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Features

A Kickstart for Your Crop

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Each type of growing medium is unique and addresses the characteristics that are ideal for the crop grown. Young plant growing media are no exception. Young plants include the production of seedlings and rooted cuttings—both categories require different growing media.

Seeds used to produce seedlings or plugs are often very tiny and are grown in small-cell trays, such as 288s or smaller cell sizes. As a result, growing medium for seed germination must contain fine components that allow for uniform filling of plug trays from one cell to another and that can also keep the seed in the upper profile of the growing medium. Coarse components can allow for the seed to move down into the depths of the cell during irrigation, causing poor or inconsistent germination.

Unrooted cuttings also require a growing medium with fine components, but they're more susceptible to overwatering and poor root development. Many are started in larger-celled plug trays, such as 72s or 50s, so larger media components can be incorporated into the growing medium to increase air space and reduce water retention. Often companies will use a fine sphagnum peat moss, but incorporate large perlite or coir fiber to accomplish this.

Growing media components

Most young plant growing mediums have a base of fine sphagnum peat moss and to this perlite, vermiculite, coir or in some cases, compost is added. Each component contributes to the overall performance of the growing medium by influencing the physical and chemical properties as seen in Figure 1. (Keep in mind that the size of each individual component has an influence on these properties.) The larger the size of the component, the more air space it provides and also contributes to faster dry-down of the growing medium.

Component	Air space	Dry down	pH	E.C.	C.E.C.
Sphagnum moss	Moderate	Slow	3.8 to 5.0	Low	Moderate
Coir	Low-moderate	Slow	5.5 to 6.5	Moderate	Moderate
Compost	Low	Very slow	5.8 to 7.0	High	High
Perlite	High	Rapid	7.0 to 8.0	Low	Low
Vermiculite	Moderate	Moderate	7.0 to 9.0	Low	Moderate

Figure 1. Typical characteristics of the most common growing medium components used in young plant growing media. For dry-down rate, this indicates how a component influences the time it takes for a growing medium to dry out when this component is used.

Sphagnum peat moss—Has good water retention along with good aeration. It's acidic, so limestone is added to bring the pH of a mix up to a normal level of 5.5 to 6.2 and it repels water so a wetting agent is required. Fine sphagnum peat moss holds more water and has lower air porosity than coarse sphagnum peat moss, but the size of the peat particle has little influence on its chemical properties.

Coir—Has similar properties to sphagnum peat, but it has slightly less air space. It requires little limestone due to its ideal pH and wets easily with water so it doesn't require a wetting agent. The disadvantage is that it comes with high levels of potassium, chloride and sodium. Coir should be washed and checked for E.C.

Compost—Compost consists of very fine particles, which creates low air space and contributes to slow dry-down of the growing medium. Overwatering can be a concern. Compost can provide beneficial plant nutrients, but these should be monitored, as some can have high E.C.

Perlite—Perlite adds a significant amount of air space into the growing medium, while reducing the dry-down rate. It has little influence on the chemical properties of the growing medium and contributes no salts or plant nutrients. It will loosen the structure of a growing medium, so the plant must have a good, developed root system before the plant can be pulled out of a tray.

Vermiculite—Vermiculite provides good aeration and water retention, like sphagnum peat moss. It has a high starting pH, so it's best to blend with sphagnum peat moss. Vermiculite contributes minor levels of magnesium and a few other elements and has a high C.E.C. to retain minor levels of fertilizer nutrients.

Containers—Plug trays and wrapped pots

When growing in plug trays and wrapped pots, plants are grown with a very small volume of growing medium. Plug trays are typically shallow and there's little influence of gravity to pull water through the cell of the tray. The growing media selected for plug trays and wrapped pots should provide good air porosity and adequate drainage—much higher than standard growing media.

Growers must take care not to overwater or saturate the growing medium. For seed germination, deep plug trays are preferred since water and nutrient solution can move downward within the column of the cell. There are various cell configurations to consider, whether a round, square or octagonal shape. Each is different and growers should evaluate plant root growth in various trays before switching and growing entire crops.

For wrapped pots, the growing medium must be fibrous to minimize compaction during the filling process. However, the growing media should be virtually free of large roots, sticks and debris to avoid obstructions when the pots are cut to size in the machinery. This can be a challenge finding peat that is fibrous and free of debris without many fine particles. Some growing media manufacturers offer products that combine peat and coir fiber to provide products with good fibrous structure and minimal debris.

For propagators of unrooted cuttings, there are several stabilized growing media products on the market. Stabilized growing media are preformed cells made from foam, peat with urethane binders, rockwool or other materials. The advantage of using stabilized growing media is that the rooting media is preformed, and once cuttings are stuck and roots are established, plants can be transplanted into larger containers sooner or shipped to customers as rooted cuttings. The disadvantages are that there are few sizes available, it can be labor intensive to fill trays with preformed cells and stabilized growing media can be costly.

Some growing media manufacturers are working with stabilizers that offer the grower choices for plug and wrapped pot production. Although still in development, the goal of this growing media it that it can be filled into any size tray and the binder forms the plug after several weeks. The advantages are that growers can select any plug tray they wish, there's no need for expensive equipment for wrapped pots, the labor is reduced and the cost is marginal for growing media with a binding agent.

Nutrition and pH management

Understanding and managing water quality is key to successful young plant production. As previously mentioned, there's a small volume of growing media in the root zone, therefore, buffering is minimal and nutrition status and pH of small cells are easily influenced from watering and applications of fertilizer.

Pictured: Algae growth on surface of growing media in plug tray from overwatering and algae contamination in irrigation water. In later stages, algae dries and forms a hard, hydrophobic crust.

Typically, seed plug trays and wrapped pots for cutting production aren't fertilized in the first weeks. However, repeated misting and irrigation will leach any nutrients, if present, and the limestone in the growing media will cause the pH to rise. Because of the potential of irrigation water to further raise the pH of the growing medium, it's important to start with growing media with a low pH around 5.0 to 5.2.

As seeds germinate and the first set of true leaves appear and as cuttings begin to root, a weak solution of water-soluble fertilizer should be applied. Generally, an application rate of 50 ppm of nitrogen at each watering with every fourth irrigation with clear water is adequate to start. Increase the rate to 75 ppm nitrogen as plants roll out new leaves and develop, if necessary. Use water-soluble fertilizers that have adequate levels of micronutrients, particularly iron and manganese when applied at the low rate.

For water-soluble fertilizer, check water alkalinity to determine the best fertilizer solution to use. Water alkalinity for young plant production is best at 80 to 120 ppm calcium carbonate ($CaCO_3$). With an alkalinity in this range, select a water-soluble fertilizer with a potential acidity between 150 to 300 lbs. of calcium carbonate equivalent. For alkalinity below 80 ppm, use plug formulas that have added calcium and magnesium; however, monitor pH of growing medium as these are typically potentially basic formulas and can cause the growing medium pH to rise.

For water with an alkalinity above 120 to 200 ppm, it's best to use a fertilizer with a higher potential acidity, such as 300 to 600 lbs. of calcium carbonate equivalent or consider injecting acid. For water with high alkalinity, above 200 ppm of $CaCO_3$, it may be best to adjust alkalinity into the 80- to 120-ppm range with acid. If necessary, sulfuric acid is recommended compared to phosphoric acid. The combination of phosphorus from phosphoric acid and ammonium fertilizers can result in unwanted elongation and stretching of plants. For any fertilizer program, consult with your fertilizer suppliers for their recommendation to achieve the desired growth results.

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**

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