So Long Soil

WHAT SHOULD TRADITIONAL GROWERS KNOW ABOUT GROWING MEDIA WHEN MOVING TO HYDROPONICS?

By Vijay Rapaka

Times are changing. Urbanization, diminishing farmland, consumer demand for fresh, locally grown produce and their awareness of how far it travels before consumption have made hydroponics — a method of growing plants in a mineral nutrient solution rather than soil — a popular and profitable method for food production. And this popularity is increasing daily as greenhouse ornamental growers continue to seek profitable crop alternatives.

With hydroponic growing requiring just a quarter of the space, approximately 90 percent less water and delivering crops twice as fast as when using soil, grower excitement is well grounded. In fact, with an easy-to-grow, fast-turning crop like lettuce, which can be harvested in as short as four to five weeks, hydroponic growing can be the perfect strategy for traditional growers to expand business and increase profits.

This becomes especially true given that a large portion of the cost of entry for traditional growers (i.e., greenhouse structures, seeding equipment, heating, etc.) is already in place. And, while there are many ways to grow hydroponically, it's actually not that difficult for growers to install simple modular hydroponic growing systems in their underutilized greenhouse space.

In traditional growing, the growing media is required to assist in plant propagation, while also providing root and stem stability during the entire growing process. With hydroponics, the role of the growing media is different but still very crucial. It is required to assist in seed germination, but beyond the nursery stage, the "growing media" within hydroponic production of leafy greens is actually the nutrient solution. Despite the seemingly small role growing substrates have in hydroponics, the choice of growing media is critical to the overall crop success for many reasons. Also, since each growing medium has different physical, chemical and biological characteristics that affect plant growth, choosing the correct growing media is important.

Understanding Media Options

With that in mind, there are several types of growing media available. Some of the most popular are coconut coir, Rockwool, OASIS Foam, vermiculite, perlite and peat-based media. Coconut coir is produced from the brown husk that surrounds the coconut shell. Composed of millions of tiny microsponges, coconut coir is best known for its ability to absorb and hold up to eight times its weight in water. While superior water retention and aeration make coconut coir a popular choice, it is imperative to use high-quality coir from a reputable supplier to reduce high salt level concerns.

Another widely used media is Rockwool or stone wool substrates. Rockwool is a mixture of volcanic rock, limestone and coke, which is spun into a fibrous medium, and is widely used by commercial hydroponic growers. It has a high water-holding capacity, good aeration, and no buffering and cation exchange capacity. Rockwool needs to be pretreated by soaking it in water or diluted nutrient solution before being used. And while Rockwool is

Synthetic growing media, like OASIS foam shown here, allows for a clean, pathogen-free start to hydroponic germination.

considered non-toxic, it has been known to cause skin irritation when dry.

Another popular growing medium is OASIS Growing Media, a lightweight, rigid and inert foam. OASIS Growing Media maintains good oxygen levels, even when saturated. It allows for a clean, pathogen-free start to germination, and seeds can be dropped into pre-punched holes manually or via machine. The pre-scored sheets make separating the OASIS cubes easy. Moreover, because of its consistency, OASIS helps to create uniform crop growth. And, similar to Rockwool, foam has no buffering and cation exchange capacity.

Vermiculite, yet another media option, is made from super-heating the mineral, mica. Its high water absorption capacity and the fact it can hold nutrients in reserve for later use makes it beneficial to many growers. Horticultural vermiculite comes in a number of grades. Finer particle sizes are best for seedling production, while larger grades are suited for mature salad crops. Vermiculite does have a tendency to become oversaturated, which can lead to root zone damage. Given this, it's important that hydroponic growers who wish to use vermiculite make sure to adjust their irrigation frequency accordingly.

Perlite, a sterile volcanic-rock medium, is a fifth substrate to consider when growing hydroponically. It is particularly useful when combined with vermiculite, which has excellent water retention properties. Again, while perlite is a widely recognized medium for hydroponic production, growers should take care not to inhale dry perlite because it can have a toxic impact on health. Therefore, growers should either wear a dust mask, or wet the perlite while it's still in the bag before filling growing containers.

Another common growing media for hydroponic growers to consider are peat moss-based products, commonly used in ornamental crop production and many non-recirculating hydroponic systems. Peat is often mixed with other substrates like perlite and vermiculite, or with polymers to create a bonded media. As with many media, quality is key when it comes to peat selection. High-quality peat products can produce perfect results for hydroponic growers. On the other hand, low-quality peat products have been linked to oversaturation and root death.

Hydroponic Systems

Once a grower understands the inherent strengths and weaknesses of each media option, he must then consider how the media will perform within his hydroponic crop finishing system. For that, there are two main types of hydroponic systems: NFT (Nutrient Film Technique) and DFT (Deep Flow Technique).

NFT is a hydroponic growing method wherein a shallow stream of water ("film") containing all the nutrients a plant needs for optimal growth is re-circulated over the crop's bare roots in a channel or gully. This technique provides the plant's root system with the proper dose of water, air and nutrients to thrive in its hydroponic environment.

With DFT systems, plant seedlings are placed in Styrofoam rafts and placed on shallow nutrient ponds of 12 inches or more in depth. The nutrient solution is re-circulated and aerated to provide oxygen to the plant roots. Since the volume of water is greater in DFT systems than NFT systems, it is less prone to dramatic temperature variations

and nutrient changes.

Because both finishing methods are closed irrigation systems, it is important for growers to evaluate how the growing media will hold up over time. For example, growing media that comes apart easily, shreds or flakes will tend to clog system filters and pumps. This could be potentially catastrophic, as the debris could disrupt the regular flow of nutrients, water and air from getting to the plants. On the contrary, bonded or synthetic media, such as Rockwool, OASIS Foam and even peat moss with polymer additives, hold together and reduce that concern when using NFT and DFT systems. That said, growers should carefully consider the advantages and disadvantages of each growing media based on the system they are using.

Synthetic and inert media also have other benefits over their loose or organic counterparts. While growing media made from natural materials tend to bind nutrients and slowly release them to the plant, synthetic media has little to no buffering capacity. This allows the nutrient-rich solution to go immediately to the plant where it's needed. As such, synthetic growing media is generally much more steerable, since the nutrients necessary to achieve a specific grower outcome aren't tied up within the media itself.

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Finally, when evaluating hydroponic growing media, growers must also consider how the final product will be presented upon harvest. For example, synthetic and bonded growing media hold together even through harvest, allowing crops to be packaged and sold with their root system still attached. This keeps the crops fresh and vibrant longer than crops grown in other media that require the roots to be removed. This gives consumers the freshest, most nutritional produce possible, while also keeping the produce cleaner and more attractive.

While the "perfect" growing media will differ from grower to grower, it's important to weigh all the factors before diving into hydroponic growing. As with any big decision, growers should choose a medium that is in line with the job they want it to do and their overall production goals.

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