The Plant Growth Regulator Revolution: Changing the Commercial Production of Plants

When choosing the right plant growth regulator for your crop, don’t look simply to what’s new on the market. Some of the most exciting work with these chemicals is actually being done with relabeling and new application methods.

By Paul Pilon

Plant growth regulators have been used for many years, primarily as a tool to obtain height control or to promote rooting. Today, there are many fascinating and innovative ways to use the tools of yesterday. Plant growth regulators are now being used as seed soaks, bulb dips, media sprays and controlled residue. Just as exciting are the new products being developed for specific tasks such as reducing leaf yellowing, promoting the growth of offsets, reducing the shattering of flowers, increasing the longevity of flowering and increasing chloroplast efficiency. So buckle up — the plant growth regulator revolution is in full gear.

APPLICATION TECHNIQUES FOR ACHIEVING HEIGHT CONTROL

The most common method of applying growth regulators is spray applications. When using plant growth regulators as a foliar spray, it is important to achieve thorough, consistent and uniform coverage. To accomplish this with most chemicals, it is recommended to apply 2 qt. of spray solution per 100 sq. ft. Failure to apply these chemicals properly can lead to inconsistent results.

Drenching is the second most common method of applying plant growth regulators. Drench applications usually provide longer lasting, more uniform control of plant height than spray applications and typically use a larger, more diluted volume of solution than sprays. Drenches are primarily applied to the top of the media of a growing plant, and for most chemicals, 2 oz. of final solution is applied to a 4-inch pot or 4 oz. to a 6-inch pot.

The sprench method is a hybrid of the spray and drench methods. When using this technique, a higher volume of spray is applied, achieving more of a drenching effect than that of a spray application. Typically, spray volumes are two to four times that of a spray. The chemical concentration being applied is usually less than a spray but more than a drench.

Bulb dipping, or bulb soaking, is another innovative method that has been developed to help growers achieve height control for certain bulb crops. This method involves dipping or soaking bulbs in a growth regulator solution prior to planting. The concentration of the chemical and the length of time that the bulbs are submerged will vary depending on the species. Another very similar method growers and researchers have been evaluating is a seed soak. However, at this time, no chemicals are labeled for this procedure.

Many growers are using a pre-plant dip of cuttings to obtain height control. This method can be used on either rooted or unrooted cuttings of some plant varieties. To achieve results, the cuttings are placed in a growth regulator solution just long enough to thoroughly wet all of the leaves and stems, then they are removed and planted.

Applying growth regulators as a media spray prior to, or shortly after, planting is another creative method that growers are employing to achieve height control. The purpose is to obtain effects similar to a drench. The volume applied is typically a spray of 2 qt. per 100 sq. ft.

Another innovative approach that many growers are trying is called controlled residue. This application technique involves applying the growth regulator directly to the container prior to filling it with media. As the roots grow and come into contact with the container, they take up the chemical, and height control can be achieved.

HEIGHT CONTROL TOOLS

A-Rest (anycimidol) reduces internode elongation as the result of inhibition of gibberellin biosynthesis. When used properly, A-Rest produces no phytotoxic effects. A-Rest is mostly applied using spray or drench applications and has been effectively used as a media spray. The label also allows for a broad range of chemigation applications including subirrigation. This chemical is effective on a wide range of plant varieties, and its growth regulating activity is greater than B-Nine and Cycoceol, but less than Bonzi and Sumagic.

B-Nine (daminozide) reduces internode length by blocking gibberellin biosynthesis. B-Nine generally does not produce any phytotoxic effects; however, it is best to avoid applying B-Nine during periods of bright sunshine. This chemical is primarily used as a spray and recently has been used as a pre-plant dip. B-Nine is effective on a wide variety of plants, but its activity is less than most other growth regulators. This product works best when the spray is allowed to remain on the plant and dry slowly. Do not irrigate overhead for 24 hours after application, or the activity of B-Nine will be reduced.

Bonzi (pacilobutrazol) also reduces internode elongation and is known to be a very active and persistent growth regulator. This chemical, when used properly, does not produce any phytotoxic effects, but over-application can lead to stunting. Bonzi is used primarily as either
a spray or a drench but also has been used as a bulb soak. The Bonzi label recently has been expanded to include such applications as subirrigation and media sprays and has a broad spectrum label for use on ornamental crops. Bonzi is absorbed within minutes of application, and overhead irrigation can occur 30 minutes after application without reducing its effectiveness.

Cycocel (chloroquatin chloride) also reduces internode elongation within plants. It is a fairly active plant growth regulator, but has less persistence and activity than A-Rest, Bonzi and Sumagic. Phytotoxicity with Cycocel can be a concern. Tank mixing Cycocel with B-Nine has been an effective strategy for reducing the phytotoxic effects of Cycocel and gaining more control over plants used either chemical alone. Cycocel is labeled for both spray and drench applications, and like B-Nine, it is important to let it dry slowly and not irrigate overhead for at least six hours after application.

Florel (ethephon) is effective as a growth regulator for several ornamental plants. However, it is often used to stimulate lateral branching and delay flowering. Florel is only effective as a foliar spray. Sumagic (uniconazole) is the most active and persistent of all the growth regulators. Internode elongation is reduced by the inhibition of gibberellin biosynthesis. There are no phytotoxic effects, but over-application can lead to stunting. Sumagic is most often used as a spray, drench or bulb dip. Recently, the label has been expanded to include such applications as media sprays and cutting dips. The weakness for Sumagic is its potential for over-application, but the strength is that Sumagic is often shown to work on a wide range of plants when compared to the other plant growth regulators. Like Bonzi, Sumagic is absorbed into the plants within minutes of application and overhead watering can occur within 30 minutes of application without reducing its effectiveness.

THE TOOLS OF TOMORROW

In the past, plant growth regulators have, for the most part, been considered tools used by growers to control plant height. This will probably remain the primary purpose of these chemicals. However, there are new areas where growers are using plant growth regulating chemicals.

EthylBloc (MCP) is an ethylene action inhibitor, which inhibits the negative effects of ethylene. This product is being used to help prevent shattering of flowers, eliminate leaf yellowing, reduce flower browning, and stop flower and leaf drop. EthylBloc is a wettable powder, and when mixed with a liquid buffer solution, releases a gas (MCP). This gas binds to the ethylene receptor in plant cells, inhibiting the negative effects of ethylene. EthylBloc is approved by the EPA and manufactured by Floralive.

Fascination, a combination of GA4+7 and BA, is about to be introduced and labeled for several new uses. The first labeled use of this product will be to prevent the escape of leaf yellowing in Easter, Oriental and LA Hybrid lilies. Floralive is considered the primary factor contributing to low post-production longevity of potted Easter lilies. Many growers watch their crop go through a gradual leaf yellowing, which usually begins near or before the visible bud stage. Growers can also experience a postharvest leaf yellowing of their crop, which may be dramatic, with rapid leaf yellowing occurring on finished plants prior to sale.

When used preventively, Fascination plant growth regulator can inhibit both types of leaf yellowing. This product must be used carefully, however. It is intended to be applied only to the lower foliage. If the immature leaves come into contact with the spray solution, an unwanted stem elongation may result. Uniformity of coverage is extremely important because the spray is only effective where it comes into contact with the leaves.

The second labeled use of Fascination is to prolong the length...