Media for Container Growing

Nursery stock can be grown in almost any material that provides anchorage, water, oxygen, essential mineral elements, and is nontoxic. So let's take a look at the basics to help you decide where to begin, and how much to use.

BY MIKE SCHNELLE

Numerous types of media have been developed for container growing of nursery stock. With so many from which to choose, there's a bit of confusion regarding what type of media is the ideal choice for what type of container. Despite the large variety of products available to the grower, success often is contingent upon growing techniques, rather than the choice of a particular kind of container or medium. Presented are guidelines intended to help new—and "newish"—growers in making choices suitable for their particular nursery.

More ornamentals are being grown in containers than ever before. The acreage once devoted to field growing has shrunk.

Container soils have less volume and are more shallow than field soils. Therefore, what is considered an excellent field soil may perform poorly (slow to drain) in a container. Due to poor soil aeration, which leads to poor plant growth and performance, an emphasis on artificial media has occurred with little to no field soil included in the mixes.

Physical properties such as color, structure, texture, behavior toward water and air all have an effect on the health of containerized plants. Chemical properties influence chemical reactions, which supply nutrients to plants. Finally, biological factors, primarily microscopic organisms, largely influence the growing success of any given media. Therefore, the physical, chemical and biological factors all interact to form a complex control over plant health.

Soil

Soil is used by a few nurserymen in Oklahoma who have access to it and prefer it, because it often supplies trace elements (micronutrients). Although soil has advantages, it is difficult to obtain a regular supply that is uniform and of high quality. In addition, each load of soil must be pasteurized, and so the disadvantages, including cost, quickly mount. To further complicate this amendment, chemical imbalances in nutrients can occur after the pasteurization process. Lastly, the added weight may make shipping costly, so retaining prices at a competitive level becomes very difficult.

Sand

Sand is often used in media mixes to add bulk density and improve drainage. Choose particle sizes of 0.05 to 1.0 mm, with at least 90 percent of the particles towards the finer range. No nutrients or buffering capacity are offered by sand.

Peat & peat moss

The names peat, peat moss and moss peat refer to several materials that are similar in origin, but quite different in their physical and chemical properties. Peats are organic materials (plants) that, depending on their degree of decomposition, are of varying value to growers. All the peats are divided into four types:

- sphagnum peat moss
- hypnaceous peat moss
- reed and sedge peat
- humus peat or muck

Sphagnum Peat Moss. This is the most desirable of the peats and most suited for container media. It is acidic, but can be easily adjusted with liming materials if necessary. It is low in soluble salts, long lasting in the mix, uniform in composition, and it effectively improves drainage and aeration. Yet sphagnum has good water and nutrient retention. Sphagnum peat has been shown to absorb seven times its weight in water.

Although two grades of sphagnum peat moss are available, the horticultural grade should be selected, since it is finer in particle size range and grade and is most appropriate for container media.

As with any medium you're considering, peat mosses have disadvantages: They are hard to wet and may shed water. A simple solution is to soak the peat moss in warm water before use or add a wetting agent. A wetting agent is more feasible and may prove to be more efficient in large-scale operations.

Hypnaceous Peat Moss. Hypnaceous peat moss comes from the Hypnaceae, a family of mosses that grows in dense mats. This peat decomposes quicker than sphagnum peat, but it is still suitable for container mixes. It may be acquired from the northern states.

The last two categories of peat—reed and sedge peat, and humus peat or muck—are not recommended in container media. They break down too quickly and interfere with proper aeration and drainage.

Bark

Hardwood bark is a commonly used, excellent media ingredient. Aged bark should be used due to the risk of toxicity to plants when new. Bark is aged with time (at least 30 days or longer after harvest) and leaching. Also, heat and bacterial colonization help reduce toxic effects of the bark.

Additional nitrogen must be added when using bark in your container mix. Bacteria immobilize and use a great deal of nitrogen, making the additional amount necessary for the plants' use.

Softwood bark is acceptable, but it will lower the pH of a medium more than hardwood bark. Liming may be necessary, except for acid-loving plants.

Bark retains water, has excellent drainage and is sterile. Some nutrients are supplied by all barks, and the material is slow to decay. This is a definite advantage in a mix intended for long-term use for nursery stock. Additionally, bark is lightweight, which is an advantage for workers and when stock must be shipped. Bark is sometimes used alone or with sand or other media amendments.

Perlite

Perlite, which is heat-expanded volcanic rock, often is used to increase aeration while lowering bulk density. Because it is so light and will float when the media is watered, it should be restricted for special uses in the nursery, such as for propagation. In most cases, however, perlite is not appropriate for use in container nursery mixes.

Vermiculite

Mined in the U.S. and abroad, vermiculite is a naturally occurring mineral related to mica. It is normally purchased in a heat-expanded form, which has a high cation-exchange capacity. Unfortunately, it compresses easily and is not suitable in a long-term mix, such as that needed in container media. Like perlite, it is well-suited for propagation purposes in the nursery, but not for general container nursery mixes.

Manure

Manures are not recommended for use in container media. Although high in mineral elements, their use may result in nutrient toxicity. After pasteurization, which is imperative due to the weed seeds and disease organisms associated with this material, excessive nutrients become available, often at levels

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that are toxic to plants. This organic source of fertilizer has no chemical elements that cannot be supplied in chemical fertilizers. Synthetic fertilizers are easier to control and more stable and predictable, offering the same concentration of nutrients in every application.

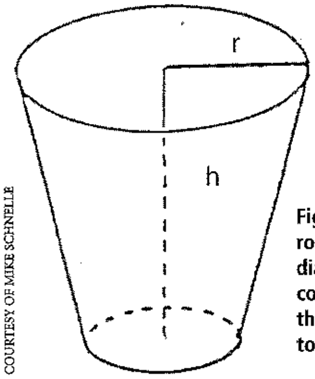

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Figure1 - To determine the volume of a round nursery container, measure the diameter of its top and the height of the container (pot depth = h). Measure h in the center of the pot. The radius of the top of the container = r.

Calculating how much you need

Many container manufacturers provide charts for their pots that indicate how many pots can be filled with a cubic yard of media. However, if containers are purchased without these guidelines, or if special-mix formulas or small quantities are needed, the following formula is convenient and accurate. Plus, this can keep you keep track of media costs invested on a per-plant basis.

The container's top radius (r) must be determined by measuring the diameter of the top of the pot and then dividing by two (see Figure 1). Determine the depth of the pot (h) by measuring from the center-top to bottom.

The formula for the volume (V) is: $V = (3.1416 \times r^2 \times h)$

To calculate the volume, multiply the top radius (r) by itself ($r \times r = r^2$) and then by pi—3.1416. Then multiply this number by the depth at the center of the pot (h). This number is the container's approximate volume (V).

Example: A grower needs to use 1- or 2-gallon round pots to containerize several bare-root plants. The grower determines the following values after measuring the containers.

Measurement	1 gallon	2 gallon
Top diameter	6.25*	7.25
Top radius (r)	3.13	3.63
Pot depth (h)	6.75	7.25

* values represent inches

For the 1-gallon container

Volume (V) = [(3.13 x 3.13) x 3.1416 x (6.75) = 23.87 x 3.1416 x 2.25 = 207.8 cubic inches media needed per 1-gallon container.

After performing the calculations used above for the 1-gallon containers, the grower finds that 300.1 cubic inches of media is needed per 2-gallon container. Two-hundred bare root plants need to be containerized, with 100 of those plants needing 1-gallon pots and the remainder needing 2-gallon pots. **Therefore**: (207.8 x 100) + (300.1 x 100) = 20,780 + 30,010 = 50,790 cubic inches of media needed for 100, 1-gallon containers and 100, 2-gallon containers. One cubic yard equals 46,656 cubic inches. Cubic inches can be converted to cubic yards by multiplying by 0.00002143, or by dividing by 46,656.

Take, for example, the above measurements of 50,790 cubic inches of media needed. This would be the same as 50,790 x .00002143 *or* 50,790/46,656 = 1.09 cubic yards media needed for the 200 containers. This method slightly overestimates media needed, but allows for settling once the media is in the containers. Remember, it's a good idea to double-check your calculations. Always.

Testing the media

Before a crop is planted, test the media for pH, soluble salts and available nutrients. This can be accomplished by working with your county Extension educator. He or she will assist you in obtaining and directing the sample to your state or a private lab. Growers often purchase pH meters and solu-bridges to monitor pH and salt levels in soils after planting, and many find they often must adjust the pH of non-soil mixes and add additional nutrients. For instance, mixes proportionately high in peat moss or softwood bark may require dolomitic limestone to elevate the pH if it is below 5.8. Hardwood bark and some sources of peat may have the opposite effect creating an excessively high pH. This media then needs sulfur or sulfur compounds to lower the pH. The pH of the soil greatly influences the availability of nutrients, particularly trace elements.

Because there is such a large variety of containers and media available, the overview I've offered here is by no means comprehensive. But it's meant to offer a quick reference for those who are starting a growing operation, as well as for seasoned growers who may appreciate a little refresher. For more specific advice, be sure to contact your extension specialist.

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