ECOMATERIAL TECHNOLOGIES

TECHNICAL BULLETIN

GYPSYN™ PERFORMANCE GYPSUM for Agricultural Fields

- Improves soil health by increasing infiltration and improving the physical/chemical properties of the soil.
- Remediates sodic soils and brine damage.
- Improves surface water quality by reducing dissolved phosphorus concentrations in surface runoff and subsurface drainage.
- Improves water quality by reducing the potential for pathogens and other contaminants transported from areas of manure and biosolids application.

Gypsum as a Soil Amendment to Improve Soil Physical Properties

The addition of soluble Ca can overcome the dispersion effects of Mg or Na ions and help promote flocculation and structure development in dispersed soils. Soil dispersion is mainly caused by highly hydrated ions, such as NA+ or MG2+, attracted to the surface of clay particles. Effectively remediating high MG soils and sodic soils as well as brine damaged soils (NA).

Gypsum Is a Good Source of Soluble Calcium and Sulfur

- Gypsum is a quality source of both calcium and sulfur for plant nutrition. Deficiencies of sulfur in crops are increasing.

Gypsum to Improve Soil Physical Properties

- Gypsum has been shown to improve surface infiltration rates by inhibiting or delaying surface seal formation.
- Gypsum application to soil can reduce soil erosion by flocculating clay particles so that they settle out of surface water and thus are less prone to be moved offsite.
- The calcium in gypsum can bind with phosphorus to form a calcium phosphate precipitate and thus help improve water quality.

Gypsum Application Rates to Improve Soil Chemical and Physical Properties

CEC	Rate (ton/acre)•
<5	0.25
5 – 10	0.5
10 – 15	1
>15	2
Goal: Base saturation of Ca = 70% to 80%	

** Annual application rate in ton gypsum/acre*

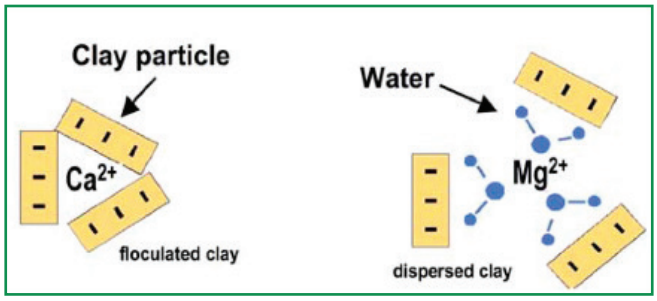

Illustration kindly provided by Dr. Jerry Bigham, The Ohio State University

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Gypsum to Improve Soil Chemical Properties

- Gypsum is the most commonly used amendment for sodic soil reclamation.

Application Rates of Gypsum for Agricultural Fields

For many land-application uses of gypsum, it is important that the recommended rates are based on well-defined principles of soil and agronomic science. If the source of gypsum is FGD gypsum, application at a rate greater than predicted necessary may be interpreted as disposal and could also be harmful. This is similar to other types of agricultural inputs, such as nitrogen fertilizer, if applied at excessive rates. Application at a rate less than that predicted as necessary may be ineffective for enhancing crop yields or improving soil quality. According to the specific purpose for why gypsum is to be applied to soil, the appropriate rates can vary greatly, from less than 100 lbs. to several tons per acre each year.

Rate, Time, and Method of Application of Gypsum for Various Functions

Function	Suggested Rates of Application (lbs./acre) Low	Normal	High	Suggested Time of Application	Suggested Application Method	Reference
Sulfur fertilizer to enhance crop production	100	300	500	Before planting	Soil surface or incorporated	Chen et al., 2008 DeSutter and Cihacek, 2009
Calcium fertilizer to enhance crop production (especially root crops; e.g., peanuts)	1,000	2,000	4,000	Before peanut pegging	Soil surface	Grichar et al., 2002
Soil amendment to remediate subsoil acidity	3,000	6,000	10,000	1 – 180 days before planting	Soil surface	Chen et al., 2005
Soil amendment to remediate sodic or sodium-affected soils	2,000	10,000	****	90 – 180 days before planting, before rainy season	Soil surface or incorporated	Xu, 2006
Soil amendment to improve water quality (e.g., by reducing phosphorus concentrations in surface water runoff)	1,000	6,000	9,000	1 – 180 days before planting	Soil surface	Norton and Rhoton, 2007
Soil amendment to improve soil physical properties and water infiltration and percolation	1,000	3,000	9,000	1 – 180 days before planting	Soil surface	Sumner, 2007
As a lawn care product and sport field application	4,000	8,000	10,000	Spring, summer, or autumn	Soil surface	Schlossberg, 2007
As a component of synthetic soils for nursery	5%	10%	20%	Preparation of synthetic soils	Mixing with other components	Barhan et al., 2004