Reducing PGR Liner Dip Variables

New research from the University of Florida will help you eliminate some of the guesswork when using liner dips to apply growth regulators.

By Rebecca Schnelle and Jim Barrett

The liner dip method for applying plant growth regulators (PGRs) is finding increased acceptance with growers. Liner dips are an efficient and effective way of controlling vigorous crops. However, in some cases inconsistent results have been reported, and we know this technique is potentially more variable than other application methods. Identifying the causes of this variability has been much more difficult than we expected.

The research we published in the July 2005 issue of *GPN* identified several factors that could potentially affect the activity of liner dips, and the findings of several other researchers support this theory. Our studies this spring focused on four factors:

- Chemical rate,
- Moisture level of the plug media at treatment,
- Time the liner remains in the solution, and
- Light level during treatment.

In our experiments we attempted to standardize as many variables as possible. The moisture level of each set of liners and the light level at treatment was recorded. Also, all cuttings were rooted onsite and dipped at the same time by hand-dipping strips of 10 plugs into trays containing 4 liters of Paczol (paclobutrazol, Chemtura Corp.). Unless otherwise indicated the dip time was 30 seconds, and the media was moderately dry without plants being wilted. Liners were potted into 4½-inch pots and watered in immediately. We used petunia 'Suncatcher Deep Plum' and scaevola 'Fancy' because of their varying levels of PGR sensitivity.

Application Rate

As with other PGR application techniques, application rate for liner dips must be established for each cultivar and production system. The photos to the right show the effect of increasing rate on a highly sensitive crop (scaevola) and a less sensitive crop (petunia). If these cultivars were being grown for hanging baskets or mixed containers, a different rate may be more appropriate. Also, growing conditions influence the rate of growth regulator needed. The rates used in our experiments done in spring in Florida should not be taken as the optimum for all conditions; rather, they show the response of sensitive versus insensitive crops and how growth regulator rates affect each.

Moisture Level

There has been considerable discussion among researchers about dipping a liner wet or dry. The studies we reported last year showed the media's moisture at dip significantly affects the control achieved. It makes sense that a dry liner will take up more PGR solution than a wet one will. Most of our previous experiments and the work of others have used typical visual and hand weight cues to separate "wet" and "dry" liners.

We actually measured the moisture level of each plug tray. The dry and saturated weights of a strip of plugs were measured and used to calculate the water holding capacity. Then the liners could be weighed to determine the percent of weight lost since saturation. Liners at 45 percent weight loss still appear damp on the surface and are moist to the touch; at 65 percent the plug media appears dry on the surface and feels only slightly damp to the touch; and at 85 percent the media looks and feels dry, and the plants begin to wilt.

As shown in figure 1, right, and the photos on page 71, both petunia and scaevola at each dryness level were dipped for 30 seconds at moderate Paczol rates. As one would expect, saturated liners were not affected by the liner dip at all and were as large as the untreated control plants. However, liners dipped at 45-, 65- and 85-percent weight loss were all the same size.

We had expected drier liners to take up more solution, giving a stronger response. In other

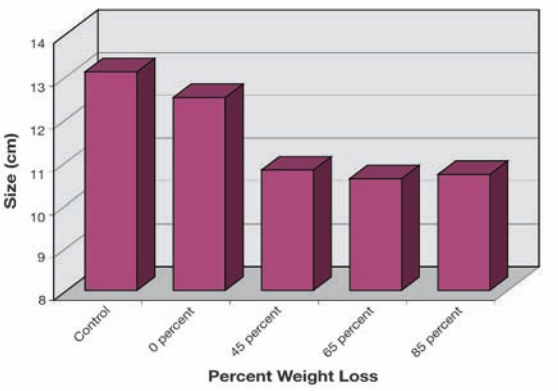

Figure 1. Petunia 'Suncatcher Deep Plum' treated with a Paczol liner dip (4 ppm) at different media moisture levels. Plants started wilting at 85 percent weight loss.

Scaevola 'Fancy' following Paczol liner dips of, from left to right: control, 1 ppm, 4 ppm.

Petunia 'Suncatcher Deep Plum' following Paczol liner dips of, from left to right: control, 4 ppm and 16 ppm.

Scaevola 'Fancy' following a liner dip of 1.5 ppm Paczol. Media moisture levels at treatment, from left to right, were: 0, 45 and 85 percent weight loss from saturated.

experiments, we generally find that after the media reaches about 50-percent weight loss, moisture level has little affect on PGR activity. This seems to indicate that the plug media does not need to be overly dry for an effective and consistent liner dip. This is good news since it is not practical to have uniformly dry liners from one time to another and it alleviates problems when the edges of a tray are drier than the middle.

Dip Time

The time liners remain in the dip solution is definitely an important factor, as the media needs to absorb the PGR solution for the desired effect. There is good news in this area: If the liners are moderately dry, a short dip time is sufficient.

In the experiments shown in Figure 2 and the photo, both on page 72, all liners were dried down to 65 percent. The dip times were 10 seconds, 30 seconds, 1 minute and 2 minutes, and there was little difference in activity at the different dip times. In other studies, we have seen some additional activity when initially dry liners sit in the solution for 5 minutes. We have found, as have other researchers, that a wet liner needs to sit in the PGR solution for 5-10 minutes to get any activity.

We feel that 2 minutes represents the longest commercially viable dip time. If one tray is dipped at a time, the shortest effective dip time is the most efficient and most desirable. If multiple trays are dipped at a time, then times of 30 seconds to 2 minutes will generally provide uniform response. Although the results of this experiment show that a 10-second liner dip is sufficient, we caution growers to make sure the media is saturated if this short time is used.

Light Level

With light we achieved variable results from very similar dip protocols. We theorized that in high light the plants would be transpiring at a faster rate than in low light so they would take up more dip solution, giving a stronger response. As we reported last year, our early experiments indicated that light level did have a subtle effect on the control achieved. Subsequently, more detailed experiments addressing the effect of light level during the dip treatment ➧

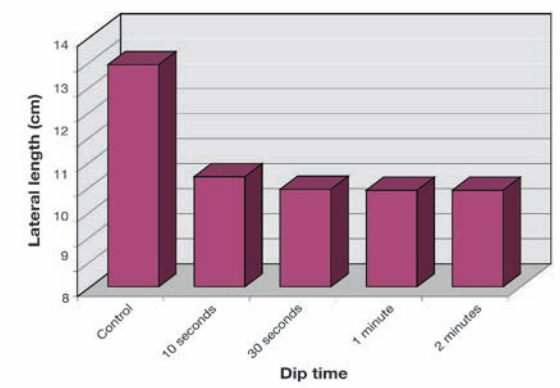

Figure 2. Growth of scaevola 'Fancy' following a liner dip in 1 ppm Paczol for different durations.

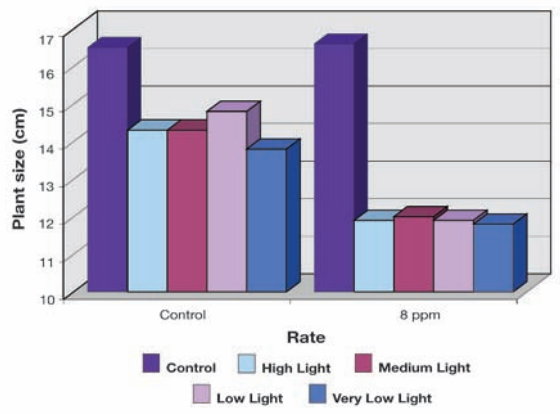

Figure 3. Growth of Petunia 'Suncatcher Deep Plum' following a Paczol liner dip at either 2 or 8 ppm under high, medium, low or very low light levels at the time of treatment.

have shown that we were wrong, as can be seen in figure 3 above.

In these studies, we used four light levels with a high, medium and low Paczol rate for each crop. All liners were at 65 percent weight loss and were dipped for 30 seconds. The light levels were full sun (high), overcast (medium), under an open-sided structure (low) or indoors (very low). The results indicate that light level at the time of treatment does not have a significant impact on the activity of a Paczol liner dip. This is good news for growers since this means liner dips can be done wherever convenient. For us, it means we will have to develop another theory to explain some of the variability with this procedure.

Petunia 'Suncatcher Deep Plum' following a liner dip in Paczol at 4 ppm. From left to right dip time was: control, 30 seconds and 2 minutes.

Conclusions And Recommendations

This year's series of liner dip experiments show that consistent results can be achieved with attention to detail. We still recommend trying to standardize as many factors as possible. With this or any other PGR application technique, the grower needs to determine the proper rate for the size control desired. Once the rate is established, keep in mind that for liner dips to be effective the plug media must take up the PGR solution and the plant must then take up the solution from the plug media. For efficient solution uptake, the media should be no higher than half of its water-holding capacity, which can easily be approximated simply by feeling the weight of the plug tray. When the trays are at about half of their saturated weights you will have more flexibility with the other major variable, dip time. The results of this year's experiment show that a dry plug can be dipped for as little as 10 seconds to produce the full effect. Once a liner dip protocol is established, consistent and efficient size control can be achieved for a variety of crops and production schemes. GPN

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