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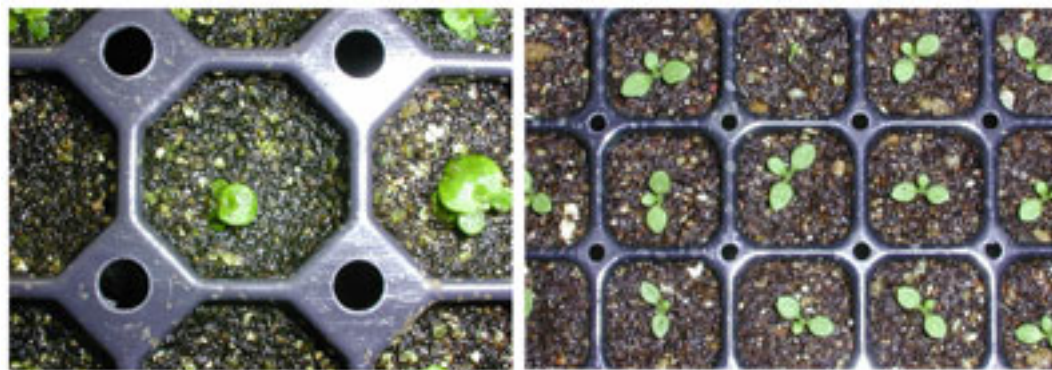
Plug Growers' Tips, Tricks & Tools

| Dr. Roger C. Styer

Having worked with plug growers around the world for almost 30 years, you would think that there's nothing new to learn. However, I'm constantly amazed at how plug growers can either get things right time after time or continually struggle with certain problems. There's always something new to learn, a different way to achieve the same endpoint or a new problem to solve. That's what keeps me interested and in business as a horticultural consultant. So here are some key areas where I see a number of plug growers struggling and how to overcome those problems that I've learned from many good plug growers and researchers.

Germination and uniformity of stands

Verbena | The best way for optimum germination I've found is to sow seed into filled plug trays without soaking first, cover properly with coarse vermiculite and give half as much water to the tray as you would other crops. Keep this half-moisture in the germ chamber or on bench until seedlings start to emerge. Then use your normal wet/dry cycle. Or, if you go by moisture number levels, keep at level 2 to 3, no higher, for best germ.



roots are very shallow until this point, which makes it extremely important not to let the soil surface turn a lighter color or you'll stunt the plants. After the first true leaf is showing, then you can dry off the soil surface, but not halfway down the cell. And you really need to spot the edges of plug trays all the time and not rely too heavily on booms to accomplish even moisture. Algae, fungus gnats and shoreflies are always an issue with begonias due to moisture needed for the first three weeks.

Petunia | Many growers get great germination with pelleted seed, but then seedling growth becomes uneven and can never even out. The trick is to keep trays moist for germination (levels 4 to 5), then dry down hard (level 2 or even 1) for the next week once cotyledons expand and first true leaf is coming out (Figure 2). Petunia seedlings send down a tap root, which needs to branch with drier conditions in order to keep top growth expanding. If you think plug trays are too dry at the end of the day, then wait until the next morning before watering. Every time I work with a plug grower on this trick, they're deathly afraid the seedlings will die. But they survive and thrive! The best plug growers can manage uniform seedling growth with begonias and petunias.



Begonia | Some growers I know have great success with high germination and uniform seedling growth, while other growers continually struggle to keep seedlings uniform. The key is to keep plug trays uniformly moist (level 4 to 5) until first true leaf is just emerging (Figure 1). The

Gerbera | This crop likes it on the drier side almost as much as verbena, especially if covering with coarse vermiculite for best germination and uniform seedling growth. If grown too wet anytime in the crop cycle, then you get stunted seedlings that look like boron deficiency (Figure 3). It actually is boron deficiency, but not due to lack of boron in the feed or soil, but the inability of the roots to take it up due to too wet conditions. I see more growers trying to do their own gerbera plugs and making major mistakes with moisture management. Use a well-drained plug media, especially with larger cells, water halfway every time, use good under-bench heating and HID lights during low-light months.

Budding and flowering in plug trays

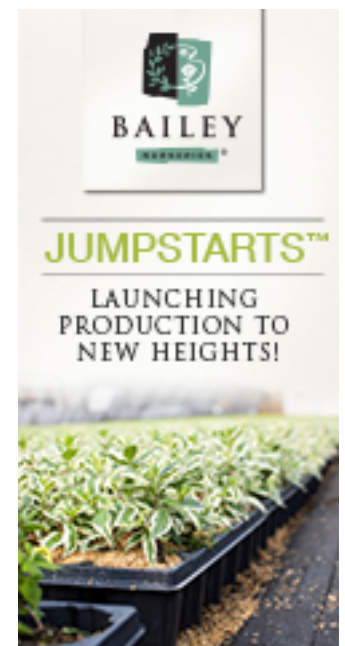
There are certain crops we grow in plug trays that are short-day plants, meaning they'll flower when day length is less than 12 hours. Unfortunately, we're growing those plug trays in January through early March for most of the country. To keep these crops from flowering too soon, which limits their vegetative growth after transplanting resulting in too small plants with just a few small flowers (Figure 4), use HID lights for day length extension or at least night-interruption lighting until transplanted. Crops that need these conditions include cosmos, *Zinnia elegans*, celosia and African marigolds. Nonstop Begonias and dahlias should also be lit to prevent tuber formation, which takes away from uniform growth and flowering.

Other crops that want long days to flower can be initiated in plug trays with longer days, again using day length extension or night-interruption. Flowering will occur faster after transplanting for earlier sales. Crops that benefit most include petunias, snaps, lobelia and ageratum. I've seen clients in California and Florida light these crops in the middle of winter because they want finished crops to sell in February.

Features



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Daily Light Integral (DLI)

This is a term that every plug and propagation grower either knows or will know. It's the total photosynthetic light per day that the crop receives. Basically, during winter and early spring months, light levels are low and days are short, resulting in DLI levels around 2 moles/day. This low total light limits how much root and shoot growth you can achieve with any crop, as well as adversely influencing flowering with crops that need higher light levels, such as vinca, geraniums, dianthus and gerbera. I'm always totally amazed at the number of Northern growers who don't light their plug and propagation areas with HID lighting to increase the DLI to 5 moles/day, which is the desired level during those months. If you can light those areas, then you reduce your plug crop times, get better root and shoot growth, better branching and faster flowering. Begonia plug crop times can be reduced by two weeks or more. Turn on lights during cloudy days and use day length extension whenever possible.

Now, how do you measure DLI? Most light sensors attached to environmental control computers are mounted outside the greenhouse and won't be useful for measuring DLI. This needs to be done at the plant level inside the greenhouse. Spectrum Technologies (www.specmeters.com) offers a cheap meter that can be stuck in trays or pots, recording DLI over a 24-hour period. But you need to manually reset it each day. This tool is easy to move between zones to determine how much light you're getting, even with HID lights. A more expensive and complete meter is the Watchdog WeatherTracker, which will continuously record temperature (DIF and ADT) and light levels (DLI). Information can be downloaded to your computer whenever needed.

Holding plugs too long

Every year, somewhere growers are having to hold plug trays due to slow finished sales and running out of room to put new crops down in the greenhouse. Holding plugs for a week or two isn't difficult if you follow certain key techniques. Avoid overwatering, overfeeding, letting plugs get rootbound, turning yellow, having diseases and insects show up, and flowering when you don't want them. (That was easy, wasn't it?) The hardest and most difficult crop to hold in plug trays is vinca, as this crop's roots will raise the media pH to the point that it adversely affects rooting after transplanting, in addition to turning upper leaves yellow. I always recommend not holding vinca plug trays longer than a week and making sure to test media pH before transplanting. This crop doesn't like media pH 6.2 or higher, and is very sensitive to high EC, too wet and too cool. **GT**

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