GROWERTALKS

Features

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Mass Media

Ed Bloodnick & Troy Buechel

Whether you make your own growing medium or purchase a preformulated blend, finding a one-size-fits-all growing medium for plug growing and seed germination can be a challenge. Tray cell size, plant species, growing environment and each individual grower's practices are different from one operation to another and can vary each growing season. What works well for one grower may not be the best for another, so here's a primer on plug growing media.

Particle size

The majority of seed germination growing media are made with a base of fine grade sphagnum peat moss and a combination of mineral-based aggregates, such as perlite and/or vermiculite. Some blends may also contain fine coir, which is the pith of the coconut husk. Peat and coir have high water-holding capacity, while the mineral aggregates reduce water-holding capacity and improve air porosity.

The challenge for formulating growing media for seed germination and plug applications is to have a range of small particle sizes that correlate to the size of the seed to be germinated, while minimizing fine, dusty particles. Large particles are suitable for larger containers, however, they can cause bridging in plug trays and uneven water-holding capacity from one cell to the next. Fine, dusty particles can also be problematic, since those particles can migrate in the growing medium when watering and can clog pores, thereby reducing air porosity.

Perlite, vermiculite or both

Perlite is an amorphous volcanic glass (SiO_2) that has a relatively high water content. When heated, the water turns to vapor, causing the granules to expand to more than 20 times their original size, forming a lightweight, odorless aggregate with a neutral pH. When used in growing media, its physical structure reduces water-holding capacity and increases the air space of growing media.

Vermiculite is a natural, hydrous phyllosilicate mineral, which also has the remarkable ability to expand many times its original volume when it's heated in a process called exfoliation. Vermiculite can increase air porosity, contribute moderate water-holding capacity and has a moderate cation exchange capacity to retain nutrients in growing media.

Pictured: The most common problem when growing young plants is overwatering. Heavy watering can not only cause insect and disease problems, but perlite in your growing media to "migrate" to one side of the cell.

Perlite-based plug media are better suited for large size cell trays, propagation of cuttings that are frequently irrigated or for seeds that take longer to germinate, such as begonia. Perlite-based plug media hold less water than media containing vermiculite. They may also require a bit more time on the bench for seedlings to form adequate root balls, since perlite-based media can crumble easier than vermiculite-based growing media blends.

Vermiculite-based plug media are used more frequently for vegetable transplants and fast-growing horticulture plant species due to the higher water-holding capacity and the ability of the root ball to hold together better when pulled from the tray. Vermiculite-based plug media can hold more nutrients than perlite-based plug growing media, however, it's small and serves more as a buffer to resist changes rather than providing significant crop nutrition. It's best to apply a fertilizer solution to the crop on a regular basis once the true leaves emerge rather than to rely on the nutrient-holding capacity of the growing medium.

Some plug growing media contain both perlite and vermiculite. There are different schools of thought on this—perlite reduces water-holding capacity, while vermiculite has moderate water-holding capacity, but introduces some air porosity. So blending the two should work well together by introducing more air porosity, right? In many cases, it will if the percentage of perlite is at least as high as a peat-perlite plug mix without vermiculite. This is a matter of grower preference to determine if the combination works well for their application. A plug growing medium with a combination of perlite and vermiculite is often used for large cell trays and specific applications.

Fertilizer

Almost all plug growing media contain a wetting agent, are pH adjusted with limestone and contain a starter fertilizer charge to promote initial plant development. The fertilizer charge is minimal and the nutrition status of individual plugs can be impacted by irrigation volume and frequency.

Fast-germinating plant species will use some of the fertilizer shortly after roots are formed; however, most of the fertilizer is likely leached out for plant species that take more than 10 to 14 days to germinate, such as begonia. All considered, plan to apply a 30 to 50 ppm nitrogen solution of a complete fertilizer shortly after seed germination and maintain applications of appropriate rates of fertilizer as seedlings develop.

Trays

Although the type of plug growing medium selected will impact water-holding capacity and air space, the plug tray itself greatly influences these properties. Growing media in plug trays with deep cells will drain better due to gravity pulling the water through the growing medium column, thereby reducing water retention and increasing air space. The growing medium will dry out faster on the surface in these trays, and with more air space, roots will be under less stress and have fewer issues with root disease.

Deeper trays are better for slow-growing seedlings and those that are more susceptible to root disease. Shallow trays are better for fast-growing plants that have few issues with root diseases.

Active ingredients

When growing plugs and seedlings, there are often issues with root disease. Choosing a growing medium that

drains well, using deeper trays and carefully watering to the needs of the plant all help, but for additional insurance, it's best to incorporate a biological organism or biofungicide that can colonize the root system of the plants and help suppress root disease pathogens.

These biofungicides suppress root disease by forming a biological barrier around the roots, synthesize antimicrobial byproducts or physically attack the pathogens. Biofungicides are preventative and don't cure an existing root disease problem, so they should be pre-incorporated into the growing medium or applied at the time of seeding.

Common cultural problems

When growing any crop, problems can occur. The most common issue with young plants is overwatering or keeping plugs/liners constantly moist. This contributes to numerous problems.

Algae and insects: A moist to wet growing medium serves as an ideal environment for the growth of algae on the growing medium surface. The surface layer of algae will continue to thicken and turn black as long as the surface doesn't dry out.

This is also the ideal environment for shoreflies, as they need moist/wet growing medium for their larvae to grow and survive and algae is their principle food source. Fungus gnats are also attracted to moist/wet growing media—not because it's required for part of their lifecycle, but because it encourages fungal growth within the growing medium, which is their preferred food source. To minimize any of the above problems, dry out the growing medium between waterings as soon as possible.

Root disease: Pythium and Phytophthora are both water molds that require high moisture in the growing medium to thrive. It's best to allow the growing medium to dry down between waterings to discourage their growth. Keep in mind that anything that causes plant stress—such as over watering, underwatering, high salts, inadequate fertilization, etc.—will make plants more susceptible to attack from root rot pathogens. These stresses must be corrected to minimize root diseases.

Poor root development: Often poor root development is caused by overwatering. Too much water causes roots to stay up in the upper layer of growing medium so they can access oxygen. If the roots grow down into the continuously wet growing medium, they'll suffocate and eventually die.

It's best to again allow the growing medium to dry down between waterings to encourage root development in the bottom of the cell. Other factors that can contribute to poor root growth is improper fertilization, overfertilization, pH imbalance and root disease.

When deciding on which growing medium to use for young plant production, determine your growing needs and consult with manufacturers. Ask for samples and evaluate the product under normal growing conditions. If you grow a wide array of plant species, sample an adequate amount to be sure it will address the needs of various crops, trays/cell sizes and your particular growing situation. **GT**

Ed Bloodnick is Director of Grower Services and Troy Buechel is Horticulture Specialist—Mid-Atlantic U.S. for Premier Tech Horticulture.