

JOHN'S CORNER

Soil Amendments - Lava Sand

By John Ferguson

This week I want to continue talking about soil amendments of volcanic origin and discuss Lava Sand. This is an interesting subject since some gardeners swear by it and others have had very disappointing results.

As with so many other products that use a generic type name, there are dozens of types of sandy minerals sold as Lava Sand throughout the country. A few years ago when I was writing a book with Howard Garrett (a colleague of mine) he had stated that he had great results in using Lava sand in the Dallas area while my experience had been on the negative or neutral side. However, at various conferences and events many others have stated that they have had great results. I was curious as to why the different experiences occurred. So I went to New Mexico and Colorado and visited some of the mining operations that produced Lava sand.

Lava Sand is a natural substance that come from the crushing of various rocks made of lava. In general the lava cooled quickly so big mineral grains did not have time to form as in granite or basalt. As a result, any dissolved gasses in the lava did not have time to escape, and they formed many tiny air bubbles that contribute to lava sand's high porosity. The color of lava sand depends on the type of lava than was used and may be brown, reddish, or black.

To explain the differences in the types of Lava sand and their benefits, I want to clarify a couple terms used in describing materials of all sorts: permeability and porosity. These terms are often used incorrectly in horticulture. Porosity is the amount of pore space in a substance and permeability is the ability of a fluid (liquid or gas) to move through a substance. For example Styrofoam has a very high porosity and zero permeability and that is why it is used in ice chests, insulation, etc. By contrast,



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Limestone rock has low porosity but often high permeability so much of our oil and natural gas comes from limestone rock formations as the oil and gas can easily move through the rock and be collected. Many rock minerals sold as Lava sand have a high porosity but low permeability as compared to Pumice which often has high porosity and high permeability.

Since lava sand is produced directly or as a by-product of crushing lava, the particles tend to be irregular in size with many sharp edges rather than rounded as in other sands (bank sand, beach sand, etc.) that have been exposed to the action of water and tumbled by the action of the water breaking off the sharp edges, thereby creating a rounder particle shape. This difference in particle shape changes the physical properties when used as a soil amendment. Lava sand is not permeable, hence it does not hold water on the inside of the grains as other soil amendments (pumice, vermiculite, perlite, expanded shale, etc.). However, due to its irregular surface it has a lot more surface area than rounded sand particles thus more water can be stored as a coating on the individual grains. Many of the good microbes live in these water films, and as result lava sand offers some small advantage in this area. However clay particles and humus in compost can hold many times more water than lava sand and more surface area.

Lava sand is almost neutral in pH, with some types being slightly alkaline and others slightly acidic depending on the source of the lava. As most amendments of volcanic origin it is relatively inert so it does not change the pH or release significant amounts of minerals (nutrients). It also tends to have a low cation exchange capacity (C.E.C.) value hence does not hold nutrients from other sources very well especially when compared to clay or the humus in compost.

Lava sand is composed mainly of aluminosilicate minerals similar to other rocks of volcanic origin. Depending on the source of the lava sand, it may or may not have additional plant nutrients like iron. The minerals (elements) in lava sand tend to be locked up chemically and very slow to break down and be released into the soil where plants and microbes can use them. However there are a few exceptions to this depending on the geologic origins of the Lava sand.

Like many soil amendments of volcanic origin, it may be paramagnetic to some degree. Many gardeners and farmers believe paramagnetic materials give them noticeably improved results in



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gardening and agriculture. Some of my research when in graduate school was in magnetization studies. I went through my CRC (Handbook of Chemistry and Physics) and looked at some of the minerals that compose Lava sand and they all have relatively low values of a property called magnetic susceptibility, hence most lava sands would have low paramagnetic values. I will save a more complete discussion of my experiences with Paramagnetism and gardening for a future article.

In summary, it will not hurt to use Lava sand but the best results will come from mixing it with compost, greensand, organic fertilizers and other amendments. In Houston and along the Gulf Coast there are other options that will probably work better and at lower cost.

PROS:

- will not break down (rot or decompose)
- does not compact
- gives beneficial microbes a place to live (bacteria, fungus, protozoa, nematodes, etc.)
- has no offensive odors
- loosens the density of heavy clay soils (will take a lot, expanded shale is a better option)
- neutral in pH so it does not change the acidity or alkalinity of soil
- free of pathogens
- reduces crusting , cracking and swelling of soils

CONS:

- for the Gulf coast it must be shipped a long way
- higher cost than other soil media with similar properties
- dries out quicker than other soil amendments
- low nutrient availability
- has a low buffer capacity to prevent pH change
- variable benefits depending on your soil and where you live