

STRATEGIES FOR MANAGING WATER TODAY & TOMORROW

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WATER ISSUES SHAPE THE FUTURE

The May, 1989 issue of *LANDSCAPE MANAGEMENT* magazine carried a cover story titled "Smart Water: Every Drop Counts." If you've been in the green industry for any length of time, we don't have to tell you how important it is to conserve water—from both environmental and financial standpoints.

Weather conditions the last two years have magnified the problems. Articles in such well-read consumer publications as *Newsweek* and *Time* have dealt directly with the recent lack of water in our environment, also pointing out expected "global warming" trends that will intensify as the 21st century unfolds.

As these publications also report, groundwater contamination and pesticide runoff are also becoming more important points of concern.

The astute and concerned landscape manager—from the golf course superintendent to the landscape contractor to the irrigation contractor—realizes the existence of presently available methods to improve water use efficiency. Chief among them are improved turfgrass cultivars like turf-type tall fescue that use less water to remain healthy, and computerized weather stations that link up to irrigation control systems.

Some other shortcuts, such as the products mentioned in this special advertising supplement, can be added to the list. Soil wetting agents, water absorbents and transpiration minimizers—AquaGro, SuperSorb and FoliCote to be specific—promise to play an increasing role in water conservation as the millennium approaches.

We hope that you, as a concerned landscape manager and an environmentalist in your own right, will take a few minutes to look over the information contained herein. Because, by using improved cultivars, state-of-the-art irrigation systems and the products being marketed by your friends at Aquatrols, the industry and the environment will be better served in the years ahead.



Jerry Roche
Executive editor,
LANDSCAPE MANAGEMENT



Aquatrols founder Robert A. Moore cuts 35th anniversary cake at 1989 GCSAA convention and trade show.

FROM THE SEED OF AN IDEA, GREAT THINGS GROW

When I first started Aquatrols in 1954, I was very naive about the turf industry. I knew that grass was fertilized and mowed, and little more. I was to learn very quickly that the industry was more sophisticated than that. But I soon observed that landscape management practices of the day relied on traditional labor-intensive technologies, which had changed very little since the 1930s. I could not foresee at the time that Aquatrols was to become a participant in the technology explosion that resulted in the coming of age of an industry which impacts our daily lives.

I am proud to consider myself at least a minor contributor to this technology explosion. Thirty years ago, Aquatrols not only introduced AquaGro to the turf industry, we created a new labor-saving category of chemicals called soil wetting agents.

Old-timers scoffed at the idea—they had gotten along quite well up to

now without wetting agents, thank you. Many turf scientists proclaimed that AquaGro would never work, and if it did, the greenskeeper who knew what he was doing would not need to rely on soil wetting agents.

If I could have predicted that the simple concept of chemically reducing the surface tension of water to make it perform more effectively in soils would stir up so much debate and outright skepticism, I might never have left my job at Mobil to start Aquatrols. But I persevered, my confidence bolstered by many innovative greenskeepers who gave AquaGro a try and observed the difference it made.

Over the years, many progressive lawn care and landscape companies have begun using AquaGro, along with the more recently-introduced Aquatrols products SuperSorb and FoliCote, to improve the results of their turf and landscape management programs.

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Today, soil wetting agents, water absorbents and transpiration minimizers are accepted tools of the landscape management professional, due in part to our commitment to this industry.

The future holds many new challenges for turf management professionals, to whose fortunes Aquatrols' future is tied. For example, the millions of new golfers that the National Golf Foundation predicts will take up the game by the year 2000 will expect to play on perfect turf. Yet the golf course superintendent, along with his colleagues in the lawn care, landscape

and athletic turf management professions, will be increasingly expected to do more with less...lower volumes of pesticides, less flexibility in their application, less water and with scarcer labor.

How will we deal with these pressures?

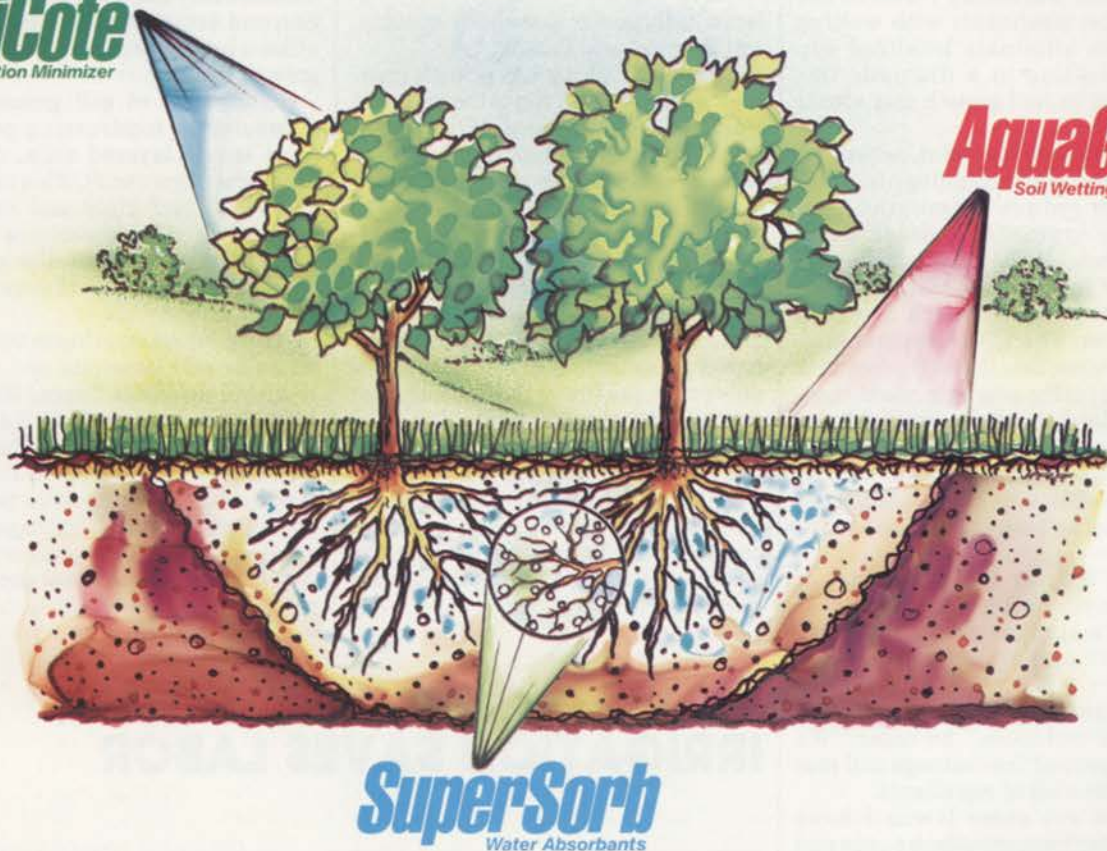
Inspired by their dreams and driven by the incentives of our economic system, I expect the innovators to rise to these future challenges. Continued improvements in chemicals and equipment supported by biotechnology and computers will no doubt help us address these challenges.

Our company is taking aim at one

of the toughest of these challenges: water resource management. Aquatrols has been built on developing products for solving water-related problems in the turf and horticulture industries. We are confident that better products are to be discovered. At Aquatrols, we are planning to continue turning dreams into practical technologies for helping turf and horticulture professionals improve our quality of life while more effectively managing the world's finite water resources.

Robert A. Moore
President
Aquatrols, Inc.

FoliCote
Transpiration Minimizer



GETTING TO THE ROOT OF THE PROBLEM

As the green industry becomes more water conscious, the innovative landscape manager will want to use any available tools that help improve water efficiency.

Useful products for this are soil wetting agents, water-absorbent polymers and transpiration minimizers.

Aquatrols, based in Pennsauken,

N.J., specializes in developing these tools that can help turf and landscape managers save water, labor and money. AquaGro soil wetting agent reduces the normal surface tension of water so that it moves more easily into and through the soil; SuperSorb water absorbents capture and hold water for use by plants when needed; and Fo-

liCote then minimizes transpiration from plants when they are under moisture stress from transplanting, transporting or weather extremes.

Use of these quality Aquatrols products will thus help more efficiently manage water through all phases of the life cycle: propagation, installation and maintenance.

IMPROVING TURF QUALITY USING LESS WATER

Soil wetting agents are one of the most effective tools a turf or landscape manager can use to alleviate water infiltration and drainage problems.

By easing the surface tension of water molecules, wetting agents like AquaGro allow water to penetrate into heavy thatch, hydrophobic (water repellent), layered or compacted soils. University research has proven that treatments with wetting agents can eliminate localized dry spots, resulting in a dramatic improvement in turf growth and visual quality.

AquaGro wetting agent, when applied to the soil surrounding plant material, can reduce evaporation and run-off by promoting quicker water penetration. In highly compacted areas, for instance, surface-applied water cannot easily reach a plant's root system. The USDA reports that, in some states, less than 20 percent of rainfall actually gets into plant root-zones. Field tests, however, have shown that AquaGro can help solve such problems because 30 to 50 percent less water will be used since the water is not lost to evaporation or run-off.

Joseph Broyles of Lawn Doctor of Oyster Bay-Syosset, N.Y. finds that AquaGro makes the grass "obviously healthier" and it's also a money-maker.

"It separates me from other people in a lot of instances," he notes. "It's really improved the drainage and root systems for a lot of my clients."

"There are some lawns I have where customers are side-by-side and one person will pay for it and one won't. You can tell the difference. I say that's because I use the AquaGro, because everything else I do on the properties is similar."

Broyles says AquaGro treatments are an excellent add-on service. He charges \$8 to \$10 per 1000 square feet, making two applications per lawn per year.

Meanwhile, Chris Sann owns a customized lawn service that recommends AquaGro to 90 percent of its clients. It helps solve three main prob-



Joe Broyles: AquaGro makes turf "obviously healthier."

lems: hilly areas that drain quickly, soil layering and thatch.

"The bulk of my use is with granular, AquaGro • S," notes the owner of Complete Lawn Service, Wilmington, Del. "I'm small enough that I can isolate and solve problems with a custom application."

"After I test soil, if there is a physical layering problem, I use AquaGro. The wetting agent helps reduce the soil interface problem. I've also noticed that, if you use it in a coordinated program...where thatch is involved...AquaGro will increase root depth by 100 percent easily."

Paul Luccia of Heyser Landscaping, Norristown, Pa. agrees.

"The turf grows thicker with AquaGro," he says. "In a sense, it gets me contracts that I might not get. I can be precise in solving a particular client's problem."

One client, Luccia explains, had 150 flowers to be watered two to three times per week to keep them healthy. But a potting mix incorporating AquaGro solved time and labor problems. "The wetting agent helped take care of almost all the water needs of the flowers. We just watered maybe once a month, and when we did water, it was very fast."

On slopes, berms and exposed areas and on compacted or thatchy soils, water tends to easily run off the soil surface. In these instances, wetting agents—along with a well-managed irrigation program—are the keys to improving water infiltration. AquaGro does not change the soil structure or eliminate thatch; it does measureably improve water penetration and aeration, which in turn provides a healthy environment for root growth.

In the case of golf greens where inconsistent topdressing practices have led to layered soils, drainage problems often result. This can mean decreased turf vigor and increased disease. In this scenario, a wetting agent can help solve the problem without completely renovating the greens.

"I use AquaGro to 'open up' the soil so water will penetrate and cure the localized dry spots," notes Bill Foust, superintendent at Pine Lake Golf Club in Anderson, S.C. "The big triplex mowers running over the greens cause a lot of compaction. So unless you've got real good drainage, it's not a bad idea to apply AquaGro on a regular basis. It's done a real good job for me."

INJECTING AQUAGRO WITH IRRIGATION SAVES LABOR



P.P.M Unit

Wetting agents can be more conveniently applied when injected directly into irrigation systems. Aquatrols manufactures The Little Squirt System and the P.P.M. Unit to inject AquaGro • L or AquaGro Injectable directly into the irrigation stream.

The Little Squirt is a very precise injector which is regulated by the flow rate of irrigation water. It automatically and consistently injects the desired concentration of AquaGro regardless of changes in flow rate. The

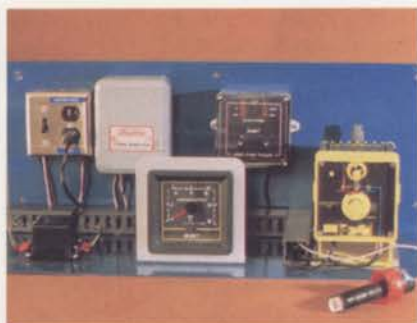
P.P.M. Unit is an economical, heavy duty fixed-pulse pump that provides accurate time-proportioned applications.

Bill Black at Congressional Country Club in Potomac, Md., has been using AquaGro since 1964 and The Little Squirt System since 1985.

"We're using it to do away with localized dry spots," he says. "We give the turf a good squirt at the beginning of the year to get AquaGro into the soil. Then we come back in June and July with a light application."

Black used to hand-water greens to treat localized dry spots. But, with the efficiency and convenience of The Little Squirt System, he's found that he can expand his use of AquaGro.

"The Little Squirt got rid of the inconvenience of putting the AquaGro on with a sprayer," he notes. "We figured that—what the heck—if it works



The Little Squirt System.

on greens, it can work on fairways too."

Bob Ribbans, superintendent at Foresgate Country Club in Jamesburg, N.J. favors the simpler P.P.M. unit.

"We set it on top of a 52-gallon drum of AquaGro, plugged into a 24-

hour timer," notes Ribbans. "It takes absolutely no labor to inject the wetting agent—just 20 or 30 minutes to (initially) install the unit. The labor saving is incredible, and it's all applied in the evening so you don't have to disturb the golfers."

Ribbans claims that he can visually see the difference in his turf.

"Our east course is real hilly, and our west course has heavy soil. So the east course puddles easily and the other drains fast," he notes. "Since wetting agents work both ways—to help eliminate puddling and promote drainage—it makes both courses healthier and more attractive."

The Little Squirt and P.P.M. Units—take your choice—make applying a product with proven effectiveness even more economical, efficient and convenient.



Chris McCarron: nice result with SuperSorb.

WATER ON DEMAND WITH POLYMERS

Water-absorbent polymers, relatively new products of agronomic science, can help maximize a landscape's beauty and minimize maintenance requirements by controlling water availability to plants.

Once water has penetrated the soil surface surrounding a plant, it needs to be made available as the plant uses



SuperSorb provides controlled water availability in the landscape.

it—in the right amount, at the right time. Water absorbents help make this possible.

During periods of high precipitation, water-absorbent polymers gather and store extra water, thus helping alleviate waterlogging and providing a store of water for later use. Then, as the soil dries, the polymers

can release stored water to the plant as needed.

Water absorbent polymers consist of molecules with the same electrical charge. When water touches a water-absorbent, the electrical charge causes the absorbent's molecules to push away from each other. As this happens, water molecules are drawn

into the particles. The captured moisture is then released from the water-absorbent as the rootzone dries, thus providing a consistent water source.

Water absorbents provide controlled water availability in the landscape, hanging baskets and nursery liners. They are also helpful when installing sod to minimize plant stress and maximize water efficiency. SuperSorb, a popular water absorbent among landscape managers, provides a rootzone reservoir that yields healthier, faster-growing plants while reducing irrigation costs.

"Watering is not a real attainable goal because of other priorities" at Sesame Place Park in Langhorne, Pa.,

says landscape manager Chris McCarron. So he uses SuperSorb • C in annual flower beds, topiary gardens and hanging flower baskets.

"We have no automatic irrigation system whatsoever; we're relegated to using what moisture's in the soil," McCarron says. "We till SuperSorb into annual beds that have been typically dry, and we're able to get a nice result in places where previously moisture was a problem. SuperSorb really works out well."

SuperSorb, which is available in two particle sizes, is applied during the installation of trees, shrubs, turf, planters, flower beds and landscape islands. They are fast and easy to use, whether installing ornamentals, sod

or seeding.

SuperSorb • C, a more coarse particle (1-2 mm), is easily incorporated into backfill or soil when transplanting ornamentals. SuperSorb • F, a fine particle (less than 0.5 mm), is broadcast and tilled two to three inches into the soil before transplanting sod or seeding.

"I used SuperSorb (F) when we installed the sod on our driving range," notes Bill Foust, superintendent at Pine Lake Golf Club in Anderson, S.C. "You can tell the difference. With SuperSorb, you get better growth, a better root system. And if you've got a better root system, you'll have better color."

"I'm real happy with the results."



Jim Moreau, chemicals supervisor at Church Landscape, readies evergreens for winter with FoliCote.

PROTECTING PLANTS FROM STRESS

There are some situations when a plant cannot absorb enough moisture through its root system to compensate for moisture loss through the foliage. In such cases, transpiration minimizers can help.

FoliCote, one kind of anti-transpirant, holds moisture in the leaves when plants are under stress caused by transplanting or transporting them,

or when the ground is frozen. FoliCote helps protect plants from moisture stress by maintaining the balance of moisture within the plant. It works by temporarily blocking leaf stomates, which reduces transpiration loss from the plant.

"I recommend it for routine maintenance of broadleaf evergreens, especially rhododendrons and azaleas,"

says Bob Hansen, a landscape architect from Westtown, N.Y. "In the past, our yews were desiccating and dropping all their needles. Now that we treat them with FoliCote, they look a lot better in the spring."

"We usually apply during the latter part of October or the first of November, and then sometimes re-apply around February, depending on (the harshness of) the weather."

FoliCote is a thin film of wax that stays flexible and looks natural. It can be used when transplanting or transporting trees, shrubs, sod, liners, foliage plants and ground covers, or for protecting established ornamentals and turfgrass from winter desiccation.

"We've been using FoliCote for five years now," says John Mitten of Church Landscape in Lombard, Ill. "We're strong believers in using it in early winter or late fall to guard against winter burn. We also use it in the summer to guard against moisture loss."

Mitten says FoliCote "makes the plant look a lot better and puts it in a lot better shape come springtime."

Since Church Landscape is so quality-oriented, they don't always charge for the FoliCote-ing service.

"Sometimes we do it just because it helps keep our plants alive," says Mitten. "It's a judgement call."

FoliCote is easy to handle. It won't clog sprayers and it washes out of spray equipment with soap and warm water. It is also less expensive—about half the cost—as competitive products.

In short, FoliCote is easy and inexpensive, a combination that's hard to beat.

AQUAGRO COST BENEFIT CHART

AQUAGRO PROGRAM

Note: M = 1000 Sq. Ft.

	AquaGro•S OPTIMUM 3.5 lbs/M monthly on greens	AquaGro•L OPTIMUM 8 oz/M monthly on greens	AquaGro Injectable 2-6 qts/Acre as needed thru irrigation	AquaGro•L CURATIVE 2-8 oz/M as needed on problems	AquaGro•S CURATIVE 3.5 lbs/M as needed on problems	AquaGro Advantage 1 pellet/Acre as needed during hand watering
BENEFITS						
Touch Up Localized Dry Spots	✓	✓	✓	✓	✓	✓
Control Localized Dry Spots	✓	✓		✓	✓	
Prevent Localized Dry Spots	✓	✓	✓			
Control Wet Areas	✓	✓		✓	✓	
Improve Pesticide Activity	✓	✓		✓		
Improve Water Use Efficiency	✓	✓	✓			✓
Reduce Disease Incidence	✓	✓				
Improve Rooting of Turfgrass	✓	✓				
Reduce Irrigation Requirements	✓	✓				
Cost of Each Program	\$4.45/M or \$26.60/M/Yr	\$1.60/M or \$11.00/M/Yr	\$0.60/M or \$24.50/Acre	\$0.20/M to \$1.60/M	\$4.45/M	\$7.00/pellet or \$0.25/M



AQUAGRO ADVANTAGE PELLET

Aquatrols has created the Advantage Pellet, a solid formulation of AquaGro soil wetting agent. The pellet, applied through a special hose-end unit, allows turfgrass managers to spot-treat localized dry spots, syringe and perform touch-ups on the golf course as a supplement to their regular AquaGro program. The AquaGro Advantage System—consisting of the Pellet and Applicator—makes applying AquaGro convenient and safe for turf under any weather conditions.

NEW AQUAGRO FORMULATIONS ADD CONVENIENCE AND FLEXIBILITY

Turf managers will be getting about twice the active ingredient of competitive pellets and at a lower cost per pellet. The Advantage Pellet can be used in competitive wetting agent applicators. Each pellet treats as much as an acre.

The Advantage Applicator features a hose quick-couple and comes complete with fittings for one-inch hose and an adaptor for a 3/4-inch hose.

AQUAGRO INJECTABLE

Aquatrols is introducing a new soil wetting agent formulation, AquaGro Injectable, created spe-

cifically for injecting into golf and landscape irrigation systems, according to company president Robert Moore.

Injectable is a low-viscosity formulation containing 33 percent AquaGro soil wetting agent. The new formulation can be injected into irrigation systems using any commercially available irrigation injection pump. AquaGro Injectable permits the user to easily adjust rates and application frequency for performance and economy.

"Many golf courses and athletic facilities across the country are already injecting AquaGro•L and other wetting agents to improve water use efficiency and save labor," says Moore.



"Increasingly, golf course superintendents are telling us that injecting soil wetting agents is an ideal method of applying them to get the benefits all over the course, especially fairways." Like the other AquaGro formulations, AquaGro Injectable will reduce water run-off and evaporation and enhance the performance of water-soluble chemicals.

Aquatrols also offers two injection pumping systems, the P.P.M. Unit, a fixed-pulse pump and The Little Squirt, which automatically adjusts AquaGro injection rates to compensate for variable irrigation flow. Both systems require no special skills or tools to install.

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EARLY-SEASON FERTILIZATION

Applying the right fertilizer at the right rate and at the right time is an important step toward growing high quality turf.

by Roch E. Gaussoin, Ph.D., Kansas State University

To get a high quality turfgrass stand, you need to conscientiously and judiciously implement a number of management factors. Fertilization, one cultural practice, involves several considerations. If it is properly addressed, it can help you maintain quality turfgrass.

Correct choice of fertilizer carrier, laboratory soil analysis to determine fertility needs, and equipment calibration—all need to be completed before the growing season as they are vital to success.

Nutritional needs

Nutrients required for turfgrass plant growth are divided into two general categories. Nitrogen, phosphorous, potassium, magnesium, sulfur and calcium, required by turfgrass in relatively large quantities, are called macronutrients. Iron, boron, manganese, copper, zinc, chlorine and molybdenum, needed in relatively small amounts, are termed micronutrients.

Supplemental application of magnesium and calcium, as well as boron, manganese, copper and chlorine is not usually necessary because these elements are in abundant supply in the growing environment. So are carbon, hydrogen and oxygen, which also are required for turfgrass growth.

The primary nutrients the turfgrass manager is concerned with are nitrogen, potassium and phosphorous. These elements are used by the growing turf in large quantities and must be replaced in the soil via fertilizers to insure healthy green growth.

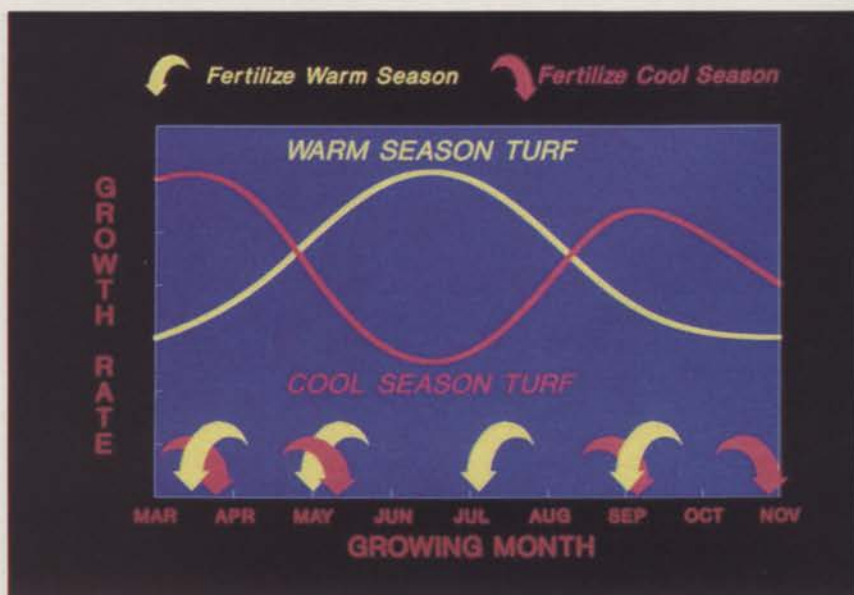
In some instances sulfur, iron and zinc may also require supplemental application.

The turf manager's decision of the



Fertilizer that is poorly applied can result in lost revenue from call-backs or turf loss. Therefore, application equipment should be calibrated regularly.

FIGURE 1.



product to use depends on the turf's nutritional needs. These needs are best determined by soil testing at a reputable soil testing laboratory.

Most state universities have a soil testing facility. Cost is relatively inexpensive. Commercial testing laboratories are also available. Check with your local county extension office for the availability and cost to analyze your soil samples.

Follow guidelines

Many testing laboratories will provide sample containers as well as guidelines for proper sample collection. Follow these guidelines explicitly; test results can be no better than the sample collected in the field.

A basic fertility test will include pH, available phosphorous and exchangeable potassium. Because nitrogen is very transient in the soil and a sound fertility program will include nitrogen application, nitrogen analy-

sis is not required or recommended. The basic fertility test will, however, indicate the need for supplemental phosphorous or potassium.

In certain regions of the country, especially the western U.S., a soluble salts test is also recommended.

Nitrogen sources

A myriad of nitrogen sources are available on the market, each with characteristics that influence their adaptability to a turf care operation.

Nitrogen sources can be categorized as "slow" or "quick" release, depending on the speed of release in the carrier and its availability for plant growth.

Release of nitrogen from fertilizers is by chemical or biological means, depending on the nitrogen source. Urea, ammonium nitrate and ammonium sulfate are very water soluble and quickly dissolve after a rainfall or when irrigated. Other car-

riers, such as ureaformaldehyde or natural organic fertilizers, require microbial activity for nutrient release.

Conditions which favor microbial activity with these types of fertilizers, such as moist soil and warm temperatures, also hasten nitrogen availability.

The nitrogen in IBDU becomes available as the product is hydrolyzed, so release depends on soil moisture, as well as fertilizer particle size. Another important facet of nitrogen sources is the salt index, which indicates the burn potential of a particular fertilizer. The higher the index, the greater the potential for fertilizer burn.

Carriers which have a high salt index per unit of N should not be used when conditions are favorable for burn (such as high temperatures and low soil moisture). A summary of some common nitrogen sources and their characteristics is shown in Table 1.

TABLE 1.

N SOURCE CHARACTERISTICS

N-SOURCE	SALT INDEX	RESIDUAL (WEEKS)
QUICK RELEASE		
Urea	1.62	4-6
Ammonium Nitrate	3.18	4-6
Ammonium Sulfate	3.25	4-6
SLOW RELEASE		
IBDU	0.20	6-8
Methylene Urea	0.86	6-8
Ureaformaldehyde	0.20	52+
Sulfur Coated Urea	0.70	Varies
Natural Organics	0.70	Varies

TABLE 2.

MONTHLY N REQUIREMENTS FOR DIFFERENT COOL SEASON TURFGRASS SPECIES AT TWO MANAGEMENT LEVELS

	LBS N/GROWING MONTH/1000 SQ FEET	
	Management Level	
	LOW	MED-HIGH
Chewings Fescue	0.2-0.3	0.4-0.6
Red Fescue	0.2-0.3	0.4-0.6
Italian Ryegrass	0.3-0.4	0.5-0.6
Common Ken. Bluegrass	0.3-0.4	0.5-0.6
Perennial Ryegrass	0.3-0.4	0.5-0.6
Tall Fescue	0.3-0.4	0.6-0.7
Kentucky Bluegrass	0.4-0.5	0.6-0.7
Creeping Bentgrass	0.4-0.5	0.6-0.7

Within each range higher N level should be used if clippings are removed, if soil is sandy and if turf is irrigated frequently or grown in a high rainfall area.

Application timing

Differences in geographic location, soils, climate and species will strongly influence application timing. These general recommendations for timing and rates should only be used as a guideline, making adjustments as necessary.

Application timing is strongly influenced by turfgrass species. Warm-season turfs, like bermudagrass and zoysiagrass, are fertilized at a different time of year than cool-season turfs like tall fescue and Kentucky bluegrass.

This timing difference is closely related to when these turfs are actively growing. Warm-season turfs go off-color in the fall and, depending on location, will not green-up in the spring until as late as April or May. Cool-season turfs, on the other hand, grow actively in the spring and fall, but growth is minimal in the late summer months.

Cool vs. warm

In general, fertilizer is applied to an actively growing turf. There are, however, exceptions to this guideline. Cool-season turfs should be fertilized in the late fall, after the last mowing of the season.

University research and practical experience has shown that cool-season turf fertilized in the late fall has better root growth, fewer weeds, disease and thatch, longer fall color, and earlier spring green-up than turf fertilized in the spring.

A strong disadvantage to spring fertilization is a flush of top growth at the expense of root growth prior to the