



By Erik Runkle and Paul Karlovich



Keys to Successful Seedling Production

It's a bit naïve to write an article on successful production of seedlings in just one page, but for inexperienced growers it's easy to overlook some critical aspects that can lead to failure. Although the topics below don't include all of the key aspects of plug production, focusing on these key parameters will certainly help lead to success. Growers need to understand that the NO. 1 goal of seedling production is to produce great roots on a well-formed plant.

Proper media fill and seed sow. Plug trays that are uniformly filled are much easier to manage than when there is variation within a tray or from one tray to another.

Cells should be filled with slightly moist media in a manner such that after a full watering, all the cells are equally filled. Proper seed sow includes placement of the desired number of seeds near the center of each cell (which is easier to accomplish if cells are first dibbled) and lightly covering species that need darkness for germination. This process is usually semi-automated but very skillful (attention-to-detail) employees need to closely manage this process, especially when transitioning from one crop to the next.

Proper moisture management. The amount and frequency of water delivered to plugs should depend on the species, cell size, environmental conditions and stage of growth.

Proper watering is a major determinant of plug quality yet is a huge challenge because growers usually have multiple crop types, production stages and cell sizes in the same area, and temperature, light and humidity inside a greenhouse are rarely constant. Large plug sizes (e.g., 128-cell trays) are easier to manage (are more forgiving) than smaller ones (e.g., 512s). Moisture levels in general start wetter and with less moisture fluctuation in the early seedling stages and progress to wet-to-dry moisture cycles as the plugs mature.


Many growers and industry professionals have adopted a moisture scale from 1 (very dry) to 5 (very wet). Seed companies have established moisture recommendations during the plug production stages, where stage 1) seeding to initial root emergence, 2) initial root emergence to flat cotyledons, 3) flat cotyledons to first true leaf, and 4) first

true leaf to transplantable size (Table 1). Some companies have this information on their websites and grow sheets.

Controlled environment. Temperature controls rate of seedling germination and subsequent development while light primarily regulates quality attributes. Many seeds germinate well at a media temperature of 72-75° F; although, some crops do better at a cooler or warmer temperature. Delivering these media temperatures improves germination percentage and uniformity, which makes management much easier as seedlings mature. Except for the cool-germination crops, temperature is usually dropped a few degrees at every stage change to improve crop quality. It is highly recommended that the heat for plug production be delivered from a bottom heat source.

For almost all plug crops, light intensity should be as high as possible while maintaining the proper temperature, humidity and moisture level. Because many seedlings are produced in the winter and early spring, once seeds germinate, light quantity is limiting in many parts of the country. Supplemental lighting is usually cost effective for seedling production, since it improves plant quality and greatly improves rooting, which thereby reduces time from germination to transplant. For more information, see the article "Supplemental Lighting Guidelines for Young Plants" available online at <http://flor.hrt.msu.edu/assets/Uploads/LightingYoungPlants.pdf>.

Humidity should be relatively high in stages 1 and 2 and gradually decreased as plugs progress through stages 3 and 4. High humidity slows drying down, which is desirable in the early stages. Lower humidity is desirable in later stages to promote drying so that moisture level fluctuates.

Proactive PGR applications. Plant growth regulators are widely and regularly used in plug production. Success lies in knowing what to apply, at what rate, and at what time. The applications are typically made as sprays or spranches, since drenches can be too persistent. Many different PGRs are used in plug production. For more information on proper PGR usage, see articles online at <http://flor.hrt.msu.edu/PGRs>. Companies also provide PGR suggestions for plug production on their websites and grow sheets. 

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Table 1.

Examples of moisture recommendations for the various stages of seedling growth (1=seed sow, 4=nearly ready for transplant). Moisture levels range from 1 to 5 where 1= very dry and 5=saturated. "4 / 2" means plugs should be watered to level 4 once the cells reach level 2.

Seed crop	Seedling Stage			
	1	2	3	4
Impatiens	4	4 / 3	4 / 2	4 / 2
Petunia	5	5 / 4	4 / 3	4 / 2
Vinca	4 / 3	4 / 3	4 / 2	4 / 2