Hydroponic peppers growing in coir blocks.

Alternative Hydroponic Substrates

Rockwool and perlite have been the standard for years, but with so many alternatives out there now, it's time to reconsider the basis of your growing system.

By Bridget White

Cultivating plants without soil, the accepted definition of hydroponics, continues to gain popularity within commercial horticulture, and as it does, more and more products are developed for it. More sophisticated lighting, easier to mix nutrients and simplified plant supports have all come onto the market within the past five years. But one of the most exciting developments in the world of hydroponics has been the refinement and popularization of alternative growing media.

There are probably hundreds of different kinds of growing media; basically, anything that a plant can grow in is considered a growing medium. Among the aggregates now available are rockwool/stonewool (the industry standard), oasis cubes, vermiculite, perlite, coconut fiber (coir), peat, composted bark, pea gravel, sand, expanded clay, lava rock, fiberglass insulation, sawdust, pumice, foam chips, polyurethane grow slabs and rice hulls. Each alternative has positives and negatives, and the choice between aggregates will depend on many variables, including the size and type of plants you wish to grow and the type of hydroponic system being used.

THE INDUSTRY STANDARDS

Rockwool/stonewool. Made from rock that has been melted and spun into fibrous cubes and growing slabs, rockwool has the texture of insulation and provides roots with a good balance of water and oxygen. Rockwool can be used with continuous drip or ebb and flow systems and is suitable for plants of all sizes, from seeds and cuttings to large plants.

Rockwool is considered by many commercial growers to be the ideal substrate for hydroponic production. Because of its unique structure, rockwool can hold water and retain sufficient air space (at least 18 percent) to promote optimum root growth. Since rockwool exhibits a slow, steady drainage profile, the crop can be manipulated more precisely between vegetative and generative growth without fear of drastic changes in EC or pH.

Note that some rockwool products require an overnight water soak before usage, as the bonding agents used to form slabs can result in high pH. Additionally, there has been a growing concern about disposing rockwool after use because it never truly decomposes.

Perlite/Vermiculite. Perlite is a substance made from volcanic rock. It is white, light weight and often used as a soil additive to increase aeration and draining of the soil. Vermiculite, which is used the same way as perlite and often mixed together, is made from heat expanded mica and has a flaky, shiny appearance. Because perlite and vermiculite are so lightweight, they are suggested only for starting seeds and cuttings.

Perlite has good wicking action, which makes it a good choice for wick-type hydroponic systems, plus it's relatively inexpensive. The biggest drawback to perlite is that it doesn't retain water very well, which means it will dry out quickly between waterings. Just the opposite is true of vermiculite; it retains too much water and can suffocate the plant's roots if used straight. Additionally, the dust from perlite is bad for your health, so always wear a dust mask when handling this media.

MEDIA ALTERNATIVES

The rising cost and difficult disposal of rockwool has led many growers to investigate alternative substrates, and with so many options available, there is practically a substrate for each situation. The following options are just a few of the more popular and promising ones.

Expanded clay pellets. This man-made product is often called grow rocks and works extremely well as a growing medium. It is made by baking clay in a kiln. The pebbles range in size from 1-18 mm and are inert.

Clay pellets are full of tiny air pockets, which give them good drainage. Clay pellets are best for ebb and flow systems or other systems that have frequent waterings. Because expanded clay pellets do not have good water-holding capacity, salt accumulation and drying out can be common problems in improperly managed systems. It is recommended to flush clay on a regular basis with either a half-strength nutrient solution or a commercially available flushing agent.

Though pellets are rather expensive, they are one of the few kinds of media that can be easily reused. After harvest, remove old roots and sterilize with bleach, steam, heat or hydrogen peroxide.

Sand. One of the oldest known hydroponic substrates, sand is not widely used today, mostly because of its low water-holding capacity and weight. Sand has a tendency to pack tightly together, reducing ➧

the amount of air available to the roots; therefore, a coarse builders' sand is best suited for hydroponic use. Alternatively, sand can be mixed with other media for a greater water-holding capacity and lighter weight.

Gravel. One of the earliest commercially available hydroponic systems was gravel. Gravel is usually fairly cheap, works well and is typically easy to find. Gravel supplies plenty of air to the roots but doesn't retain water, which means roots can dry out quickly. Its weight makes it difficult to handle, but it does have the advantage of not breaking down in structure and can be reused.

Gravel can easily be reused as long as it is washed and sterilized between crops. Also use heat, steam, bleach or hydrogen peroxide for cleaning.

Sawdust. Sawdust has had limited success as a hydroponic medium, but it is used, especially in Australia with tomatoes. There are many variables that determine how well sawdust will work, predominantly the kind of wood used and the purity of it. Growers need to be careful to ensure that their sawdust isn't contaminated with soil and pathogens or chemicals from wood-processing facilities or undesirable tree species. Another problem with sawdust is that it will decompose. Additionally, sawdust retains a lot of moisture so be careful not to overwater. The best thing about sawdust is that it is usually free.

Coconut fiber. Coconut fiber, also called coir, is rapidly becoming one of the most popular growing mediums in the world and may soon be the most popular. It is the first totally "organic" medium that offers top performance in hydroponic systems.

Coconut fiber is a waste product of the coconut industry and is actually the pulverized husks of coconuts. Coconut fiber is available in different grades, the lowest of which has an extremely high salt content that necessitates leaching before use.

The main advantages of coconut fiber are its oxygen and water-holding abilities. It can maintain a larger oxygen capacity than rockwool yet also has superior water-holding ability. Some research has also shown that coir might have insect-repelling abilities. High-quality coir (the grade commonly used for hydroponics consists of the coarser fibers) also has the advantage of not containing any, or extremely low, levels of nutrients, so it won't alter the composition of the nutrient solution.

Oasis cubes. Oasis rooting cubes are rigid, open-celled, water-absorbing pieces of foam specifically designed for optimal callus and rapid root formation. Made from phenolic foam, oasis cubes are most often used as a rooting media in commercial floriculture and make a great medium for starting seeds and cuttings in hydroponic produc-

tion. Oasis cubes hold over 40 times their weight in water and have wicking action that draws water to the top of the foam. They have a neutral pH and can be easily transplanted into practically any kind of hydroponic system or growing medium.

Sphagnum peat moss. A completely natural medium that is used as a major ingredient in most soilless mixes, sphagnum moss is often overlooked as a medium for hydroponics; however, it has many properties highly suitable to hydroponic production and is readily available.

Sphagnum moss has long strands of highly absorbent, spongelike material that hold and retain large amounts of water while simultaneously having good aeration. Because of this structure, it is best used in larger lattice or net-pot production where the long strands can spill out the holes in the pots to wick up water without falling out.

The major problem with this growing medium is that it can decompose over time and shed small particles that can plug up your pump or drip emitters.

Sphagnum is usually purchased in dry, compressed blocks and needs to be soaked for approximately one hour before use.

Rice hulls. Rice hulls are a lesser known and underutilized substrate in most parts of the world, but they have proven to be as effective as perlite for the production of a range of crops. Rice hulls are a by-product of rice production and have the potential to be an inexpensive, effective medium in rice production areas.

This free-draining substrate has low to moderate water-holding capacity, a slow rate of decomposition and low level of nutrients. However, as rice hulls are a by-product, they are not pre-sterilized. Growers need to take care by using hulls that have not been stored outside or uncovered.

Rice hulls have a tendency to build up salt and decompose after one or two crops, so they should be replaced often.

Polyurethane Grow Slabs. Polyurethane grow slabs are a reasonably new media developed specifically for hydroponic production. This media is composed of approximately 75-80 percent air space and 15 percent water-holding capacity. As this substrate is so new, very little information is available on it. GPN

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