INORGANIC ROOTZONE AMENDMENTS

As long as turf has been grown, turfgrass managers have amended soils with materials that are supposed to increase drainage, enhance compaction resistance, reduce nutrient losses, provide more plant-available moisture, and promote root growth. Some products claim to do all of these at once! The beneficial effects of high-quality organic matter sources (reed-sedge peat, rice hulls, compost, sphagnum moss) on the physical and chemical characteristics of both clay and sandy soils has been documented by years of testing and field evaluation. Similarly, the negative, potentially disastrous effects using poor quality organic sources, or of improper mixing of even high-quality organics, have been observed by most turfgrass mangers.

Less well-documented, both by university testing and actual field sue, are the effects of many of the non-organic rootzone amendments. Such products include: zeolites, calcined clays, and diatomaceous earth products (Isolite). Some of these products have been around for years - and we still can not agree on how much (or little) benefit they provide as soil amendments. We see increasingly more of these types of products on the market now, under many different trade names. Many are marketed on a local or regional basis. Some suffer from inconsistency in composition or performance, either as a result of natural variability or because of a lack of quality control during manufacturing. The large number of available products, in combination with product variability, crate difficulties for researchers and turfgrass practitioners who wish to evaluate and compare these materials for product performance.

Zeolites,naturally-occurring alumninosilicate minerals, have been investigated for a number of years because of their potential to reduce leaching of N-fertilizer from coarse-textured soils and to reduce irrigation requirements of plants growing in zeolite-amended soil. Natural zeolites would appear to function well in this capacity due to their unique chemistry that provides selective absorptive capabilities for certain nutrient cations, a high cation exchange capacity (CEC), and high moisture-holding capacity. In particular, clinoptilolite zeolite (CZ) demonstrates the ability to selectively retain the ammonium (NH4+) and potassium (K+) ions, thus reducing their leaching potential. In a 1986 report from the University of Arizona, Ferguson and co-workers found that creeping bentgrass germination, establishment, and root growth were significantly enhanced on sand amended with CZ on a 5 or 10% volume basis. Clipping yields and N-use efficiency also increased significantly where CZ was used and a soluble N source (urea) was the fertilizer source.

A recent study published by Drs. Jeff Nus and Stan Brauen also noted superior establishment of bentgrass when CZ was used as an amendment to sand at 5, 10 or 20% (volume/volume) rates. In their study, the 10% volume mix significantly improved water retention when compared to sand only.

At Cornell University, Dr. Marty Petovic has found that the incorporation of CZ into sand can significantly reduce nitrate leaching (as compared to unamenable sand). Clipping yields of creeping bentgrass increased, and water use decreased, when CZ was prese the rootzone mix. These findings agree with those of a number of other studies conducted with CZ materials, showing that the high affinity for the ammonium ion reduces the potential for conversion of ammonium to nitrate (NO3-). Nitrogen is most easily leached from turfgrass rootzones when in the nitrate form. By keeping fertilizer N in the ammonium for, N leaching losses are minimized and fertilizer is used more efficiently in the turf system. Loss of potassium (K+) is similarly reduced when CZ is a present in the soil mix.

The abundance of high-quality deposits of natural zeolites found throughout the Western U.S., with their unique chemical and physical properties, make them (especially clinoptilolite zeolite) attractive as an amendment for coarse-textured soils. Because research on CZ use is limited, and long-term use in the field has not occurred, it is wise to approach CZ use with caution. While initial results look promising, the long-term physical stability of zeolite under high traffic must be investigated.

Pacific Sod
A Division of Pacific Earth Resources
600 N. 2nd Street, Suite 3
Patterson, CA 95363
(800) 692-8690
Brian Snow
Sales Representative

PACIFIC PEARL OYSTER SHELL
NATURE'S BEST CALCIUM
John Mazura
North Coast Division Manager
Bus: (707) 762-7251
Res: (707) 274-1875
Jerico Products
100 East "D" St. - Petaluma, CA 94952

TES Turf Equipment Services
A Mobile Service and Repair Facility
Ben W. Showard
7432 Highland Oaks Dr.
Pleasanton, CA 94588
Bus. (415) 426-8968
Res. (415) 426-9062

Ciardella's
GARDEN SUPPLY INC.
PLANTER MIX • TOP SOIL • SAND • GRAVEL
DECORATIVE ROCK • FIR BARK • FERTILIZERS
PROFESSIONAL CUSTOM BLENDS • NURSERY
R.A. "BOB" BUDELLI
VICE PRESIDENT
2027 E. BAYSHORE
PALO ALTO, CA 94303
415/321-5913

Contact:
TORO
WEST STAR DISTRIBUTING, INC.
2438 Radley Court • Hayward CA 94
(415) 887-1222 • FAX (415) 785-3576
Sprinkler Systems & Turf Maintenance Equipment!

Also, CZ often contains high levels of exchangeable sodium. The sodium will leach out of the rootzone over time, but may initially create some toxicity problems if sodium-containing CZ or other zeolites as a topdressing component must also be investigated before that use can be recommended with confidence.

Calcined clays have been used as soil amendments and topdressing materials for years. A good deal of research on calcined clays had been conducted at Purdue University in the '60's. The use of these materials as a rootzone amendment or a topdressing material was found to produce putting and tee surfaces that allowed for rapid water infiltration and percolation. Because of their clay structure, the calcined clays possess high CEC's. While calcined clays can hold a great deal of water, the amount of retained water that is plant-available will vary with product composition and particle size. Some materials supply little plant-available water, even when fully hydrated. When used as a component of a rootzone mix, calcined clay is typically added at a rate of 10% on a volume basis. When used as a topdressing, turf mangers have used topdressings containing 10% calcined clay/ 90% sand, up to 100% calcined clay, with success.

Recently, work conducted by Dr. Hank Wilkinson and associates at the University of Illinois found that some calcined clays can hold 80% or more of their weight in water, and that more than 20% of the retained water may be plant-available. They found that water-holding capacity of soil may be increased by adding calcined clay, but that the water-holding advantage (plant-available moisture is lost as the soil becomes moderately dry.

The major concern with the use of calcined clays over the years has been with their stability under traffic, and the potential to cause layering problems in greens. The concern is especially valid when calcined clay is used as topdressing. The capability to produce uniformly-sized, physically stable particles increase the potential usefulness of calcined clays. In some cases, especially where good-quality sand is unavailable, their use has allowed the superintendent to successfully modify greens and tee surfaces without rebuilding. In a few situations, however, their use has resulted in the production of excessively droughtly rootzones (when particle sizes are too large) or layered soils (where the clay particles have disintegrated and migrated in the rootzone).

A diatomaceous earth product, Isolite, is currently being evaluated as a soil amendment (for both sand and clay soils) at Colorado State University. This material absorbs large amounts of water quickly, but is also able to maintain a favorable balance of aeration porosity while doing so. Application rates being evaluated range from 1 to 3 pounds of material per square foot, incorporated into the surface 4 inches. Moisture release curves indicate that Isolite can increase the amount of plant-available moisture when mixed with a good-quality sand. This material also demonstrates the potential, when mixed into heavy clay soil, to increase the soil's resiliency and compaction resistance.

Credit: Article taken from "The Reporter". Article by Dr. Tony Koski, Extension Turfgrass Specialist, Colorado State University.

Ph.(408) 728-3520 Cambridge FAX (408) 722-2247
SPORTSTURF SYSTEMS – WEST, INC.
Sportsturf Drainage
1022A San Andreas Rd.
La Selva Beach, CA
95076-9639 USA
Charlie Kollmeyer
Operations Manager
Lic. No. 569065

MARTINS' IRRIGATION SUPPLY, INC.
DISTRIBUTOR OF SPRINKLER AND IRRIGATION SUPPLIES
FRANK & ELAINE MARTIN, Owners
420 OLYMPIA STREET
SEASIDE, CA 93955
(408) 394-4106

JENKINS MACHINERY CO.
Agricultural Machinery
Construction Machinery
Turf Machinery
I. F. "GEORGE" MOORE
Bus. (510) 685-6685
Res. (415) 595-5597
JENKINS MACHINERY CO.
1848 Arnold Industrial Place, Concord, CA 94520
CA/NV (800) 642-2456
FAX 510-685-9303

SIERRA PACIFIC TURF SUPPLY
Don Naumann
510 Salmar Avenue • Campbell, CA 95008 • (408) 374-4700
(800) 827-TURF Mobile (408) 234-4571 Fax (408) 374-4773

COUNTRY CLUB Sales, Inc.
830 LATOUR CT.
NAPA, CA 94558
(707) 255-2828
(800) 252-6660

GOLF COURSE RENOVATION
Jim Duhig Terry Stratton
(415) 229-1060
CONTRA COSTA LANDSCAPING, INC.
P.O. BOX 2069 • MARTINEZ, CA 94553

INTERNATIONAL SEEDS, INC.
Breeders and Marketers of World Class Turf Seed
"Seed – the Gift of Life"®
Halsey, Oregon