

Expanded Aggregates Solve Soil Problems

by Rita Pelczar



WHEN I MOVED to western North Carolina nearly five years ago, I was introduced to Carolina clay—very different from the sandy loam of southern Maryland, where I had gardened for 20 years or so. The sticky, reddish soil seems better suited for making pottery than for gardening—at least until it's amended.

Organic matter—large quantities of compost, manure, and pine fines—that I had added regularly to my sandy Maryland soil to help retain moisture, I now add to my heavy clay for the opposite reason, to improve drainage and porosity. But organic matter breaks down and needs to be regularly replenished. That's not a problem for the vegetable garden and other annual plantings, but for more permanent plantings, I needed a longer-lasting solution.

Many public gardens across the country have employed expanded aggregates to resolve a variety of soil problems and to incorporate into “designer soil mixes” for specific uses. A bit of research and a trial of my own has convinced me of the value of expanded aggregates in the home garden.

PUFFED PARTICLES

When a slate, shale, or clay particle is exposed to very high heat, it expands. The result is a stable, lightweight granule—or aggregate—with lots of pores. When added to soil, the pores provide space for

the air and water necessary for healthy plant growth, offering a long-term solution to opening up heavy soils, adding porosity, and preventing root compaction.

Expanded aggregate products have other landscape uses: a component in the growing mixes for rooftop gardens and container gardens; a porous medium for rain gardens; root bridges to protect tree roots; a lightweight option for backfilling retaining walls; and for porous walkways. They also provide a physical barrier to protect plants from vole damage. Sold under a variety of brand names, many are regionally distributed, although some brands are nationally available. The following are just a few of the brands that have found wide usage in horticulture.

Stalite PermaTill® and Espoma's **Soil Perfector™** are derived from slate heated to over 2,000 degrees Fahrenheit. It is then crushed and graded by size. **Utelite E-Soil®** and **TXI TruGro®** are derived

from shale. There are several other brands of expanded slate and shale.

Hydroton® and **Turface®** are made from clay and the resulting expanded particles are round. They are commonly used in growing media for plants such as orchids and bonsai. They are also used in terrariums and hydroponic systems.

EXCELLENT DRAINAGE REQUIRED

At Mount Vernon Estate, Museum, & Gardens in Alexandria, Virginia, PermaTill has been used in several garden areas, including the large boxwood parterres, where excellent drainage is essential. “Our flourishing boxwood parterres have survived for 13 years without losing a plant. I credit much of the success in these formal plantings to the benefits of PermaTill,” says Dean Norton, Mount Vernon's director of horticulture. “The expanded aggregates improve soil structure, allowing for roots to breathe.”

At the Dallas Arboretum in Texas, Jimmy Turner, senior director of gardens, considers expanded shale “an indispensable component of our standard soil improvement regimen...if you have clay it's the miracle cure.”

Turner also recommends mixing expanded shale with potting soil to increase drainage and reduce weight in large containers. He adjusts the ratio of shale to potting soil based on the plant. “I have some agaves and yuccas planted in 80

Sources

Espoma Soil Perfector,
www.espoma.com.

Growco Indoor Garden Supply,
www.4hydroponics.com.

Stalite PermaTill Horticultural Aggregates, www.permatill.com.

TXI TruGro, www.txi.com.

Utelite E-Soil, www.uteliteesoil.com.



Soil aggregates have been added to the soil underlying Mt. Vernon's boxwood parterre.

percent shale; for most plantings though, I do 30 percent," says Turner.

At the Gardens at Post Hill in Morris, Connecticut, Ron Burch propagates, displays, and sells orchids. He uses a combination of Soil Perfector and Turface for some tropical orchids grown in pots and temperate terrestrial orchids in the garden. "We use these materials for orchids that require high moisture: *Phragmipedium* and *Maxillaria* in pots, and *Cypripedium* in the garden," says Burch. "These orchids require consistent moisture but they must always have excellent air capacity around the roots. Use of expanded aggregates allows for both conditions."

RAIN GARDEN

In 2003, PermaTill was used in the construction of the Baker Exhibit Center Rain Garden at the North Carolina Arboretum

in Asheville, which was designed to capture stormwater runoff. Downspouts and underground pipes direct runoff from a portion of the Exhibit Center roof to the adjacent Events Lawn. The stormwater fills perforated culverts below the surface of the lawn, which are supported by bioretention media composed of PermaTill and recycled brick chips. Water then drains into the rain garden nearby, which also collects runoff from the surrounding parking area. In addition to its function as a sub-grade filtering material, PermaTill, combined in this garden with composted leaf mold, provides a porous growing medium.

"PermaTill has been incorporated into several other projects at the Arboretum, including an undersurface layer in sod replacement areas, incorporated into soil in landscape beds, and as a planting media

for plants requiring very sharp drainage," says Clara Curtis, director for design and exhibit assets at the Arboretum.

SCREE GARDEN

Sharp drainage is a necessity for the Scree Garden that was developed in 2006 at the JC Raulston Arboretum in Raleigh, North Carolina. "We tilled about six inches of PermaTill into the beds," explains assistant director and curator of collections, Mark Weathington, "then built berms composed of one third PermaTill and two thirds good sifted topsoil." A PermaTill mulch prevents soil splashing onto plant foliage.

During the severe drought of 2007, the scree beds actually retained more moisture than other gardens at the arboretum. "This was presumably due to the capillary space in the slate particles," says Weathington.

Based on the positive results in the Scree Garden, expanded aggregates have been used as a soil amendment in other projects at the arboretum including the expanded Xeric Garden, the Asian Valley Garden, and the Rooftop Garden.

ROOFTOP GARDENS

Expanded aggregates are a good fit for roof gardens. "Being one-third to one-half the weight of regular sand, soil, or rock, expanded shale reduces the weight load requirements," says Scott Jensen, landscape and horticulture sales manager for Utilite Corporation. In Salt Lake City, Utah, Utilite E-Soil—expanded shale mixed with compost and topsoil—was used to create a five-acre, low-maintenance rooftop garden at the Latter-Day Saint's



Left: The Baker Exhibit Center Rain Garden at the North Carolina Arboretum in Asheville supports a variety of plants. Above: During the garden's construction in 2007, slate aggregate was a component of its foundation soil.

Conference Center. It was also used for an intensive rooftop garden at the Salt Lake City Main Library, where it supports a variety of small trees, shrubs, and grasses. "Expanded shale will not degrade, decompose or break down over time—even in freeze-thaw climates," says Jensen. "It maintains its porosity and drainage properties, is consistent and predictable."

At the Atlanta Botanical Garden (ABG) in Georgia, nearly 50 percent of the roof area of the Visitor Center is a garden, and PermaTill is an important component of the growing medium. "The engineered soil has held up very well since it was installed," says Amanda Campbell, ABG's manager of display gardens. PermaTill has been employed in other areas of the garden, including the conservatory, as a component of various container mixes. It is also being used as a root bridge to protect large tree roots. "In the Camellia Walk, the best location was chosen for the sidewalk but that still meant getting closer than we'd like to a couple of large trees," says Campbell. "The sidewalks are actually built on a mix that includes PermaTill in order to protect



A worker shovels a shale-aggregate soil mix on the roof garden of the Latter-Day Saint's Conference Center during its installation.

the tree roots, ensuring water and nutrient availability because it resists compaction."

FOR HOME GARDENS

Expanded aggregates work as well in home gardens as they do in public gardens. By combining them with other ingredients, such as compost and good topsoil, designer soils can be created to suit specific plants.

For heavy or compacted soils, Turner suggests applying a two- to three-inch layer of the aggregates over the intended planting area, tilling it in six to eight inches deep, then working in three more inches of composted organic matter. The resulting bed will be slightly raised, further improving drainage.

Their light weight means that container plants grown in a medium that contains significant amounts of aggregates will be easier to move. I also found that mulching with Soil Perfector prevents wind from drying out and blowing away loose soil from the surface of large containers.

Last year I gave PermaTill a try in my red clay. I incorporated it along with composted manure into a new bed near my driveway. So far, the results are good—sinking a shovel in the prepared bed was a breeze. And despite a very wet spring, the bed has handled the moisture easily, drainage is good, and my winter jasmine is growing well.

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