



GREENSAND

Greensand is a naturally occurring mineral mined from ocean deposits from a sedimentary rock known as “Glaucanite”. It is often an olive-green colored sandstone rock found in layers in many sedimentary rock formations.

Origin of Greensand

Greensand forms in anoxic (without oxygen) marine environments that are rich in organic detritus and low in sedimentary inputs. Some greensands contain marine fossils (i.e. New Jersey Greensand). Greensand has been found in deposits all over the world.

The greenish color comes from the mineral glauconite and iron potassium silicate that weathers and breaks down releasing the stored minerals. The color may range from a dark greenish gray, green-black to blue-green depending on the minerals and water content. It often weathers easily and forms nodules that have been oxidized with iron bearing minerals that has a reddish brown or rust color.

The major chemical description is $((K,Na)(Fe^{+3}, Al, Mg)_2(Si,Al)_4O_{10}(OH)_2$

General chemical information:

Iron (Fe)	12-19%
Potassium (K)	5-7 %
Silicon (Si)	25.0%
Oxygen (O)	45%
Magnesium (Mg)	2-3 %
Aluminum (Al)	1.9 %
Sodium (Na)	0.27%
Hydrogen (H)	0.47%

Over 30 other trace minerals and many micronutrients.

Types of Greensand

Glaucanite is the name given to a group of naturally occurring iron rich silica minerals that may be composed of pellets or grains.

When glauconite is mined the upper layers that have weathered and become oxidized and minerals are released. These sometimes form pyrite a iron sulfide (FeS_2) when oxygen is



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absent. In the deeper layers or reduced zone pyrite crystals often form. Other minerals found by magnetic separation are Zn, Ni, Cu, and many trace minerals and micronutrients.

The potassium (K) is often found in potassium saturated layers of mica, vermiculite and montmorillonite. Greensand is often considered a clay mineral due to the presence of chlorite, kaolinite, vermiculite, and other clay minerals that may be present.

Greensand is a very heavy mineral with a density of approximately 90 pounds per cubic foot (over 1 ton per cubic yard). The minerals are normally released slowly over time but occur much faster in organic rich soils full of beneficial microbes (microbes produce organic acids as they break down organic matter which facilitates the release of the minerals for plant absorption).

The pH of greensand varies from slightly acidic to slightly alkaline depending on the source and has little effect on soils.

Sources of Greensand

Greensand deposits are found all over the world with the largest and most numerous deposits in the United States and in Great Britain. The original deposits used in Horticulture were from the New Jersey area. In recent years several deposits have been found scattered from East Texas near Lufkin to West of San Antonio and in Arkansas.

Uses of Greensand

Greensand has been used for over 100 years as a natural source of slow release fertilizer and soil conditioner. The slow release of potash and phosphate does not burn plants and the minerals improve the moisture holding properties of soil. The best deposits of greensand contain at least 90% of the mineral glauconite and less than 2-3% clay minerals.

The cation exchange capacities (CEC) of soils were found to increase as the weathering of the greensand increased. The mineral glauconite is used as a water softener and it very beneficial to fight chlorosis in iron deficient soils.

Greensand often has the consistency of sand but is able to absorb 10 times more moisture which makes it a good amendment for use in agriculture and horticulture for many soils types. Greensand does not burn plants and helps for beneficial microbes to grow in the soil. It also has been found to be a good conditioner to help loosen heavy and tight soils and help bind loose soils.

Greensand is often used in compost piles to increase the nutrient content and diversity of beneficial microbes.



Recommended application is 2-4 pounds of greensand per 100 square feet or 1 ton per acre. For potting soils 5-20 pounds per cubic yard can be beneficial.

A field test by Rutgers University in a sandy loam soil with greensand applied in the row at the time of planting found that the application of greensand increased the yield of potatoes by 16%.

The benefits of greensand, largely unexplained by scientific research are far more than a laboratory analysis would indicate. However numerous greenhouse and field studies have shown significant improvement in the growth of plants. Other studies have shown that the use of greensand improves the taste, color, nutritional value, the health of plants and the health of soils.

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