

## **Soil Basics #10: Rocks for Crops**

Rocks for crops - this statement sounds strange, counterintuitive in fact, how can rocks be used for crops? We live in an area bountiful in gravel pits, should our crop production not be astounding?!! And are not rocks another form of pest for farmers and gardeners?!

Using rocks for crops falls under the umbrella of Agrogeology, the science of applying geological principles to the practices of agriculture.

This is such a fascinating opportunity and process, and is actually used around the world. I first learned about Rocks for Crops from a professor in university, Peter Van Staaten, an interesting and comical fellow of 100 and counting red reading glasses splayed across the piles and piles of papers atop his hidden desks. His research was primarily conducted in sub-Saharan Africa, though the use of rocks for crops is not exclusive to Africa, farmers in Canada have been utilizing rocks in their cropping fields for hundreds of years starting with the indigenous peoples, and on the worldwide scale back to Egyptian and Roman times.

Regardless of location in the world, phosphorous is the most limiting factor in crop production as it is involved at every stage of plant life, from germination to fruit production.

Phosphorus is found in phosphate rock which primarily consists of apatite, a calcium phosphate mineral. "Now both you and your soils have an appetite for apatite!" A Peter van Straaten line at the ready! It is found in sedimentary marine deposits, making it more easily collected (vs mining underground). Most will be processed to produce soluble P fertilizers, but there are opportunities for directly applying the (ground) rock to the field, avoiding extensive processing and allowing for a lower-cost nutrient source and option for organic crop production. This form is more like a slow-release nutrient as the rock has to weather in order for nutrients to be released. Product choice is dependent on cost, soil pH, soil P-fixing capacity, soil properties (ability to take on the phosphorous), product placement – soil surface or incorporated, crops applied on, and timing of application. The majority (>90%) of phosphate rock is turned into soluble P fertilizer, which indicates where the demand is and the desire for more immediately available nutrients.

Other rocks that are used in crop production are: Basalt, which contains Magnesium, Calcium and Silica, enhancing soil fertility and supporting plant growth; Gypsum which contains Calcium and Sulphur, does not alter pH, but does improve soil structure in heavy clay soils and helps to reduce the sodium content in sodic soils; and Limestone, which contains Calcium and Magnesium, increasing soil pH to provide a healthier plant growing environment and availability of nutrients, while also supporting beneficial microbes, and deterring slugs.

Rocks for crops, not only improve soil health and thus boost crop yields, but they also have the ability to sequester Carbon! Rock weathering, especially with silicate-based rocks allows for the process to initiate the movement of CO<sub>2</sub> from the air to the soil, then on to our water system.

CO<sub>2</sub> in the air comes in contact with water (rain or soil surface) forming carbonic acid (H<sub>2</sub>CO<sub>3</sub>). Once Carbonic acid meets the crushed silicate rock on the soil surface, where Calcium and Magnesium are available, the Carbonic acid reacts with the Calcium and Magnesium, dissolving them and neutralizing the acid. This moves the Carbon into a stable, dissolved state as bicarbonate ions HCO<sub>3</sub><sup>-</sup>, which move through the soil water and ground water into Lakes where it can be sequestered for a long time.

Rocks for Crops contributing to not only the frustration of gardeners, but to the health and productivity of our soils, and slowly improving our climate by pulling Carbon from the atmosphere. After you thank a farmer, thank a rock or two as well.