

GSR DORMANT

Applied in the fall after harvest, or when your plant/turf has stopped growing for the season,

GSR Dormant is designed for the soil.

GSR Dormant is best applied to the bare dirt, at a rate of 45 to 90 grams per acre.

GSR GROW

Applied during the planting and growing season,

GSR Grow is designed for the plant.

GSR Grow is best applied to the bare dirt, at a rate of 45 grams per acre, and is also used as a foliar throughout the growing season.

GSR TURF

Applied during the growing season, **GSR Turf** is specifically designed for the turf and grass.

GSR Turf is applied to turf and grass, at a rate of 45 grams per acre, and is also used as a foliar throughout the growing season.

GSR Calcium is distributed by Sustainable Soil Solutions Canada Inc.
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GSR
CALCIUM
“The Rite Calcium”

Genesis Soil Rite Calcium: The Rite Calcium
**No matter if conventional or organic
farmer, gardener or turf care specialist.**

calcium

The New Vogue

Calcium has always taken a back seat to the "big boys" of soil fertility. The industry buzz is usually nitrogen and new forms are frequently being released to the market. Recently potassium has taken on the role of "favored son." Referred to as a secondary nutrient behind nitrogen, phosphorous and potassium, calcium is finally starting to take its place in the ranks of vogue nutrients.

It is true that NPK is used in greater percentages than calcium, but calcium is used more by weight and volume than any other nutrient. Practically speaking, calcium is rarely considered as a nutrient at all! Instead the focus on calcium has been more as a soil buffer to help adjust pH. However, calcium is of macro importance to both the plant and the soil in many more ways than simply moving the pH scale. It plays a major role in the physiology of the plant, strengthening its physical structure and helping in protection from disease attack. In the soil, the importance of calcium is many fold, including the reduction of soil compaction and helping to provide a better environment for the proliferation of beneficial bacteria. Some research even suggests that calcium plays a role in weed populations.

THE PLANT

Imagine the room that you're sitting in is a plant cell of your favorite plant species. The walls that surround you are made of calcium. The more calcium that is available to that cell the stronger those walls become. If calcium is limited the walls are as weak as balsa wood. As more calcium becomes available, those walls take on the strength of cinder blocks. The stronger the cell, the stronger the plant, and the quicker its recovery from the enormous pressures that it's faced with. This works for both leaves and roots. The stronger the root cells are the more aggressive the roots will be moving through the soil. Proper levels of calcium within the plant strengthen the whole plant and allows for efficient use of sunlight, carbon dioxide, water, nitrogen and mineral nutrients. Calcium also plays a major role in the construction of numerous hormone and enzyme systems that can help protect the plant from insect and disease attack.

THE SOIL

Calcium plays many roles in the soil, but it is the relationship with other nutrients such as magnesium, potassium and sodium that are most significant. To associate calcium only as a buffer of pH in the soil is an injustice. In fact pH can be driven by numerous minerals such as magnesium, potassium, sodium or even aluminum. Often times calcium is applied to the soil to lower pH. It is important to understand that an imbalance of calcium will lead to tight, hardpan soils which will restrict the flow of air and water through the soil profile. This will not only affect the plant roots, but perhaps even more important, will slow down the growth of beneficial micro-organisms.

The soil is an extremely dynamic environment consisting of numerous chemical, biological and physical reactions. It is on all three levels that we must manage the soil. We can change the physical structure of a soil by properly managing the chemistry, thus providing a stronger biological environment. It is this biology that is so important to the success of managing any crop. For the first time in recent memory soil biology has risen to the forefront of our industry. If we are going to make any improvement in the health of the plant, proper soil management is imperative, and this all starts by managing calcium levels.

MANAGING CALCIUM IN THE SOIL

Dr. William Albrecht, the former head of the soils department at the University of Missouri, established the protocol for balancing the basic cations on the soil colloid over 50 years ago. Today that research is the backbone behind a growing interest in sustainable soil management. When evaluating the base saturation percentages of a soil the ideal targets are: 68% Calcium, 12% Magnesium, 5% Potassium, 2% Sodium, 3% Trace Nutrients, 10% Hydrogen. With an ideal range of calcium in the high 60 percentile it becomes very clear to see why calcium is so important. Using these percentages as a standard, the manipulation of these nutrients becomes manageable. If one nutrient is high it can be exchanged off the soil colloid by applying one of the other nutrients. For example, if magnesium is excessive in a soil, 20% or higher, another nutrient becomes weaker. The relationship is always 100% so it becomes a game of "give and take." Very often the nutrient given up will be calcium. The addition of calcium will drive out the excessive magnesium allowing calcium to saturate the colloid. This manipulation will work with any nutrient that is out of balance.

One of the great fallacies of conventional soil management is that we too often manage exclusively to soil pH. The acidity of a soil is dictated by the percentage of hydrogen on the soil colloid. On the above example, base saturation of hydrogen is 10%. On this test, with 10% hydrogen the pH will always be 6.3. As the percentage of hydrogen increases the pH drops and as it increases it rises. If we effectively manipulate the relationship of the base saturation, we can always manage the soil to 10% hydrogen and end up with a pH in the range where we have the greatest potential nutrient mobility (6.0 - 6.5).

When imbalances among the cations exist the soil becomes very tight and air and water can not penetrate. When this occurs roots are not the only thing that suffers, but beneficial bacteria suffers as well. Since the relationship between calcium to magnesium makes up 80% of the soil colloid it is this relationship that is most important. As calcium drops below 60% and magnesium creeps above 20%, the soil becomes very tight. These are looked at as heavy, unmanageable soils, and excessive mechanical aeration appears to be the only help. Unfortunately, this does not address the real problem and until the Ca:Mg ratio is addressed that soil will remain tight.

THE CONCLUSION

Calcium perhaps plays more roles in the overall health of both the plant and the soil than any other nutrient. If well balanced on the soil colloid it will help to physically open up the soil for better air and water movement. This in turn provides the needed environment for beneficial bacteria creating checks and balances for pathogens. Within the cell it provides turgidity and is needed for numerous physiological reactions. It helps in root and leaf development and makes phosphorous and micro-nutrients more available. If well balanced the proper levels of calcium will help reduce the need for nitrogen by making nitrification more efficient. As Dr. Albrecht explains it in his volumes of research, if we get the calcium right in the soil most of our work is done.

Calcium: The New Vogue was written by Joel Simmons. Joel Simmons is a former County Extension Agent and the owner of Earth Works Natural Organic Products. This article was first published in TurfNet Monthly, December 1997.

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