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Cotton Insights Newsletter

A service provided by Windstar, Inc. affiliated gins.

June 30, 2022

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Plant Growth Regulators

Mepiquat-based plant growth regulators or PGRs (such as Pix Ultra, Mepex, Mepichlor, Mepiquat Chloride, Mepex Gin Out, Stance, and others) have been available for many years. Companies are constantly enhancing formulations, but the main active ingredient in nearly all of these products is mepiquat chloride. Some premium products include various enhancements to mepiquat chloride or contain mepiquat pentaborate (Pentia).

- Mepiquat chloride (MC) reduces production of gibberellic acid in plant cells that in turn reduces cell expansion, ultimately resulting in shorter internode length. MC will not help the plants compensate for earlier weather or disease damage. It does not increase growth rate.
- MC cannot and will not shrink the plants, it only reduces cellular expansion of new growth.
- It may, under good growing conditions, increase fruit retention, control growth and promote earliness. MC should not be applied if the crop is under any stresses including moisture; weather; severe spider mite, insect, or nematode damage; disease stress; herbicide injury including herbicide damage (for example 2,4-D, dicamba, etc.) due to drift or from tank contamination; or fertility stress.
- Results from replicated testing indicates that a 5 to 20% reduction in plant height (compared to the control) can be obtained from 16 oz of 4.2% a.i. MC material applied in up to 4 sequential 4-oz/acre applications starting at match head square (MHS) and ending at early bloom. It is generally possible to reduce about one node from the growth of the main stem, which can result in about 3-5 days earlier cutout.
- Low rate multiple applications initiated at MHS have generally provided more growth control than later higher rate applications made at first bloom or later.

- Research trials have shown that statistically significant increases in yields are not generally obtained, but excellent growth control is consistently provided. Many times we don't see a lot of differences in performance of these products with respect to growth control.

Available Products

Mepiquat based products have been around for many years. Several generic PGRs based on the same active ingredient are now available. Refer to the product labels or contact company representatives to ensure you understand the correct use of these products.

Pix Ultra, Mepex, Mepichlor, Mepiquat Chloride and other generics

- Range from 3.9% to 4.2% active ingredient (a.i.)/gallon or 0.35 lb/gallon a.i.

Mepex Gin Out

- 4.2% a.i./gallon or 0.35 lb/gallon a.i. with 0.0025% Kinetin (a cytokinin).
- Cytokinins are plant hormones that promote cell division and growth and delay the senescence of leaves. This product has use guidelines similar to other MC materials.

Pentia

- Active ingredient has a different molecular structure than mepiquat chloride, and contains mepiquat pentaborate.
- 9.6% a.i./gallon or 0.82 lb/gallon a.i. Typically Pentia has similar use rates when compared to 4.2% MC products.

Stance

- This product is a MC based PGR, but it has a 4 to 1 ratio of MC and cyclanilide (0.736 lb/gallon MC plus 0.184 lbs/gallon cyclanilide). Cyclanilide is an auxin synthesis and transport inhibitor. Auxins are biological compounds which have the capacity to induce cell elongation. Therefore, the inhibition of auxins could reduce cell elongation and inhibit growth. Producers should be aware that the MC concentration in Stance is about twice as high as most of the other products, plus when considering the effect of the cyclanilide synergist, THERE IS A CORRESPONDING REDUCED USE RATE (check the label).

Considerations

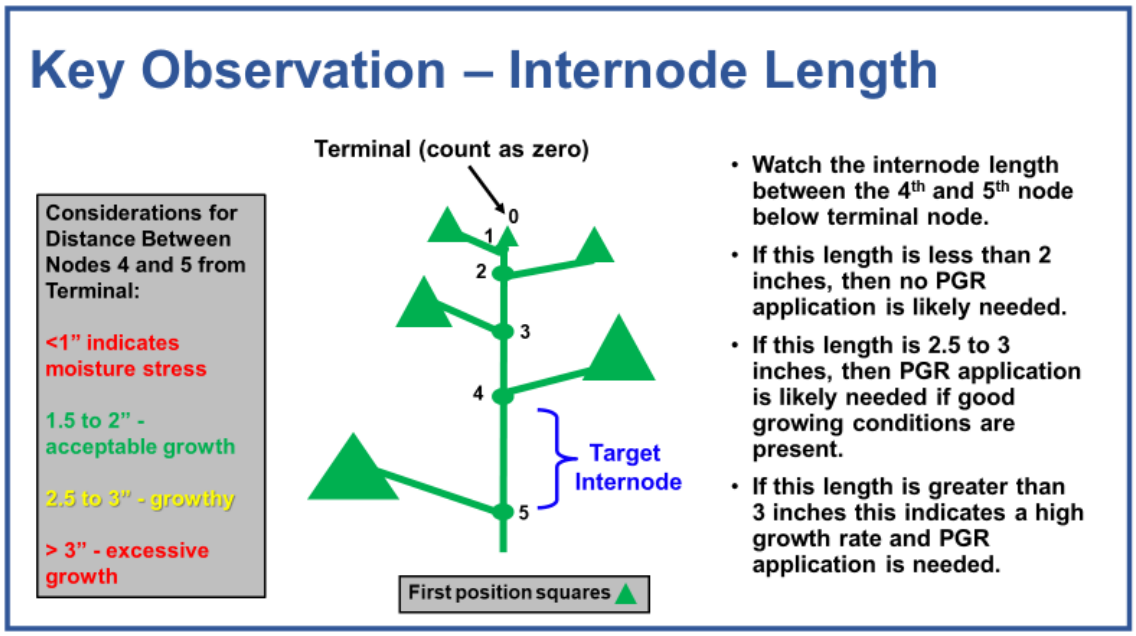
- Consistent yield increases have not been observed from any of the MC materials we have investigated.
- A good boll load will normally help control plant growth. Fields with poor early-season fruit retention, excellent soil moisture, and high nitrogen fertility status may be candidates for poor vegetative/fruiting balance and should be watched carefully.
- Specifically, varieties with genetically vigorous growth potential and in general, all others that have a high likelihood of excellent vegetative growth conditions should be considered for PGR applications.

- Some varieties tend to be smaller, more compact, have fewer vegetative branches, and have a lower node of first fruiting branch.
- Many newer varieties tend to be taller, have more vegetative branches, and have a higher node of first fruiting branch.
- Conditions favoring high vegetative growth potential include low early season fruit retention, high nitrogen fertility, and high irrigation capacity and/or high rainfall resulting in ample soil moisture.
- It is difficult to stop some varieties when they have ample resources to grow.
- Growth rate is reduced by high fruit set and drying soil.
- Note that some varieties respond better to mepiquat based PGRs than others.
- For brush roll header stripper harvest, 28-32 inch tall plants optimize stripper-harvesting efficiency. If possible, target a maximum plant size of about 28-32 inches for varieties under high input irrigation (sub-surface drip or high capacity pivots). If plants get larger than 36 inches, harvest efficiency and productivity can drop significantly.
- For spindle picker harvesters, larger plant size for high yielding cotton is not as much of a harvesting consideration. Pickers can handle higher yielding, taller plants with much greater ease than stripper harvesters, especially when the stalks are still alive (or "green"). However, if harvesting operations are delayed until after killing freezes are encountered, large brittle plants can result in picker harvesting difficulties.

Application Rates, Varieties, and Production Environment

- Determination of application rates for these products is generally more "art" than "science."
- In ultra-short season environments it is necessary to target growth potential early in the season.
- ***Know the growth potential of <u>your variety</u> and recognize the factors which provide it with the ability to reach its genetic growth potential. Genetics, available water, fruit retention status, and fertility effects are critical to plant size.***
- Applications should begin when 50% of the plants have one or more matchhead squares (see specific product label for more information). Labeled rates of MC are typically 4-8 oz/acre at this stage (or about 1.5-2 oz/acre of Stance).
- It is best to manage high growth potential varieties using higher pre-bloom rates if conditions favor excessive growth for an extended period of time. ***It is imperative to not be late with these applications.***
- Fields should be scouted and if applications are necessary these can be done on 7-14 day intervals. Labeled MC application rates are typically 4-12 oz/acre just prior to bloom, then 12-24 oz/acre at bloom stage.

- Note that the maximum labeled rate per application of these MC type products is typically 24 oz/acre. The maximum labeled rate of MC per acre per season is 48 oz/acre. See specific product label for more information.
- If applications are initiated pre-bloom, that will help reduce the need for typically less effective higher rate or "firehose" applications at first bloom and later.
- The current growth rate is best measured by the internode length between 4th and 5th node below the terminal (counted as zero).



- A sustained high growth rate over time most likely indicates poor fruit retention and/or conditions favoring excessive growth, and/or a variety with high growth potential.
- Watch high growth potential varieties and fruit retention. If a high growth potential variety has been planted and has low fruit retention, then PGR application should begin early and with the MC rate increased, especially under high water, fertility, and good growth conditions.
- Many newer varieties generally need aggressive management under high irrigation capacity and/or if heavy rainfall conditions are encountered. The situation that has arisen due to the release rate and availability of new genetics is challenging.
- ***Visit with your seed company representative to determine which varieties should be watched closely for PGR needs under field-specific conditions, and the expected response of particular varieties to PGR application.***