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Plant Growth Regulators

Questions concerning mepiquat-based (Pentia, Mepex, Mepichlor, Mepiquat Chloride, Mepex GinOut, Stance and others) plant growth regulators (PGRs) are being asked. Pricing of these materials varies significantly. Mepiquat chloride (MC) has been around now for years. Our results have shown that we usually do not get statistically significant increases in yields, but do get excellent growth control.

In 2006, Bayer CropScience began marketing a new mepiquat chloride based PGR. This product is called Stance. It is a 4 to 1 ratio of mepiquat chloride and cyclanilide (0.736 lbs/gallon mepiquat chloride plus 0.184 lbs/gallon cyclanilide). Cyclanilide is an auxin synthesis and transport inhibitor. Auxins are generally referred to as compounds which have the capacity to induce cell elongation. The inhibition of auxins could reduce cell elongation and inhibit growth. We have had the opportunity to work with this material over the last three years. **Producers should be aware that the mepiquat chloride concentration in Stance is about twice as high as most of the other materials we have become accustomed to applying. THEREFORE, THERE IS A CORRESPONDING REDUCED RATE.** If you have specific questions concerning this product, visit with your local Bayer CropScience representative.

Pix, Mepex, Mepichlor, Mepiquat Chloride and other generics
4.2% active ingredient (a.i.)/gallon or 0.35 lb/gallon a.i.

Pix Plus
4.2% a.i./gallon or 0.35 lb/gallon a.i. with Bacillus cereus (BC) strain BP01 bacteria (reported to increase uptake of MC).

Pentia
Mepiquat pentaborate molecule (different structure than MC)
9.6% a.i./gallon or 0.82 lb/gallon a.i.
It has been reported that the physiological effect of Pentia is "hotter" oz for oz than MC, however, BASF's suggested use rates are essentially equivalent to Pix.

Mepex GinOut
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.

Stance
Mepiquat chloride (8.4% or 0.736 lb a.i./gallon) with cyclanilide (2.1% or 0.184 lb a.i./gallon)
It has a lower use rate than other mepiquat-based PGRs (2-3 oz/acre - see label)
Has higher concentration of MC than other 4.2% or 0.35 lb a.i./gallon products
Cyclanilide is an auxin synthesis and transport inhibitor. Auxins are compounds which have the capacity to induce cell elongation. The inhibition of auxins could reduce cell elongation and inhibit growth.

General Comments

Mepiquat chloride 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 by increasing growth rate. It may under good growing conditions increase fruit retention, control growth and promote earliness. MC should not be applied if crop is under any stresses including moisture; weather; severe spider mite, insect, or nematode damage; disease stress; herbicide injury; or fertility stress. Results from our replicated testing indicates that we typically observe from 5 to 20% reduction in plant height (compared to the control) 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 and ending at early bloom. We have been able to "shave" about 1 node from the growth of the main stem at some locations, which can result in about 3-5 days earlier cutout. 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.

Growers who have planted picker varieties (many of which are more indeterminate than most of our stripper types) and have conditions resulting in high growth potential need to be concerned. Growth potential of some of these varieties is considerably greater than many of our stripper types. For brush roll header stripper harvest, 28 32 inch tall plants optimize stripper harvesting efficiency. If possible, target a maximum plant size of about 32 inches for picker varieties under high input irrigation (drip or high capacity pivots). If plants get larger than 36 inches, harvest efficiency and productivity drop significantly.

Determination of application rates is generally more "art" than "science" for these products. Based on label information, applications must begin no earlier than 50% matchhead square. It is best to get a handle on excessive growth potential early if conditions favor excessive growth for an extended period of time. Herein lies the High Plains dilemma: It is unknown at that time as to how weather will affect the crop in July. Will we get 100+ degree temperatures, southwest winds at 30 mph at 10% relative humidity? If so, those conditions will limit plant growth in many fields with low irrigation capacity.

With all of the new varieties out there, I suggest you visit with your seed company representatives concerning the specific varieties you have planted in high-input fields concerning the amount of growth potential you might expect. We noted in 2004 and in 2005 that many fields did get growthy due to variety and the considerable rainfall we obtained. We

usually see July weather turn hot and dry, which limits growth in many fields (even with "good" irrigation capacity). If mepiquat-based PGRs are used, data from Extension field projects indicate that it is usually best to initiate low-rate multiple applications of these products, making adjustments for growing conditions as the season develops. The bottom line here is to manage each specific field that may have high growth potential. High fruit retention should help "tie the plants down" unless we encounter significant losses due to square thieves such as Lygus bugs and fleahoppers. Insect management will be very important this year due to the late crop in many areas. Watch picker varieties and fruit retention. If poor fruit retention is encountered and the cause addressed, then MC rate should be increased, especially under high water, fertility, and good growth conditions. One should target applications to fields with high growth potential.

Some picker varieties may need aggressive management under high irrigation capacity and/or if high rainfall conditions are encountered. The situation that has arisen due to the release of new genetics is challenging. In 2007, numerous new Roundup Ready Flex and Liberty Link cotton varieties were planted, and I think growers should be on point on this issue. Visit with your seed company representative to determine which new varieties should be watched closely for MC needs under field-specific conditions. Use MC to limit plant size. Sequential applications can be adjusted to meet subsequent crop conditions and growth potential.

Some decision tools are available, including the Pix Stik and Pentia Stik from BASF, which are used to measure the uppermost 5 nodes (down from the terminal which is counted as zero). The Pix Stik suggests use rates for various average internode lengths beginning at 50% matchhead square and in the absence of stress. For an average of 1.5 to 1.8 inches, 4-8 oz / acre are suggested. For average internode lengths greater than 1.8 inches, 8-16 oz / acre are suggested. Follow up assessments every 7-14 days are also suggested. Applications must begin no earlier than 50% matchhead square.