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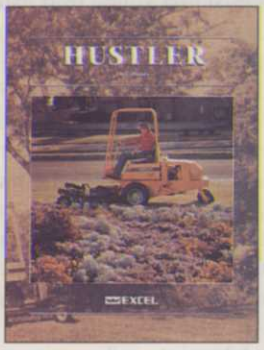

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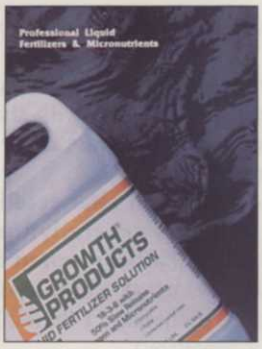

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Circle No. 307 on Reader Inquiry Card

For year-round green fields, overseeding turns the trick

The key to effective overseeding is adequate year-round maintenance of your warm-season athletic turf.

by Gil Landry, Ph.D.
University of Georgia

■ Overseeding warm-season sports fields with cool-season grasses during the fall and winter can:

- improve appearance,
- develop higher-quality facilities,
- smooth out the playing surface,
- yield superior traction, and
- increase traffic tolerance.

Landry: Seeding rates of 300 lbs./acre or more tend to decrease establishment time of overseeded warm-season athletic fields.

Successful overseeding involves selecting the proper seed, proper timing and preparation, maintenance, and transitioning out in springtime. It also requires maintaining a healthy warm-season turf throughout the year. It is particularly important to maintain proper soil fertility, to relieve soil compaction, and to prevent excessive thatch.

For best results, select the appropriate overseeding grasses. Annual ryegrass has rapidly been replaced by perennial ryegrasses, fine fescues and rough bluegrasses because of improved turf quality, stress and pest tolerance, and manageability. The "intermediate" ryegrasses tend to perform as the name implies: between annual and perennial ryegrass.

Cultivars that perform well in the fall and do not persist in the spring are generally ideal for football fields, like first-generation perennial ryes (such as Derby, Manhattan, Pennfine and Yorktown II) and intermediate ryes (like Agree, Oregreen and 3CN). More persistent and traffic-tolerant cultivars (Prelude II, Palmer II, Gator, Fiesta II, Birdie II, Citation II and Assure, to name a few) are more suited to spring sports like baseball and soccer.

The overseeding rate (see table) is one of the more important factors affecting establishment and spring transition. Seeding rates of 300 lbs./acre or more tend to decrease establishment time and increase spring transition time because of greater competition.

Using high quality, "certified" blue tag seed that is free of annual bluegrass (*Poa annua*) is essential. It is also important to use seed treated with fungicides (such as Apron, Koban or Subdue)—particularly for early fall overseeding—to help prevent seedling blight diseases.

If overseeding is properly timed, a gradual transition from warm-season turf to cool-season turf and back again results. Common timing indicators include: temperatures at a four-inch depth approaching 75°F; night temperatures consistently in the 50s, average midday temperature below 70°F; or two to four weeks prior to the average annual first killing frost date.

Preparation—Overseeding preparation generally consists of close mowing or scalping, verticutting and coring. For areas with little thatch, sweeping with power brooms and scalping is often enough preparation. As a rule, the more the turf is opened, the better the establishment rate, the better the wear and stress tolerance, and the more competitive the cool-season turf will be in the spring.

The steps:

1) Seed and drag into soil.

2) Lightly irrigate (three to five times daily until seedlings are well established, then gradually reduce to normal watering).

3) Minimize traffic during establishment.

4) Mow when seedlings are 30% higher than desired. Use a mower with sharp blades and mow when the grass is dry to reduce seedling injury.

5) Begin fertilization after seedling emergence, which is generally three weeks after seeding. Earlier nitrogen fertilization may encourage warm-season turf competition. (Generally, 1 lb. N/1000 sq. ft./month is adequate.)

Proper transition—Fertilization, irrigation, mowing, thatch and traffic control, cultivation and pest management throughout the year affect transition. A good transition also requires knowing and making use of normal climatic conditions. Most warm-season turfgrasses resume growth when soil and night temperatures approach 60°F. Sometimes, forcing soil

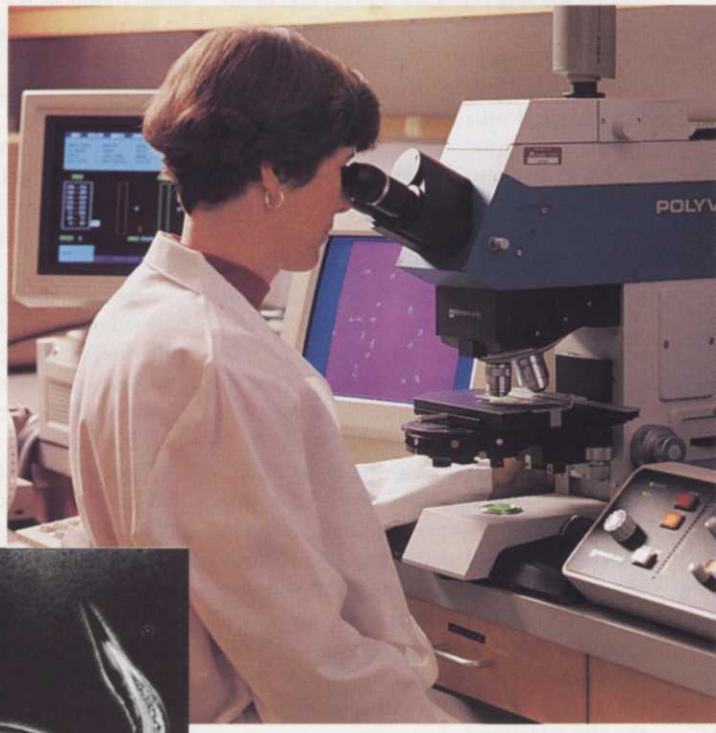
Suggested turfgrass overseeding rates

Location	lbs./1000 sq. ft.	lbs./acre
soccer/football	7-10	300-400
baseball outfield/sidelines	5-10	200-400
baseball bench areas/infield	7-10	300-400

Source: Dr. Landry

Bio-Turf: The Basics

Biological alternatives to conventional chemical control products are more than 30 years old, but are only recently attracting mass attention.



Biological research, originally meant to benefit the agricultural sector, is being applied to turf and ornamental protection. (Photo courtesy of Mycogen.)

Biosys, of Palo Alto, Calif., has perfected fermentation technology to breed trillions of nematodes.

EDITOR'S NOTE: Following are exerpts from an article published in LANDSCAPE MANAGEMENT in November, 1989.

Authored by Dr. John Briggs of the Ohio Agricultural Research and Development Center, the article introduces the workings of biological control products. We also believe interest in biological products has increased considerably over the past three years, and offer this review for the newly-curious.

■ **What they are:** Bio-rational agents are biological alternatives to conventional chemical pesticides. They are micro-organisms that attack and cause diseases of insects, mites and certain weeds. Of five principal groups of micro-organisms, bacteria, fungi and nematodes are used in products marketed for landscapers.

How they work: Milky spore products are a good example of how biological control of insects take place. Milky spore products contain the resting spores of the bacteria *Bacillus popillae.* These spores physically damage the mid-gut growth of the bacteria in the body cavity of beetle grubs, thereby destroying them.

Such products have been on the shelves for about 50 years. Newer formulations are available for control of flies, beetles and moths. Bacteria that attack caterpillars and mosquitoes are also available, and important progress has been made on nematodes that attack immature forms of insects in the soil and on plants.

How bio-herbicides work: The concept behind biological herbicides is basically the same. In Florida, researchers are looking at specific viruses that infect only aquatic weeds, and Abbott Laboratories has registered a biological herbicide—Devine— for use in certain counties. Landscapers can expect to add bio-rational agents to their weed-control arsenal in the near future.

For the past 30 years, another bacteria, *Bacillus thuringiensis, (B.t.)* has been produced and marketed by 20 different companies for managing populations of larval forms of some species of flies, beetles and moths. Several manufacturers in the U.S. have registered formulations of bacteria with the EPA and USDA for landscape use.

Important progress has been made in the production, formulation and marketing of nematodes that attack immature forms of insects in the soil and on plants.

An essential condition for nematode survival is adequate moisture in or on the material inhabited by the immature insect. Moist soil and/or moist plant parts are ideal sites for the activities of *Neoaplectana carpocapsae* nematodes. These nematodes can enter an insect through any body openings, particularly the mouth and spiracle, into the respiratory system.

Nematodes respond to the presence of susceptible forms of insects and literally seek out their prey.

Nematodes multiply in the body of the attacked insect which, in turn, increases nematodic egg production. This action results in a continuous supply of nematodes to control additional generations (if moisture conditions are suitable).

IPM, biologicals now partners in pest control

■ Integrated pest management (IPM) programs have become a way of life for many green industry professionals seeking to modify the way they care for turf and ornamentals.

And IPM practitioners await the day when biological controls can be fully incorporated into their existing chemical control programs.

It's been around for years, but for the uninformed, IPM involves the carefully managed use of three different pest control tactics—biological, cultural and chemical—to get the best long-term results with the least disruption of the environment.

Dr. Pat Cobb, entomologist at Auburn University, likes to think IPM stands for "Intelligent Plant Management."

Cobb told attendees at the annual Lofts Seed Field Day in Bound Brook, N.J. this summer that the proper IPM program consists of proper management, monitoring, threshold setting, timely controls and evaluation. "The 'when' is more important than the 'what you do,' she noted. "IPM starts with putting a plant in the right place, and that means plant selection for the site selection."

Susan Barton, horticulture specialist with the University of Delaware Cooperative Extension, prefers the name 'Plant Health Care' (PHC), and is applying it to urban environments. She believes PHC is a more accurate label, and wants the attention taken away from the pest and focused on the health of the plant.

"Instead of one crop and several pests, you have hundreds of different plants, each with many potential pest problems," says Barton. "But by focusing on healthy plants, and periodically scouting for pests, it can be done."

The Delaware Extension "Plant Health Care" program selects appropriate plants for each site, and well-timed maintenance practices, including fertilization, watering, pruning and pest control.

One of the things the "keepers of the green" should be concerned with is insect identification, first and foremost. "Be sure you know the insect and whether it's a pest or a beneficial insect," says Cobb. "You don't want to wipe out the good guys."

Developments in bio-technology show some application in the turf and ornamental care areas, she notes. "Some of the citrus products (oils) promise control for fire ants."

Other points Cobb thinks are important when trying an IPM program:

- Use area mapping to treat only the problem site.
- Sell a "service," not a "spraying program."
- Proper communication with customers is critical to their accepting or turning down an IPM approach. Explain the concept in simple terms, and stress the benefits.

Several copanies operating in Maryland have adopted an IPM program in tandem with their conventional spray programs. This way, customers are offered a chioice of either IPM or cover sprays. Both programs are of equal cost.

Here are the steps necessary to work IPM into your landscape pest control program:

1. Hire one person with an in-depth knowledge of ornamental insect and disease management. The ideal place to obtain such a candidate is from your state land grant university, if it has an IPM training program.

Be sure the person you hire is able to recognize beneficial insects. It is preferable to hire someone who has been trained in the methodology of IPM if the program is to work for you company. The manager must be familiar with beneficial insects, cultural and mechanical controls, biorational pesticides, and pesticides.

2. Define the type of customer you wish to work with. Different landscapes require different time commitments for a monitoring program.

The average half-acre residential landscape takes 30 to 40 minutes for a thorough inspection in the spring, and 15 to 20 minutes by midsumer, when fewer pests are active.

3. Decide on how many customers you can handle. One good scout supervisor should be able to handle 40 to 50 half-acre residential homes per season.

4. Contact your local extension service for help. Extension agents in urban agriculture are experts in plant diagnosis.

5. Decide on a price for you service. Most companies presently using IPM are charging the same amount charged for cover sprays. Determine the frequency of seasonal monitoring and the time required, then add your profit margin.

6. Advertise your IPM program, and stress its benefits. Let your regular customers know they have a choice of programs.

7. Read as much as you can about IPM and the different approaches being used.

EPA grants exemption to Ecogen's Bt research

■ Ecogen, Inc. announced recently that it has received clearance from the Environmental Protection Agency (EPA) to evaluate recombinant strains of *Bacillus thuringiensis* (Bt) in small-scale field trials without prior notification or seeking an experimental use permit before testing each strain.

Under the generic EPA exemption, the Langhorne, Pa.-based Ecogen will be able to immediately field test recombinant Bt strains it has already developed, using the company's proprietary cloning vector system. Using this vector system, Ecogen can develop recombinant Bt strains that contain new combinations of Bt insecticidal genes but no foreign genetic information.

In 1991 the company received EPA go ahead to field test its first recombinant Bt strain without an experimental use permit.

The strain, developed to control the Colorado potato beetle and certain caterpillar insects, has been found to be very effective in field trials performed during 1991 and 1992.

Ecogen has already developed and is marketing second generation Bt products.

"This EPA testing exemption significantly enhances Ecogen's Bt development program by allowing novel Bt strains with unique gene combinations to be quickly evaluated in the field," said Dr. Bruce C. Carlton, executive vice president of research and development.

According to Carlton, the research allows Ecogen to develop new strains or alter existing strains.

Mycogen settles patent suit; cuts deals with Kubota, Lubrizol

■ Mycogen Corp. and Entotech Inc. announced recently that the two biological pesticide companies had settled two lawsuits brought by Entotech against Mycogen for patent infringement and patent interference.

Entotech's patents are based on the discovery by Professors Krieg, Huger and Schnetter, of a new insecticidal technology using the *Bacillus thuringiensis* (*B.t.*) strain toxic to beetles, including *B.t. tenebrionis*.

As part of this settlement, Mycogen has formally acknowledged the discovery of Krieg, Huger and Schnetter. It also has concede that the original *Bacillus thuringiensis* 'San Diego' strain is actually the *B.t. tenebrionis.*, and has therefore disclaimed several Mycogen patents directed to the use of *Coleoptera*-specific B.t. Other patents in this area have also been assigned to Entotech.

Mycogen paid $1.3 million to Entotech to resolve past claims in the lawsuits. For an additional $3 million, Mycogen received a non-exclusive paid-up license under the Entotech patents in the U.S. and Canada.

In July, Mycogen announced it had signed an international licensing agreement with Kubota Corp., providing for the commercialization of bioinsecticide products in Far East Asia and Japan.

Mycogen and Kubota have been field testing products in Far East Asia since 1989. Registration is currently pending in Japan, Taiwan and Korea for MVP bioinsecticide, the first product that will be commercialized in Far East Asia.

MVP was recently approved by the Spanish Ministry of Agriculture, Fisheries and Food for commercial sale in Spain.

On August 27, Mycogen said it had agreed to form a partnership with the Lubrizol Corp. to buy Lubrizol's seed and plant science unit in a transaction valued at $135 million. Mycogen will have a 51 percent interest in the venture, and Lubrizol will have a 49 percent interest.

The companies will work together to develop genetically engineered biological crop pesticides and seed products. Mycogen said the transactions will strengthen its technology base and broaden its participation in the emerging biological crop protection industry.

Jeffrey Zekauskas, analyst with New York's First Manhattan bank, said the venture would help Mycogen because of the patents held by Lubrizol's Agri-genetics company.

According to Mr. Zekauskas, the deal allows Lubrizol's management to focus on its specialty chemical business, "which is most important for its long-term growth."

Lubrizol, based in Cleveland, makes and sells specialty chemicals for a variety of industries, and develops and produces crop seeds and specialty vegetable oils.

Biosys links with chemical firms for marketing opportunities

■ Biosys, breeder of the beneficial nematode, recently announced it had entered into a joint, long-term partnership agreement with Archer-Daniel-Midland's Bio Products Division.

The agreement—the company's third major joint-marketing move this year—gives Biosys access to significant additional large-scale fermentation facilities for the production of products beyond its core nematode-based biopesticides. According to Biosys, the agreement includes products it develops, or those it scales up and manages for third parties.

Under the new and existing agreements, Biosys technical personnel will work in conjunction with ADM personnel at ADM's new bioproducts manufacturing facility in Decatur, Ill., to provide production technology and expertise and management of the fermentation and downstream processes. Biosys mass produces its beneficial nematodes, insect-killing micro-organisms that constitute the active ingredient in the company's biological pesticide products, at the ADM facility. Products that Biosys can produce under the new agreement include biopesticides and other industrial fermentation products which are not competitive with ADM's own product lines.

Dr. Mark Whitacre, president of ADM's BioProducts Division, says ADM is hoping to prosper from other products Biosys will bring to ADM's facility.

The agreement with ADM marks the second time this year that Biosys has taken up with larger chemical concerns. Its first quarter report told of an agreement with Ciba-Geigy, Ltd., of Basle, Switzerland, which granted exclusive worldwide marketing rights to Ciba-Geigy for all agricultural and horticultural markets excluding the U.S., and the turf market in Japan. Under the agreement, Ciba-Geigy is to provide $5 million of research and development funding through 1993—a drop in any research program coffer—to support development of Biosys' beneficial nematode technology.

Ciba-Geigy Corp., U.S., currently markets Exhibit biological larvicide for control of turf and ornamental insect pests.

Other Biosys products are marketed in the U.S. and Europe under the brand names BioSafe Lawn and Garden Insect Control (marketed by Chevron's Ortho unit); and Sanoplant and Boden-Nutzlinge for homeowner use.

BioVector and BioSafeN biological insecticides are used for a broad range of agricultural applications.

The biggest news about Biosys—at least as far as investors are concerned—may have nothing to do with nematodes. Craig Torres, writing in the *Wall Street Journal* of April 30, noted the company could represent a takeover opportunity. According to Torres, these various marketing agreements give Archer-Daniels, Ciba-Geigy and Ortho equal time in evaluating the nematodes' customer appeal over standard chemical control products.

Biorational agents for ornamentals

■ Biorational pesticides are naturally-occurring biochemicals and pest control agents that are used to maintain pests in the ornamental landscape at an acceptable level. Here's a look at some of the most popular agents:

Pyrethrum: A botanical insecticide naturally produced by the flowers of the *Chrysanthemum cinerariaefolium* plant.

Pheromone traps: Sex attractants secreted by the glands of insects. Specific insect pheromones duplicated and used in a trap containing a sticky substance are available for several pests.

Horticultural oils: Improved over the years, to the point where we now have high-quality dormant and summer oils for trees, they are a favorite of extension agents and state entomologists. The oil disrupts the insect's oxygen exchange, cell membrane function, and interferes with feeding habits of sucking insects.

Pesticidal soaps: Potassium salts of select fatty acids, effective against many ornamental pests, including aphids, spider mites, mealybugs and whiteflies. One such product is M-Pede insecticide, manufactured by Mycogen.

Microbial insecticides: *Bacillus thuringiensis* is the method of choice for lepidopterous larvae, particularly those with high stomach pH.

Source: Tree Care Industry

AgriDyne, Scotts to market Turplex

■ AgriDyne Technologies, Inc. announced in September that it had signed its first marketing and development agreement for its Turplex bioinsecticide—for cutworms, armyworms and sod webworms—since receiving Environmental Protection Agency registration earlier this year.

The five year agreement is with the Professional Business Group of O.M. Scott & Sons Company of Marysville, Ohio. Scotts has received exclusive rights to market Turplex to the U.S. golf course and professional turf markets in early 1993.

AgriDyne retains the rights to market Turplex internationally and to a select group of national lawn service companies.

Scotts initiated Turplex field trials over the summer, with a number of geographically dispersed golf courses.

According to Eric B. Hale, AgriDyne president and chief executive officer, Turplex is an environmentally-friendly insecticide that has been registered for various turf and lawn applications.

"This new relationship with Scotts represents an important part of AgriDyne's overall marketing strategy of aligning with market leaders," Hale said.

"Our extensive network of field technical representatives, with programming expertise, will enable Scotts to provide the stewardship necessary bto successfully launch this innovative new product," said James T. Fetter, Scotts' vice president of marketing.

The active ingredient in Turplex is azadirachtin, a compound extracted from the seed of the tropical Neem tree, known to have natural insecticidal properties.

A potent insect growth regulator, azadirachtin controls insects in the larval stages and has exhibited no evidence of insect resistance.

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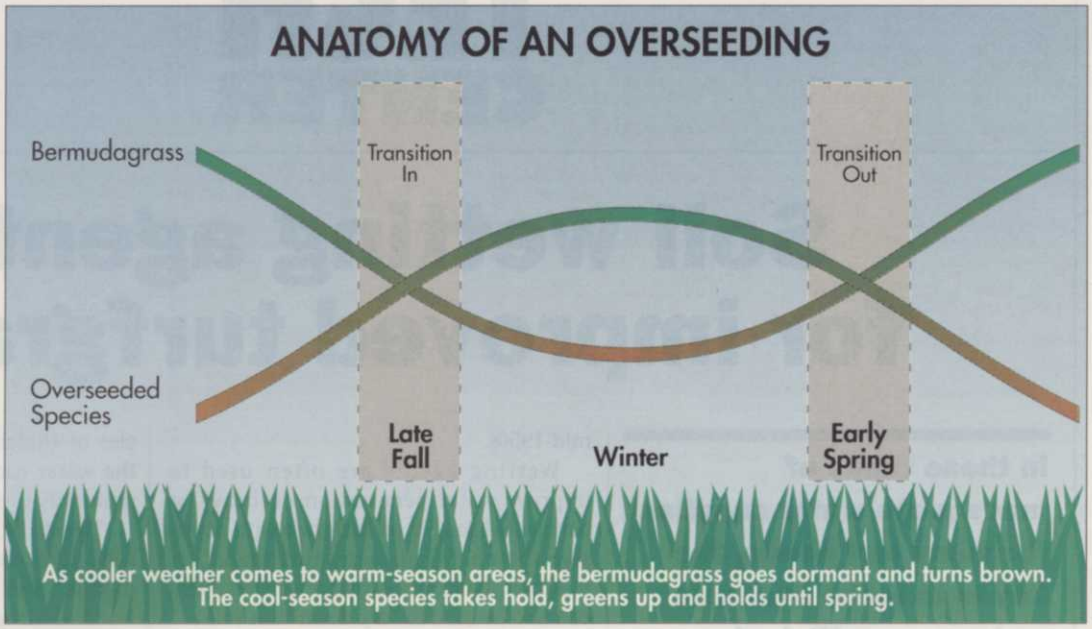
temperature increases by aeration can lead to early spring growth and premature reduction of overseeding, particularly when cool spring temperatures follow.

Maintaining a mowing height that prevents the ryegrasses from shading out the bermudagrass is critical to a smooth transition. Lowering the cutting height when soil temperatures increase stresses the cool-season turf and aids in warming the soil. Although coring, verticutting and topdressing also may help increase soil temperatures, these practices recently have been shown to inhibit warm-season recovery and thus should be avoided during green-up.

When temperatures are high enough, an application of soluble N can stimulate warm-season growth and encourage cool-season decline. Chemicals such as Retard or Slo-Gro, Embark, Kerb and some crabgrass pre-emergence herbicides also have been shown to encourage transition by reducing cool-season grass survival.

The key to successful overseeding is the same as with most other turf management programs: it requires proper year-round turf management and understanding to what degree growing conditions are dictated by weather.

—As extension turfgrass specialist with the University of Georgia, Dr. Landry provides leadership in developing statewide educational programs in turf management. He is president of the Sports Turf Managers Association.



Soil wetting agents for improved turfgrass

In these times of inadequate water supplies for many turf needs, the key is to make available water more efficient.

■ Wetting agents are members of a broad category of chemicals called surfactants. This category also includes detergents and emulsifiers. Soil wetting agents are designed to improve the ability of water to penetrate soils without harming plants. Their use for horticulture and turf culture was first conceived and patented in the mid-1950s.

Wetting agents are often used to improve water penetration on heavy or compacted soil, or on turfgrass with excessive thatch. What many turf managers overlook, however, is that a wetting agent can also be used to "dry down" wet soils.

How they work—Soil wetting agents primarily work by loosening the bonds that hold water molecules together, often hindering uniform water penetration and thorough drainage, according to Drew Effron of Aquatrols Inc.

Wetting agents change the physical properties of water. They reduce surface tension, which makes it possible to wet the surface of solid objects such as soil particles or thatch. With less surface tension, the water can penetrate and move more uniformly through soils.

"Wetting agents do not change the soil—they change the way water behaves in soils," says Effron.

"A wetting agent-treated soil will be easier to more thoroughly and more uniformly wet, but it will be more difficult to over-wet because of the water's increased mobility."

The basics—Soil wetting agents can be non-ionic, anionic, cationic, or a blend.

Anionic (negatively charged) wetting agents are seldom used on turfgrass because they are somewhat more phytotoxic and are suspect to leaching. Cationic

How wetting agents can help your turf

■ Thatch can absorb insecticides, and insecticides are only effective if they come in contact with the target organism. That's why it's sometimes better to prewet the thatch, and then apply 1/2 to 1 inch of water afterward.

In this way, the use of a wetting agent can increase the effectiveness of an insecticide.

Wetting agents can often increase foliar uptake of nutrients like nitrogen and iron. By spreading water over the leaf tissues and wetting the waxy cuticle, greater stomatal and cuticular absorption can occur.

In some instances, herbicide and fungicide activities may also be enhanced by wetting agents.

On sloped areas where thatch contributes to water run-off, a wetting agent can allow rapid wetting of the thatch and better water infiltration. Thatch tends to become hydrophobic (water repelling), and wetting agents help correct these conditions for one to two weeks after application.

A common observation for one to two weeks after applying wetting agents is less dew formation. The wetting agent allows dew to spread over the leaves and thatch instead of forming droplets. On golf course greens or high maintenance turfgrasses, this can inhibit disease activity. However, on home lawns, this should be viewed as a side benefit—but not of sufficient importance to warrant applying a wetting agent for this sole purpose.

Golf course superintendents are often confronted with hydrophobic sands on golf greens or fairways of very high sand content (more than 95 percent). Wetting agents are a primary treatment for these areas. Fortunately, this problem is extremely rare on other turf areas.

On hydrophilic soils (wettable soils), which are the vast majority of turfgrass soils, wetting agents have sometimes been applied to improve drainage, structure, rooting and/or aeration. These benefits of wetting agents on hydrophilic soils have not been consistently documented in research studies, nor is there theoretical reason to believe any significant benefits would occur.

In conclusion, wetting agents can be used to alleviate specific soil or climatic factors that limit growth.

When specific problems exist that wetting agents can alleviate, they are indeed beneficial.

Routine or indiscriminate use of wetting agents is not recommended.

—Dr. R.N. Carrow, Univ. of Ga.

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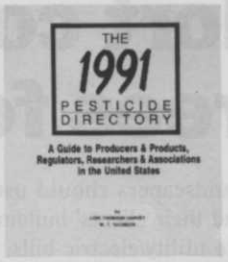

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Benefits of soil wetting agents:

1) Prevent, control and/or touch up localized dry spots.
2) Control wet areas.
3) Improve pesticide activity.
4) Improve water use efficiency.
5) Reduce disease resistance.
6) Improve turfgrass rooting.
7) Reduce irrigation requirements.

(positively charged) wetting agents act much like cations in the soil and are tightly held to the soil, which makes them less effective.

But non-ionic wetting agents have no charge and appear to be less phytotoxic than the other classes. They come in the form of esters, ethers and alcohols, which—in combination—provide more effective wetting over a wide range of soil types.

"Some products, too, are irreversibly adsorbed onto the soil particles so that they continue to exert their effect for several months," notes Effron. "Such products do not leach out of the rootzone, but are slowly degraded over time."

Localized dry spots—The number one benefit of using a wetting agent is the elimination of localized dry spots, a problem most affecting turf quality on golf courses but also a problem of many other turfgrass sites, according to Dr. Martin Petrovic of Cornell University.

The problem is caused by a fungal growth that produces a wax-like material that coats the particles of soil or thatch, Petrovic says. Sometimes the soil is affected by the fungus so deeply that cultivation may be ineffective. But when wetting agents are applied to localized dry spots, the soil moisture conditions are usually improved, notes research conducted at Michigan State University.

Selection—An important factor when selecting a soil wetting agent is its percentage of active ingredient. Soil wetting agents are available in concentrations from 15 to 100 percent active. Keeping in mind that performance is a result of physically having enough material present to initially treat the water and then reside in the rootzone, products diluted with water cannot provide the same results as concentrated products unless higher rates or more frequent applications are used.

Finally, wetting agents—like any other product—can have harmful effects if not used properly. However, carefully selecting your wetting agent and carefully following the directions for application rates and frequency, you will experience fewer water-related problems, create more uniform turf growing conditions, and improve water use efficiency.

—Sources: Drew Effron, Aquatrols Inc., and Dr. Martin Petrovic of Cornell University ("Wetting Agents," Weeds Trees & Turf magazine, July, 1985.)

Hort consultant suggests using trees for shade, lower utility bills

■ Landscapers should use more plants around their clients' buildings in order to reduce utility/electric bills, says J. Joseph Pearl, a horticultural consultant in Mesa, Ariz.

"Whether it be in Arizona or somewhere in the Midwest, trees, shrubs and vines will work if planned out properly," Pearl says.

He suggests using trees that are deciduous and full in their growth habit.

"Although trees like mulberry (*Morus alba*) will provide incredible shade, they tend to use an awful lot of water," Pearl points out. And the shade is so dense under these trees that not many plants will grow under them. "It is best to select low-water-use trees, especially in the Southwest, where water is expensive and at times hard to come by."

Pearl cites mesquite trees (*Prosopis spp.*) on the west side of a home or building in the Southwest. "By planting these trees in groupings of threes, fives and sevens, the shade will be marvelous," he notes. "These fast-growing trees will block the sun in the summer while allowing the sun to hit the building in the winter, thus warming the building."

Pearl also suggests using ash (*Fraxinus spp.*) "These globe-shaped trees will give ample shade in the summer and, once defoliated, allow for warming sun rays to heat the building."

As the plants mature, Pearl points out, the protected area will be much cooler, though cooling effects are generally immediate.

"Regardless, plan the landscape so that the trees planted on the west side of the home or office will provide shade in the summer and the sun's rays in the winter."

Pearl says mesquite trees help cool buildings in the Southwest.