and fruit load throughout the bloom period: The number of nodes above a first position white flower (NAWF) should start at 9 to 10 at first bloom (14 to 16 total plant nodes) in healthy, vigorously growing cotton and 7 to 8 at mid bloom (2 to 3 weeks after first bloom) and progress down to 3 to 4 (4 weeks) on to zero or cut out at (5 weeks bloom).

This number should gradually decrease throughout the bloom period until the cessation of fruiting. Usually, terminal growth slows as this number decreases and a boll load accumulates.

If NAWF is significantly less than 9 at 1st bloom (7 or less), then this could be an indicator

of some sort of stress (primarily drought) which occurred prior to bloom. This could also be a result of prior PGR treatments, thus a PGR application may not be necessary, especially in dryland fields. If NAWF is 9 to 10 or greater at first bloom, a PGR application may be justified if soil moisture is sufficient and there are no signs of current drought stress.

Internode distances: A very strong and one of the best indicators of vigorous growth is the distance between adjacent plant nodes, between the 4th and 5th leaf from the terminal, which is generally the uppermost internode that has fully expanded. Longer distances between these nodes are an indicator of greater terminal "horsepower" or growth potential. This is often a much better indicator of growth potential than height-to-node ratio, because height-to-node ratio may sometimes fail to account for the current growth rate.

If internode distances between the 4th and 5th leaf from the terminal are around 3 to 5 inches, then the plants are growing vigorously, possibly requiring a PGR application. If internode distances are much less than 3 inches, then the plants may be encountering some sort of stress (primarily drought) and terminal growth has slowed, therefore a PGR application may not be necessary.

The environment tends to play a very strong role in the necessity of PGR applications...just because you grow cotton in a dryland field, does not mean that excessive growth can't occur, and vice versa for irrigated fields. The same idea applies to variety maturity. PGRs should only be applied on an as-needed basis, when there are signs of current and expected vigorous growth.

Understand what mepiquat-containing PGRs do not do, as there are some misconceptions. Mepiquat does not stimulate flowering and does not create more bolls per plant. At best, mepiquat may improve retention of some bolls, but it does not cause the plant to produce more bolls. Lastly, and most importantly, yield responses to mepiquat are inconsistent yields.

So why use PGRs?

Some of the more beneficial effects, again which may or may not occur, are improved fruit retention on lower nodes and earlier maturity (generally more beneficial to later planted cotton), and especially later planted irrigated cotton), improved harvest efficiency, reduced impedance of insecticides/fungicides/harvest aids, reduced boll rot, reduced lodging of plants, and potentially increased yield.

The likelihood of achieving one or more of these positive results greatly increases if the environment is likely to result in (or has historically / consistently resulted in) excessive vegetative growth, but even then, these results may or may not occur.

Once consideration has been given to the variety's growth potential, the environment (irrigated versus dryland), field history, planting date, etc., growers should then make PGR decisions based on other factors that may indicate whether or not excessive growth is likely.

Some say there are risks associated with mepiquat applications, especially when improper rates and/or premature application timings are implemented. Keep in mind that mepiquat should be used in a manner to prevent rank growth from occurring. Our studies show that Pix does that very well with no ill effects on cotton at very high rates. On the other hand these studies show no added benefit to rates greater than the label. Δ

DR SAM ATWELL: Agronomy Specialist, University of Missouri

ANDREA PHILLIPS: Research Specialist, University of Missouri