

GROWERTALKS

Features

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Looking for a Leg Up on Your Liners

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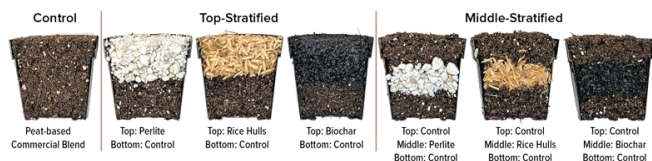
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Liner growers are always looking for an edge when rooting URCs. Better rooting. Faster turns. Fewer losses under mist.

Recently, another goal has emerged: Diversifying substrates to reduce reliance on peat.

I teach horticultural production classes at California Polytechnic State University. In the classroom in 2024, we covered substrate stratification—layering different materials inside a container instead of using one uniform mix. It's been shown to work in some container production systems, especially for improving root growth and cutting back on peat use.

A student in the room listened attentively, then asked: Would a stratified plug make a good medium for cuttings? This question prompted a good classroom discussion. Most propagation mixes are peat-based for a reason. They hold moisture, support delicate cuttings and knit together into a solid plug. Under intermittent mist, that same water-holding capacity can mean too much water and not enough oxygen in the root formation zone. Putting coarse materials, like perlite or rice hulls, in the rooting zone to boost oxygen-holding sounds attractive. Keeping finer materials, like peat or biochar, elsewhere to hold moisture and provide structure could provide balance. Would stratifying a propagation substrate actually help plug quality—or would it create more problems than it solves? After this classroom conversation, I recruited a team of students to work with me to put stratified substrates and URCs to the test.

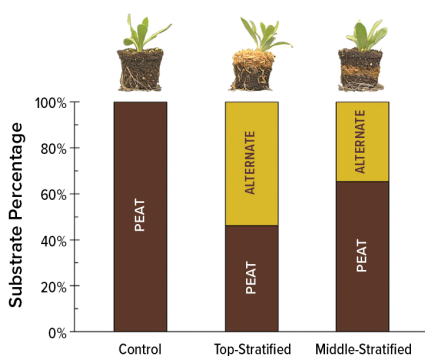


The experiments

We used a standard commercial peat-based propagation mix as our control. Then we created six stratified options: perlite, rice hulls or fine biochar as top or middle-stratified layers in small round pots (Figure 1).

Figure 1. Cross-sections of the substrate treatments we used to root cuttings.

We stuck hybrid hyssop (*Agastache Sunrise Red Improved*), false heather (*Cuphea hyssopifolia* Maria), blanket flower (*Gaillardia Eclipse*) and Jame sage (*Salvia jamensis* Ignition Purple) URCs and placed them under intermittent mist for approximately three weeks. We then moved them to a bench to be hand irrigated for about an additional week. We repeated the experiments two times, producing two crops of rooted cuttings. With each harvest we measured root growth and we rated plug stability—whether the plug stayed intact, partially broke or completely fell apart when handled.



Results

Here are the answers we found to our research questions: Can we create a plug with diversified components and reduce peat reliance? The stratified plugs we used were either 54% or 35% amendment material by volume (Figure 2). Reducing peat demand by these percentages could be very attractive for a grower. These stratified regions also promoted oxygen holding in the regions of the plug where we expected root growth.

Figure 2. The amounts of peat or alternative components we used in the experiment. The top stratified treatments were ~54% amendment by volume, while the middle-stratified treatments were ~35% amendment.

Will URCs root well in stratified substrates? All four crops produced roots in all treatments (Figure 3). When roots were washed and measured, there were very few consistent differences between stratified substrates and the control. Hybrid hyssop and false heather both showed the strongest rooting in the control substrate, while blanket flower had the strongest rooting with perlite stratification, and Jame sage rooted well in middle-stratified rice hulls. However, across the board, stratification did not deliver a clear rooting advantage.



Will stratified substrates produce a stable plug? The control substrate—the uniform peat-based mix—consistently produced stable plugs that held together during handling. Many stratified plugs were fragile or partially unstable (Figure 4). Some plugs looked okay in the pot, but fell apart when removed. Top-stratified treatments were especially prone to breaking apart. Middle-stratified plugs often developed break points in the middle. The issue wasn't that roots failed to form—it was where they formed. Roots preferred the peat-based layers; coarse layers (perlite, rice hulls) had less root penetration. Fine peat particles normally help knit a plug together. Interrupting that continuity with a loose, coarse layer also interrupts the

physical structure that keeps the plug intact. Even when rooting looks acceptable, plug integrity often suffers—and that's not a trade most growers can afford.

Dr. Benjamin Hoover showing his horticulture students two different plugs in stratified substrates.

Key takeaways

If you're producing herbaceous plugs or liners, rooting and plug stability are critical. A plug that roots, but can't survive handling creates problems, like slowing transplanting, adding labor, complicating automated lines and increasing risk of root damage. Plug structure depends heavily on fine particles and continuous root contact. We were able to reduce peat use and maintain acceptable rooting with stratified substrates; however, the stratified plugs showed reduced stability.

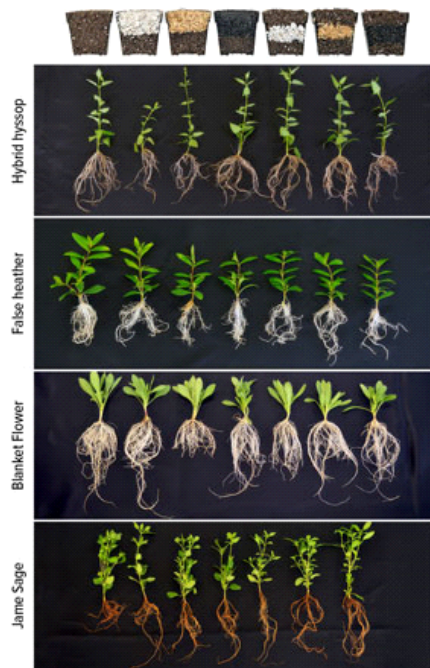
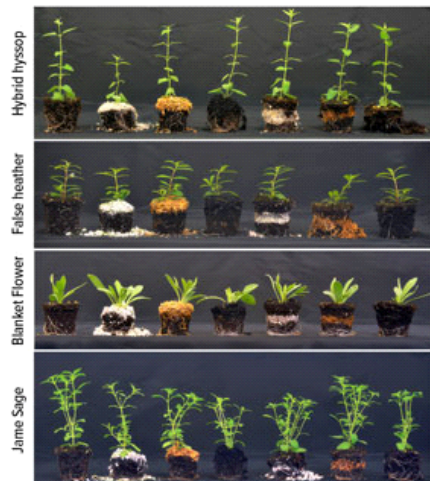


Figure 3. Rooting of cuttings in stratified substrates.



To maintain the peat reduction, but improve plug stability, using a stratification amendment that still provides binding, like wood fiber, could increase plug stability. Alternatively, peat reduction could still be achieved with a uniform blend containing the alternative components. This study is a reminder that measuring growth alone isn't enough to determine success.

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Figure 3. Rooting of cuttings in stratified substrates.

Figure 4. Plug stability of stratified substrates. These plugs were photographed after gentle handling. Official stability rankings were collected after handling that resembled transplanting.