

# Mineralizing Soil with PhoSul Fertilizer

By PhoSul, LLC



## Mineralizing Soil

Mineralization is a vital process in soil ecosystems, converting complex insoluble nutrients locked in organic or mineral forms into soluble, plant-available forms through the action of soil microbes and chemical reactions. The role of mineralization is particularly crucial in unlocking essential nutrients like phosphorus and sulfur, which are often bound in inaccessible forms in the soil.

PhoSul blends rock phosphate, sulfur, and amorphous silicon into an innovative solution designed to enhance the mineralization process. Combining these elements optimizes soil biology, nutrient release to promote soil mineralization, improving nutrient availability, and enhancing soil health.

## Components of PhoSul

PhoSul consists of three main components, each play a unique role in mineralization.

1. Rock Phosphate (Phosphorus and Calcium Source) is a natural mineral that contains high concentrations of phosphorus (P) and Calcium (Ca), critical nutrients for plant growth, especially for root development, flowering, and energy transfer. However, phosphorus and calcium in rock phosphate is not readily available to plants because it is bound in mineral forms like apatite.
2. Sulfur (S) is another essential nutrient that plays a key role in protein synthesis, enzyme formation, and metabolic processes in plants. Sulfur also has a unique ability to lower soil pH, making other nutrients like phosphorus more soluble and available to plants.
3. Silicon (Si) is not traditionally considered a primary nutrient, but it plays an important role in enhancing plant resilience to stress, improving cell structure, and stimulating microbial activity in the soil. Silicon can also influence the bioavailability of other nutrients by improving soil structure, water retention, and nutrient solubility.

## How PhoSul Mineralizes the Soil

1. Phosphorus and Calcium from rock phosphate are bound in forms that are not immediately available to plants. In order for plants to utilize these elements, they must first be released through the mineralization process, which includes microbial activation and acidification by sulfur. This is where the synergy between rock phosphate and sulfur becomes crucial.
2. Sulfur enhances microbial activity and nutrient availability. Sulfur in PhoSul plays a dual role in directly supplying a necessary nutrient for plant growth and improving the availability of other nutrients like phosphorus through soil acidification.
3. Silicon improves soil structure and nutrient cycling and is an often-overlooked element in soil health. However it offers several key benefits that complement the mineralization process including stronger cell walls, improved resistance to diseases, pests, and environmental stress.

## The Synergy of Rock Phosphate, Sulfur, and Silicon

Combining rock phosphate, sulfur, and silicon creates a synergistic approach to soil mineralization:

1. Phosphorus/Calcium Solubilization: Sulfur's acidifying effect and the activation of phosphorus-solubilizing bacteria work together to unlock phosphorus and calcium from rock phosphate, increasing its availability to plants.
2. Nutrient Cycling: The presence of silicon improves the physical and biological properties of the soil, enhancing the overall nutrient cycling process. This allows for more efficient use of phosphorus and sulfur, while also reducing nutrient losses through leaching.
3. Microbial Stimulation: Sulfur and silicon stimulate different microbial communities, creating a more robust microbial ecosystem that supports the breakdown of organic matter and the mineralization of nutrients.

## Benefits for Soil Mineralization

1. Improved Nutrient Availability: PhoSul ensures that phosphorus, calcium and sulfur, three essential nutrients, are made available to plants through enhanced mineralization processes.
2. Enhanced Soil Biology: By stimulating microbial activity and improving soil structure, PhoSul supports a healthy soil ecosystem, which is crucial for long-term soil fertility.
3. Sustainable Soil Fertility: The combination of natural rock phosphate, sulfur, and silicon creates a slow-release, sustainable source of nutrients reducing the need for synthetic fertilizers.
4. Increased Plant Resilience: Silicon in PhoSul helps plants better tolerate environmental stresses, leading to stronger, healthier growth and better nutrient utilization.
5. Improved Soil Structure: Silicon improves soil aeration, water retention, and root penetration, creating a more conducive environment for microbial activity and plant growth.

## Application Guidelines

To maximize the benefits of PhoSul in promoting mineralization and nutrient availability, consider the following application practices:

1. Incorporation into the Soil: Mix into the topsoil during planting or soil preparation to ensure that phosphorus, sulfur, and silicon are readily accessible to plant roots and soil microbes.
2. Optimal Timing: Apply before or at the beginning of the growing season to provide a steady release of nutrients throughout the plant's growth cycle.
3. Pairing with Organic Matter: Combine with compost or organic matter to enhance microbial activity, further boosting the mineralization process and nutrient availability.
4. Soil Testing: Regular soil testing will help determine the correct application rates of PhoSul and monitor the effects on pH and nutrient levels.

## Conclusion

PhoSul is not only a fertilizer, but also a powerful soil amendment that combines the mineralizing potential of rock phosphate, sulfur, and silicon to enhance nutrient availability, improve soil health, and support sustainable crop production. By facilitating the mineralization process and stimulating microbial activity, PhoSul ensures phosphorus, calcium, silicon and sulfur are made available to plants in a slow-release, sustainable manner. Its application leads to healthier soils, more resilient crops, and increased long-term soil fertility.