GYPSOIL™
BRAND GYPSUM

FACT SHEET

Using Gypsum to Advance Soil and Water Conservation

This fact sheet introduces how to evaluate gypsum as a conservation tool and gives details about the new USDA/NRCS Conservation Practice Standard **AMENDING SOIL PROPERTIES WITH GYPSUM PRODUCTS - Code 333.**

Gypsum Improves Soil Health and Water Quality in Four Major Ways:

- Soil health by improving physical-chemical properties and increasing soil infiltration;
- Surface water quality by reducing dissolved phosphorus concentrations in surface runoff and sub-surface drainage;
- Soil health by ameliorating subsoil aluminum toxicity;
- Water quality by reducing potential for pathogens and other contaminants being transported from areas of manure and bio-solids application.

This Code 333 Standard Applies

Where land application of gypsum products will be used to alter the physical and/or chemical characteristics of soil to help achieve one of the above purposes.

More than 70 scientists and technical experts reviewed the practice standard via the American Society of Agronomy before it was adopted by an NRCS review committee.

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General Criteria

- Do not apply gypsum in watersheds where sulfate additions are restricted.
- Do not exceed annual application rates of 5 tons/acre.
- Use a soil analysis no older than one year that provides cation exchange capacity (CEC), calcium (Ca), magnesium (Mg), pH and phosphorus (P) – as a minimum – to plan the appropriate application rate of gypsum products.
- Apply gypsum to pastures only when livestock are not present.
- Be sure to review additional criteria for your location via your local NRCS.

What is Gypsum?

Gypsum is calcium sulfate dihydrate. Flue gas desulfurization (FGD) gypsum, such as GYPSOIL brand gypsum, is a co-product material derived from the scrubbing of flue-gas emissions in coal-burning power plants. GYPSOIL is produced by forced-oxidation wet systems after the removal of fly ash and is acceptable for use in the practice. Gypsum can be spread with lime and litter spreaders.

How Gypsum Can Amend the Soil

Gypsum helps to shift Ca and Mg levels in the soil and offers a readily available form of sulfate sulfur, a valuable secondary nutrient benefiting the soil and the crop.

The sulfate in gypsum binds with excess Mg in the soil to form soluble Epsom salt, which moves lower into the soil profile. The Mg is replaced by Ca, improving water-holding capacity, root development and soil quality.

Proper Levels of Calcium and Magnesium

CEC in soil is a measure of the nutrient holding capacity, or the number of exchange sites in a given volume of soil that attract positively charged cation nutrients. Different soil types have different nutrient holding capacities. As an example, clay soils generally have more exchange sites than sandy soils. Slow water infiltration rates and percolation are due to poor soil particle aggregation and can be caused by an imbalance between Ca and Mg. Compaction, crusting problems and waterlogging are common when the Mg levels are too high and/or Ca is too low. This is why the desired base saturations of Ca and Mg must be attained.

Criteria to Improve Soil Health

Soil test results for CEC and base saturation analyses for Ca and Mg are the key to determining if gypsum is appropriate for specific conservation programs. In a balanced soil, soil test results should show a base saturation, or percentage of nutrient holding sites occupied by cations, of 70-80 percent for Ca and 10-13 percent for Mg.

To determine rates for gypsum applications to improve this problem, consult Tables 1 and 2:

Table 1: *Target ranges for base saturation of cations to improve soil chemical and physical properties. Of the cations listed in Table 1, Ca and Mg have the greatest impact on soil structure.*

Base Saturation	Balanced
Calcium	70-80%
Magnesium	10-13%
Potassium	2-5%
Hydrogen	1-10%

Table 2: *Gypsum rate recommendations that are described below are based on bringing base saturations for Ca and Mg into balance as indicated in Table 1.*

CEC	Annual Application Rate (ton gypsum/acre)
<5	0.25
5-10	.5
10-15	1
>15	2

State and local NRCS may have criteria to consider in specific locations and may be more restrictive than the national standard. Be sure to check your local NRCS office and state's Field Office Technical Guide for additional information and criteria to determine whether your specific application plans qualify for NRCS programs.

Basic steps to follow to use NRCS gypsum programs:

1. You will need a conservation plan approved by NRCS to determine if gypsum is needed on your field to address environmental resource concerns. NRCS and other conservation professionals are available to develop a conservation plan with you – information from your local certified crop advisor, soil agronomist or GYPSOIL dealer may also be valuable to help you determine if gypsum is right for your acres.
2. Contact your local NRCS office and review "2008 Farm Bill – How to Apply for Programs" document, plus other information to submit an application for funding.
3. Review documents found on your state's Field Office Technical Guide that deal with gypsum. Look in Section IV for materials such as the practice standard or code document and related agronomy technical notes, statement of work and other materials.
4. If approved for funding, be sure you have the proper documentation and analyses, including a current soil test with necessary information, to demonstrate that the project meets criteria and purposes designated in the practice standard.

The following states have adopted Code 333 or components of it: Alabama, Indiana, Michigan, Ohio and Wisconsin.

For more information about GYPSOIL brand gypsum and the new practice standard, consult your NRCS office or visit gypsoil.com or call 866-GYPSOIL (497-7645).

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