

## Soil problems? Try an 'amendment'

**Though they come in all shapes and sizes, each has specific functions. Here are some available products and what they can do for you.**

■ Soil problems are the bane of landscape managers everywhere. In most turf textbooks, entire chapters are devoted to soil characteristics and the problems they create in growing healthy turf.

When problems arise with soil composition, turf managers might turn to a class of products known as "soil amendments," which can modify soil characteristics in any number of positive ways.

Soil amendments can modify:

- 1) soil texture
- 2) soil structure
- 3) the soil's chemical properties
- 4) the soil's long-term stability
- 5) availability of nutrients, water, etc.

to the plant

- 6) amount of other treatments (fertilizer, pesticides) required
- 7) cost of maintaining healthy plants

Soil amendments are used to increase air porosity, change permeability, or increase water retention. Many contain micronutrients or in some way benefit nutrient release and/or overall plant health.

Soil amendments come in as many different forms as there are uses. They range from sand—found naturally in the environment—to many specialty products like super-absorbent polymers.

Some common types of soil amendments are **inorganic**, usually in granular form. They can improve pore space, water retention, percolation and infiltration, and correct acidity. The most commonly used coarse amendment is sand because of its effectiveness, stability and low cost.

### BENEFITS OF SOME SOIL AMENDMENTS

Calcined clay	improves	pore space water retention water infiltration water percolation
Lime	improves	soil chemical properties (corrects) acidity
Organic amendments (compost, peat, etc.)	improve	soil structure pore space nutrient retention water retention soil resiliency cation exchange capacity
Processed mica	improves	water retention pore space cation exchange capacity
Sand	improves	aeration water infiltration water percolation
Wetting agents	improve	water infiltration water retention

ments are calcined clay (*Dialoam, Turface, Terra-Green*), processed mica (vermiculite, *Terralite*), lime (*Limestone F, Lime Crest*), perlite, diatomite, ureaform aggregates (*Hydromul, Styromul*), clinoptilolite zeolite (*Aquasand*), expanded shales (*Haydite, Weblite, Idealite*), activated charcoal, pumice, slag, fly ash, and cation and anion exchange resins.

Another kind of soil amendment is **organic** in nature. They improve soil structure, aeration, nutrient and water retention, resiliency, aggregation and cation exchange capacity, and increase the population of beneficial microorganisms.

(*Canadian Sphagnum Peat Moss, Partac Peat, Baccto*), humus (*Humate, Liquid Humus, Iron Sea Humus, Sea Humus, New Mexico Memefee Humate*), manure, sludge, sawdust, tree barks and fibers (*Top N' Turf*), seaweed (*SeaGreen*), kelp (*Potent Sea, Sea Green*), activated charcoal, poultry litter, peanut and pecan hulls, corn-cobs, cotton burr compost, rice hulls, and vegetable wastes.

Another type of soil amendment is called the **surfactant** or **wetting agent**. They are used to improve water infiltration and water retention. Good examples are *Aqua-Gro, Hydrowet, Lescowet*, and

*Terra-Sorb.*

In some cases, **compost materials** are also considered soil amendments. They are used to improve soil structure and water retention.

Other types of soil amendments:

- **soil conditioners,**
- **polymers** (like *Krilitum* for reducing erosion, *Terra-Sorb*, *StockSorb*),
- **sewage sludge** (for enhancing soil texture, improving aeration, infiltration and water-holding capacity, like *Earthmate*);
- **clay balls** (for infiltration, nutrient and moisture retention),
- **starch polymers** (like *Super-Slurp* for water retention), and
- **mulches** (for temperature stability, less water evaporation).

Following is a partial list of the many soil amendments available.

—Jerry Roche

## Soil amendments

**Accuwet:** (see Lescowet)

**Actosol:** an organic humic acid with fertilizer additives that improves soil texture, promotes microorganism activity and increases moisture retention. (Arctech)

**Agroroots:** a kelp-based plant stimulant that promotes root growth and plant vigor. (Agro-Tech 2000)

**Aqua-Gro:** non-ionic organic wetting agent that alleviates localized dry spots and compaction, promotes nutrient uptake. (Aquatrols)

**Aquasand:** a form of zeolite (volcanic ash) that absorbs ammonium and other soil impurities, absorbs and releases moisture for less watering, and prevents root rot. (Creative Curb)

**Axis:** made from diatomaceous earth that reduces watering requirements, increases aeration, reduces compaction and improves percolation. (Agro-Tech 2000)

**Baccto Peat Moss:** comes in either sphagnum or horticultural mixes. (Michigan Peat)

**Back to Earth:** cotton burr compost products that can be used as soil conditioners and/or topdressings. (Back to Earth Resources)

**Beam Clay:** a baseball diamond surfacing product. (Partac Peat)

**BioGroundskeeper:** (Sustane)

**Break-Thru:** a non-ionic wetting agent/surfactant that increases the effectiveness of pesticides. (Agro-Tech 2000)

**Canadian Sphagnum Peat Moss:** (Conrad Fafaro)

**Dakota Peat:** (Dakota Peat & Blenders)

**DryRoots Greens Grade:** an organic soil conditioner that increases root growth and microbial activity. (Roots/RGB)

**Earthmate:** a natural organic sewage

sludge that can be used as a mulch but retains moisture better. (PRS Materials)

**Essential:** a product derived from plant extracts and hydrolyzed organic protein that stimulates the natural breakdown of organic matter in the soil. (Growth Products)

**Gro-Power:** a soil conditioner, with or without soil penetrant. (Gro-Power)

**Grozyme III:** a product that can activate locked nutrients. (Master Turf)

**Gypsum-F:** a flowable product that increases permeability and lowers sodium. (W.A. Cleary)

**Humate Ag, LS and Stress Reliever:** soil conditioners and biostimulants made of slow-release, granular humic acids. (Humate International)

**Hydro Gel:** a plant watering aid that absorbs and holds several hundred times its weight in water. (Finn Corp.)

**Hydro Source:** a water-absorbing, synthetic polymer that increases long-term water-holding capacity. (Jonathan Green)

**Hydrowet:** a blend of synthetic surfactants that improves water infiltration into the soil profile, thus increasing the moisture content of the soil. (Kalo)

**Iron Sea Humus:** cold-processed seaweed plus humic acid plus iron that enhances root growth. (Humus Products)

**IronRoots:** a biostimulant that promotes root growth and color. (Roots/RGB)



**Kick:** a natural humic acid-based wetting agent with kelp, iron complex and sugars that stimulates root development and helps release tied-up nutrients. (Earthworks)

**Lescowet and Accuwet:** surfactants plus soil conditioners (87% and 25% active ingredient, respectively) that reduce water use, eliminate localized dry spots and encourage deep rooting. (Lesco)

**Limestone-F:** a flowable limestone that neutralizes pH. (W.A. Cleary)

**Liquid Humus:** a 12% concentrate humic acid soil conditioner and root stimulant. (Humus Products)

**Luma-pHix:** a highly concentrated chelated liquid calcium to treat calcium-deficient soils, or soils where pH is high from excessive sodium. (Aabaco)

**Luma-Plex:** a concentrated liquid humic acid that acts as a chemical aerifier and organic input to eliminate compaction and flush salt out of the rootzone. (Aabaco)

**Marine-Gro:** an organic conditioner and stimulant that improves plant root structure and helps turf resist stress. (Agro-Tech 2000)

## Basic suppliers...

For more information about a specific company's products, please circle the number on LM's Reader Service Card that corresponds with the number listed below:

**Agro-Tech 2000 (#190)**

**Aimcor (#191)**

**Amereq (#192)**

**Aquatrols (#193)**

**Arctec (#194)**

**Back to Earth (#195)**

**Bonide (#196)**

**W.A. Cleary (#197)**

**Conrad Fafaro (#198)**

**Creative Curb (#199)**

**Dakota Peat (#200)**

**Doggett (#201)**

**Earthgreen (#202)**

**Earthworks (#203)**

**Emerald Isle (#204)**

**Evans Landscaping (#205)**

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**Jonathan Green (#209)**

**Green Pro Svcs. (#210)**

**Gro-Power (#211)**

**Growth Products (#212)**

**Harford Industrial (#213)**

**Humate Int'l. (#214)**

**Humus Products (#215)**

**Industrial Services (#216)**

**JaiTire (#217)**

**JRM Chemical (#218)**

**Kalo (#219)**

**Kurtz Brothers (#220)**

**Lesco (#221)**

**Master Turf (#222)**

**Michigan Peat (#223)**

**National Bark (#224)**

**Nature's Touch (#225)**

**Northwoods Organ. (#226)**

**Parkway Research (#227)**

**Partac Peat (#228)**

**Prism (#229)**

**PRS Materials (#230)**

**PSA (#231)**

**Roots/RGB (#232)**

**Sartec (#233)**

**Soil Seal (#234)**

**Stabilizer (#235)**

**Stockhausen (#236)**

**Sustane (#237)**

**Market Earthmate:** a bio-compost that enhances the physical structure and workability of the soil. (Prism)

**Maxiplex:** a concentrated humic acid. (Floratine Products)

**Nature's Blend:** a compost material, made either of mixed yard waste or leaf waste, that conditions the soil for better plant rooting and increases cation exchange capacity. (Kurtz Brothers)

**New Mexico Menefee Humate:** a granular product that helps guard against contaminants in the soil, balances micronutrients, improves soil structure and cation exchange capacity. (Earthgreen Products)

**N-Hance:** liquid calcium in a humic acid base that acts as a sodium reducer, root stimulant and nitrogen stabilizer for urea. (Earthworks)

**Northwoods Organics:** custom-processed peat to match sand particle size in loose bulk, "super sacks" and compressed bales. (Northwoods Organics)

**Nutra-Aid:** derived from plant extracts and manures that improves permeability and penetration, helps retain organic matter. (Nature's Touch)

**Nutri-Sul:** a sulfuric acid soil treatment that, after injection, reduces soil pH and releases minor elements. (Doggett)

**Partac:** a heat-treated golf course peat topdressing. (Partac Peat)

**Pelletized Gypsum:** conditions clay soil and neutralizes salt damage. (Jonathan Green)

**Pene-Turf:** a biodegradable product that improves permeability and aeration, promotes proper drainage, reduces erosion. (Four Star Services)

**Penn-Mulch:** a seedbed mulch made from recycled paper that contains starter fertilizer to protect seedbeds. (Agro-Tech 2000)

**Pervade:** a biodegradable wetting agent and penetrant. (Floratine Products)

**Professional Soil Bioinoculant:** an all-natural animal byproduct containing soil microorganisms and all-natural fertilizer that helps reactivate sterile-type soils. (Lesco)

**Potent-Sea:** a liquid sea kelp biostimulant that stimulate roots, reduces head stress and increases microbial activity. (Earthworks)

**Primer 604 Matrix Flow:** a soil surfactant that corrects and prevents soil water repellency to move water through the soil uniformly. (Aquatrols)

**Professional Plant Biostimulant:** multiple plant hormone that promotes root growth, plant development and stress tolerance. (Lesco)

**Profile Porous Ceramic:** a permanent product providing balanced porosity to reduce competition, improve drainage, solve localized dry spots. (Aimcor)

**PSA Porous Silica Aggregate:** all-natural diatomite that increases permeability, rootzone oxygen, flow, exchange of air and water. (PSA)

**Rebound:** a combination of crumb rubber and organic compost that increases pore space. (JaiTire)

**Relief:** a natural enzyme that helps soil release excess salts. (Nature's Touch)

**Roots:** a dry formula natural soil conditioner for new plantings and stresses lawns. (Roots/RGB)

**Sand-Aid:** a granular sea plant meal soil conditioner and topdressing that increases

organic weight, moisture content, carbon release rates, stress tolerance and nutrient-holding capacity. (Emerald Isle)

**SarGro:** derived from yucca, a soil wetting agent that improves water efficiency. (Sartec)

**Sea Humus:** cold-processed seaweed plus humic acid that conditions soil. (Humus Products)

**SeaGreen (Plus):** a liquid kelp product that supplies micronutrients to soil, with or without fish emulsion. (Bonide Products)

**Soil Acidifier:** 90% elemental sulfur that lowers soil pH, improves disease resistance and plant hardiness, lowers water usage. (Bonide Products)

**SoilMoist:** polymer composts that increase seed germination. (JRM Chemical)

**Soil Seal:** high-grade latex acrylic soil stabilizer that helps prevent erosion when sprayed on the soil by stabilizing its surface. (Soil Seal)

**Stabilizer:** an organic soil additive that helps produce a firm, consistent surface under all weather conditions. (Stabilizer)

**StockSorb:** an absorbent polymer for turf, nursery and horticultural applications that performs well against soil pressure. (Stockhausen)

**Sulfur-F:** a sulfur product that acidifies soil. (W.A. Cleary)

**Super-Cal Liquid Limestone Substitute:** improves germination and root development. (Jonathan Green)

**Supersoil:** a blend of topsoil, regrow, peat moss, mushroom compost and perlite. (Evans Landscaping)

**SuperSorb:** acrylic copolymer crystals that act as water absorbent to retain water and release as required by the plant(Aquatrols)

**Sustane Soil Builders:** (Sustane)

**TD 1000:** a topdressing blend of humus and silica sand. (Harford Industrial)

**Terra-Green:** a soil conditioner drying agent and topdressing. (Partac Peat)

**Terra-Sorb:** a super-absorbent polymer called acrilomide that holds and manages water release to the plant. (Industrial Services)

**TnG:** a product for straight sand topdressing of golf courses and athletic fields. (Harford Industrial)

**Top 'N Turf:** natural, untreated compost made of finely-ground bark with pH of about 5.0 for greens construction and soil conditioning. (National Bark)

**Turface:** an athletic field amendment that controls moisture and reduces compaction. (Aimcor)

**TurfGrid:** a fibrillated polypropylene fiber that stabilizes sand-based sports turf. (Stabilizer)

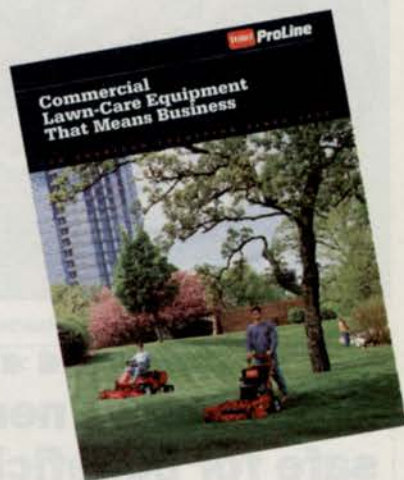
**Vita-Aer:** an all-natural organic plant material in liquid form that breaks the surface tension and thatch for water penetration into the soil and stimulates root development. (Green Pro Services)

**Vital Reactions:** a product made of plant materials only that reduces soluble salts, encourages water penetration and stimulates root and rhizome growth. (Nature's Touch)

**Viterra Gelscape, Plant-Gel, Root-Dip:** (Amereq)

**Wet Foot G:** a granular wetting agent that contains **Wet Foot L** on vermiculite, to be mixed with peat, soils or soilless mixes for moisture control. (Parkway Research)

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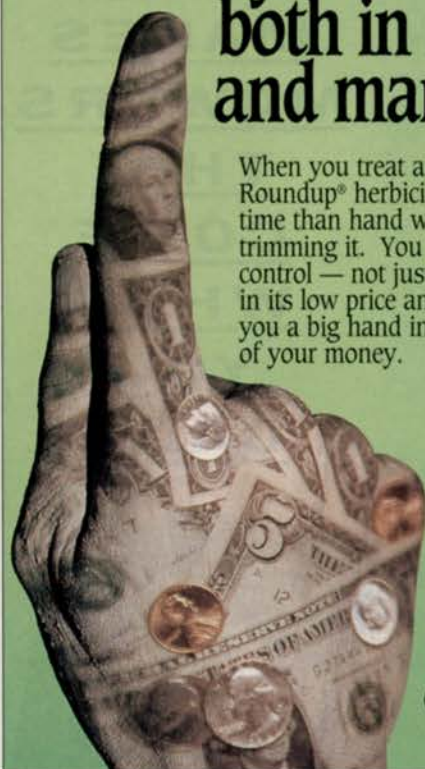
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Landscape Management, November 1994 31

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## Study shows nematodes safe for beneficial insects

**Studies suggest the nematodes are selective when dining out.**

By James E. Guyette

■ Using nematodes on lawns will not harm beneficial insects, according to a recent study at Ohio State University.

The tiny roundworms—officially called entomopathogenic nematodes—kill bluegrass billbug larvae, cutworms and sod webworms and are marginally effective against Japanese beetle larvae, which are all common turf pests, says Dr. David J. Shetlar, assistant professor of entomology at OSU. But earthworms, predatory beetles, mites and other beneficial insects are seemingly immune. "These nematodes appear to be selective assassins," says Shetlar.

A lot of the selectivity has to do with the natural habitats of the organisms found in lawns. "Most of the beneficial insects do not really live in the soil where the nematodes are moving around," Shetlar explains.

**Clearing a hurdle**—The study is among the first to measure the impact of nematodes on non-target organisms, according to Shetlar. He notes that the results are an important vindication for nematodes as a biological pest control.

"It's the first biological alternative that has efficacy that we can recommend," says Shetlar.

New techniques in nematode production have brought down the costs to be more in line with other control agents. "They're able to produce trillions of nematodes a day rather than billions of nematodes a day," he explains, adding that the cost to apply one billion nematodes per acre—the recommended rate—is about \$70.

Nematodes are also becoming available for use on warm season grasses. "There's several nematode types that are being developed for Southern lawns," he reports. Nematodes are especially effective in controlling fleas and mole crickets. "Mole crickets sort of take over the grubs (as a main pest) in Southern lawns," Shetlar says.

It is especially important to discover that nematodes are indeed selective when it comes to which organisms are targeted.

"In the lab, nematodes kill any insect they can get into. In the field, there was concern that they would be no different than an insecticide that kills everything. Thankfully, that's not the case. People who are looking for a selective, non-chemical treatment can use these nematodes," Shetlar says.

Entomopathogenic nematodes kill insects not as parasites, but as agents of disease. A nematode larva enters the insect just as a parasite does. But rather than feeding directly on the insect, it regurgi-



**Shetlar: Nematodes most effective in mid-June.**

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larvae. Untreated plots had about 80 bugs per square meter; treated plots had only about 14.

- Nematodes run out of steam pretty quickly. At two weeks after the initial treatment, two-thirds of the "guinea pig" waxworm larvae were infected; at seven weeks, fewer than one-third were infected. "This result means it's important to apply the nematodes when the billbug larvae are feeding in the soil near the turf crowns, usually in mid-June," Shetlar says.

- Most importantly, nematodes appear ineffective against beneficial garden predators and decomposers. Study results show no significant differences between treated and untreated turf in numbers of earthworms, mites, spiders centipedes, millipedes and beetles.

"Within a month after the nematode application, populations of non-target organisms were pretty well normal," Shetlar reports.

"In terms of non-target insects, we were most concerned with above-ground beetles and rove beetles," Shetlar notes. "They're probably the No. 1 predator of cutworm eggs and sod webworm eggs. According to our results, entomopathogenic nematodes should not harm these populations."

Shetlar says that nematodes can present a convenient, economical and environmentally friendly method of turf pest control. For best results, a mid-June application (in Ohio, local weather conditions may vary) is advised. "The best results occur when the lawn is moist from recent rains or just after a watering," Shetlar points out. "I also recommend a generous watering immediately after applying the nematodes."

*—The author is a freelance writer based in Cleveland, Ohio.*

tates a packet of bacteria, spewing it into the insect's body cavity. The bacteria causes rapid infection, paralyzing and killing the insect within 48 hours.

When the insect is dead, the nematode sets up shop in the carcass, feeding on bacteria and growing to maturity. If both a male and female are present in the same insect carcass, they mate, creating a new generation of infective youngsters. When the food runs out, these larvae leave the original insect and look for others to infiltrate and kill.

For the OSU study, Shetlar and his colleagues, technician Kevin Power and entomologist Dr. Harry Niemczyk, selected three bluegrass/ryegrass turf sites in Northern Ohio—among them Niemczyk's home lawn. Each site was divided in two; one half got the nematode treatment, the other half did not.

**Sub-surface placement**—The researchers applied the nematodes in mid-June using a sub-surface applicator. This device, a Rainsaver Jr., slit the turf every three inches and injected nematodes to a depth of about one inch. The injection unit was important because it protected the nematodes from damaging rays from the sun, Shetlar says.

To gauge the effect of nematodes on centipedes, spiders, mites and non-target insects, the researchers took soil cores from all sites—treated and untreated—every 10 days. They measured the effect of nematodes on their actual targets, billbugs and sod webworms, by sampling and counting the number of pests in the nematode-treated sites as opposed to the non-treated sites.

The results:

- Nematodes are particularly effective against bluegrass billbug

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