Selecting Propagation Media For Rooted Liners

There are many stabilized and loose media options available, which means there is much to consider when choosing which type to use for propagating cuttings.

By Paul Fisher, Jinsheng Huang and Bill Argo

With so many media options on the market, how do you decide which to use for propagating cuttings? Options include stabilized media (foam, peat/polymer, paper-wrapped pots, or compressed peat or sphagnum) and loose media (which typically contain a combination of peat, perlite, vermiculite and/or coir). Stabilized media hold together as a solid cell, meaning less rooting is required for a "pullable" plug that will not fall apart outside the tray. In contrast, loose media require well-formed plant roots (and, therefore, also require more time) to form a cohesive pullable root ball.

Consider The Factors

No one product is always "best" for your operation all the time. The proof is that leading growers often use more than one medium depending on the crop and time of year. At the Young Plant Research Center, we evaluate chemical and physical properties of propagation media and their greenhouse performance. We will focus on aeration, water-holding capacity, cost and crop time in this article, but there are other factors to consider in selecting a root medium:

- Rewetting both at the initial sticking and growing on.
- Oasis foam is not a preferred substrate for fungus gnats because it lacks organic matter, although fungus gnats can enter the stem base directly.
- Media with low aeration and high water holding capacity are more susceptible to algae and shorefly problems.
- Ease of sticking and the size and stability of the dibble hole in the sticking line.
- Cells that remain firmly in the tray during shipping result in fewer credits.
- Design of the plastic tray has a big effect on air and water characteristics and also how well the cell is held in place during shipping.
- The root ball should hold together and remove easily from the tray.
- Ability to customize the growing mix and tray configurations to your specific needs is an ➧

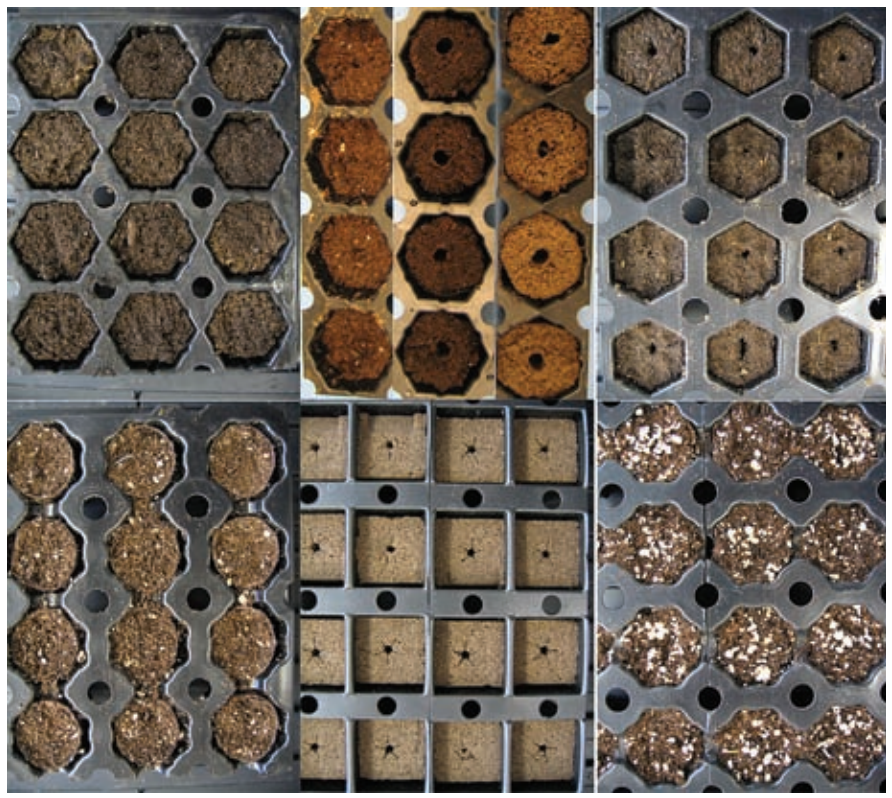

Figure 1. There are many stabilized and loose media options. Three peat/polymer products are shown along the top. The bottom left shows a paper-wrapped Ellepot. The bottom center is Oasis foam, and the bottom right is a peat/perlite loose-filled tray.

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advantage. In some cases, the media supplier may provide only a one-size-fits-all recipe.

• The pH should be in the 5.5-6.4 range, but there is very little buffering to change in pH, and pH level over time largely depends on grower management of fertilizer and water alkalinity.

• It is so easy to leach out the preplant nutrient charge with mist that the preplant charge is not a large factor. It is mainly up to grower management to replenish soil nutrients.

Aeration And Water-Holding Capacity

A cell in a propagation tray is made up of solid substrate along with pores that are either filled with water (smaller pores) or air (bigger pores). There is a trade-off between air and water porosity. As a general rule, a high level of aeration makes it easier to grow roots under mist, because growers tend to overapply rather than underapply water during propagation. Heavy misting during propagation can lead to anaerobic conditions, algae, fungus gnats, shoreflies, slow rooting, disease and nutrient leaching.

Figure 2. This shows representative liners rooted in six commercial media products evaluated 33 days after sticking calibrachoa cuttings. The top three photos show Ellepots (left) and two peat/polymer products. The bottom three photos show root development in loose media. With sufficient time and careful attention to irrigation, good rooting can be achieved in most commercial media.

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However, once the plant is rooted, there is an advantage of having high water-holding capacity. Water uptake by a rooted plant helps to rapidly dry media down. Media that have low water-holding capacity need more frequent watering.

Oasis foam, which has high aeration, provides an example of how water and air characteristics affect propagation. Oasis is very forgiving for propagating poinsettia cuttings in the summer when mist is applied frequently because there are always some pores that are not saturated with air. On the downside, rooted cuttings held in oasis need to be transplanted quickly because the media rapidly dries down.

In one test, we surveyed solid, air porosity and water porosity of eight stabilized and eight loose commercial propagation media. All loose media were placed in the same 105-count 11x21-inch Blackmore tray for testing. Similar physical characteristics were observed across the eight loose media tested. The range of water porosity, air porosity and solid by volume for the loose media were 69-80 percent, 5-10 percent and 15-24 percent, respectively.

Stabilized media were evaluated in similar 105-size trays, except one 102-size product. There was more variability among stabilized media types than among loose media. Physical properties of stabilized media were affected by both cell dimensions and media components. Water porosity, air porosity and solid for the stabilized media types ranged from 45 to 86 percent, 5 to 11 percent and 8 to 45 percent, respectively.

Figure 2, opposite, shows partial results from an evaluation of rooting in the 16 media. High quality calibrachoa plants were obtained with all media tested because we modified our scheduling of mist based on the media.

Bottom line:
Media vary in how much air or water they hold. This is important for rooting success. Good rooting occurs if the mist frequency matches air and water porosity for a particular media.

Rooting/Finish Time

There are two main stages in rooting of cuttings. In the first stage under mist, the goal is to produce initial roots so the plant can begin to take up nutrients and is resistant to wilting. As discussed earlier, this is a matter of providing the right mix of air and water by managing mist frequency and media porosity. During the second stage, irrigation frequency is lower because plants are off mist, and the goal is to produce a well-rooted plug with acceptable shoot growth for transplant.

The biggest advantage of stabilized media occurs during the second crop-finishing stage. The cell is by definition already stabilized and cohesive. Therefore, not as much rooting is required to form a plug that can be pulled out of the tray without damaging the roots or having the root ball fall apart. For rooting stations, that can mean less credits resulting from lightly rooted plant material.

We work closely with a group of leading rooting stations that report a 1-week shorter crop time is often achieved using stabilized versus loose media.

Figure 3. With stabilized media such as the paper-wrapped Ellepot, plants can be shipped or transplanted with fewer roots than would be required with loose media. This plant is 21 days old from a 105-count tray.

Stabilized media will often cost around $1 more per tray compared with loose media. Is that extra cost worth it? The exact details will vary depending on your business, but the answer is "yes" if you can gain more crop turns.

Let's take an example with a 4-week (stabilized) versus 5-week (loose) crop. The peak of spring propagation occurs over about 15-16 weeks (January to April). That means four crops could be finished with stabilized media versus three crops with loose media. This represents 33 percent more yield with the stabilized media. In other words, you would need 33 percent more greenhouse space with loose media to produce the same number of trays during that peak period. That also equals 33 percent more net revenue minus the extra cost of the stabilized media.

Bottom line:
The shorter finish time with stabilized media can increase crop turns.

Conclusion

We recommend growers continually evaluate alternative products. However, run trials first before changing growing media. That decision has downstream impacts on irrigation, fertigation, shipping and profitability. If you are going to trial a new growing medium, there is a good chance the substrate will need to be treated differently from the medium you are currently using, for example, with lower mist frequency if it has higher water-holding capacity and lower air porosity. GPN

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