

PLANT GROWTH REGULATOR USE

The best “growth regulator” for cotton is good, early fruit set and retention, as this will generally deter excess vegetative growth. Therefore, N levels, soil moisture, insect control, plant population, and crop management influence the cotton plants’ ability to balance vegetative and reproductive growth. There are two ways to influence the plants vegetative/reproductive balance. An indirect influence would be timely applications of boron, which aids flowering and fruit set. As a management tool, the growth regulator mepiquat is specifically used to reduce vegetative growth.

Mepiquat is available several formulations sold under the trade names of Pix, Mepex, Mepex Ginout, Topit, Mepichlor, Pentia, and Stance among others. Mepiquat has a number of effects on cotton growth and development. The most consistent effect of mepiquat is the reduction of plant vegetative growth by shortening internode length. It also reduces leaf area in portions of the plant canopy where stem and leaf expansion are taking place. It controls growth in such a way that does not create carbohydrate stress in the plant.

Mepiquat applications are also often associated with a slight increase in early fruit retention and thus, contributes to a trend toward early maturity. Yield responses have been erratic. Slight increases, slight decreases, and no effect are prevalent in the volumes of research dealing with mepiquat. Yield advantages observed with mepiquat products, are most often linked to situations in which the product contributes toward reduced boll rot and increased harvest efficiency.

Mepiquat formulations which include the hormone kinetin (Mepex Ginout), or formulated as a pentaborate salt (Pentia) as opposed to a chloride salt (all others) have NOT provided superior yield responses in UGA trials. In 2005 and 2006 several small and large plot trials were conducted to evaluate Stance (a premix of mepiquat chloride and cyclanilide). Growers are advised to use this product on a limited basis until a larger knowledge base can be gained.

Currently UGA data indicates that all mepiquat-containing products should be used at the same rates and timings, with the exception of Stance. *The use rate of Stance recommended by Bayer CropScience is 3 oz/A in all situations. This rate may be lowered to 2.5 oz/A if the first application is made prior to, or at the initiation of squaring.* Again, this product has been evaluated in the field by UGA Extension for only a couple of years.

Even though mepiquat has been available for over 25 years, questions persist about how to use the product. Indications from the literature show that a given rate of mepiquat in a small plant leads to more height/growth reduction than that rate in a large plant. This is related to concentration -- the concentration of a given rate of mepiquat will be greater in a small plant and more dilute in a large plant. If the product is applied when vegetative growth is about complete, little effect on height occurs. After a leaf has fully developed and internodes have elongated, no amount of mepiquat can shrink them. Vigorous plants show less response (reduction in internode length, duration of growth control, etc.) than slower growing plants. In growth chamber studies in Mississippi, mepiquat had less effect on cotton grown at high temperatures (>95^o f) or on plants under drought stress. Therefore, the activity of mepiquat is greater within plants that are actively growing, with good moisture under warm, moderate temperatures.

Factors that must be considered when determining when and how much mepiquat to use include: (1) stage of plant growth, (2) rate of plant growth, (3) pest control and (4) anticipated plant growth (irrigation, drought, fertility). Because of the many variables, hard and fast rules regarding the rate and timing of mepiquat are not appropriate. Fields vary in growth. Weather varies by year/location, and thus, recommendations must be flexible.

In most irrigated fields, we can comfortably begin low rate applications (4 oz) at least by the second week of squaring and continue on a 14-day interval for three or four applications. Another common approach in irrigated conditions is to apply 8 to 12 oz at first bloom or just prior to bloom, with a subsequent treatment if needed at up to 8 oz two or three weeks later. The key to plant management for aggressive varieties such as DP 555 BG/RR may be making applications earlier, when the plant is 12 to 16 inches tall. In dryland situations, at or just prior to first bloom is usually a time to consider mepiquat at rates near 8 oz. If aggressive growth continues, a follow up treatment may also be needed. These suggestions provide a framework upon which to base timing and rates.

A common error is to delay applications past the point where the product can provide its maximum benefit. If the intent is a single (or at most two) application program, growers should be targeting cotton in the 16 to 24 inch range. Applications that are not made until cotton reaches 30 inches often do not adequately control growth.

Late-season applications of mepiquat has received attention recently. The theory behind these applications is that they will reduced vegetative growth at the time of cut-out thus channeling more energy into the development of late-season bolls. Current UGA research has not shown any yield advantage with these treatments.

Questions related to ultra-early season applications of mepiquat have also surfaced. These questions have primarily centered around the management of aggressive varieties such as DP 555 BG/RR. The thought is that applying 2 to 6 oz at the 4-leaf stage when the last over-the-top glyphosate application is made will provide additional vegetative growth control. Research to date has not shown any effect whatsoever with these early applications.