

Lawn & Landscape MAINTENANCE

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USE READER SERVICE #53

Lawn & Landscape MAINTENANCE

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This residential landscape maintenance project at a suburban Detroit home took 160 man-hours in preparation last spring. Torre and Bruglio Inc., Pontiac, Mich., provided a complete horticultural package of mowing, gardening, flower planting, fertilizing and tree spraying on the 3-1/2

acre property. This included planting 120 flats of annuals, specialty care of a professional quality tennis court and upper-level flagstone deck, and transporting mowers via paddle boat to an island situated in the middle of the property's 1-acre pond. The service contract, in excess of \$25,000 annually, includes care of bluegrass turf in heavy shade and maintenance of several large sycamore, maple and willow trees. Torre and Bruglio was the recipient of an Associated Landscape Contractors of America grand award for exterior, residential maintenance at this site.

Photo: Jeff Garland, Sterling Heights, Mich. Courtesy of ALCA.



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Editor's Focus

CHANGE DOESN'T come easy.

People of all ages, of all backgrounds and in all professions often find change an unknown, unpredictable enigma. While change builds strength of character, tests longevity and durability and separates those committed to an ideal or career from the vacillators, it still takes tenacity to initiate and execute change.

Change is a buzz word of the 1990s. Everyone and every business must focus on change not only in how they run their businesses, but in how they perceive their employees and what they expect their employees to accomplish.

With corporate downsizing and the rapid development of the super information highway, the ability to change and accept change is vital to the development of the corporation and the individual.

Perhaps that's why the keynote speakers of the Green Industry Expo and the International Irrigation Expo recently held in St. Louis and Atlanta, respectively, discussed the urgency of change.

In his keynote address to an audience at the GIE, football great Rocky Bleier talked about "Being the Best you Can Be." Similarly, Dr. Thomas Tutko delivered a message "Playing Your Best Game All the Time" to a crowd at the Irrigation Show.

Both messages centered around sports and teamwork. While most of us probably never played sports at the professional level, we can remember back to our youth when we were part of a sports team.

It's a time when differences and beliefs are put aside and everyone works as a team toward the common goal of winning. Nothing else matters at the time and nothing is more memorable than a come-from-behind win or the sweet taste of success when dominating an arch rival.

Bleier, who has become just as popular on the motivational speech circuit as he was when playing for the Pittsburgh Steelers in the 1970s, presented the right mix of sports drama with applications for our everyday personal and business lives.

"Preconceived perceptions can be barriers in our life," Bleier told the crowd. "We all want to be a success but it depends on how you define success."

People look at Rocky Bleier as one standard by which to measure success. And his history spells success: legendary running back for Notre Dame, wounded Vietnam War Vet and popular and disciplined running back for the four-time world champion Pittsburgh Steelers. His career reeks of success.

But success was not handed to Bleier. All his life he was told he was too slow, too short and too small to play football. These



perceptions were magnified after being seriously wounded in the war. But perceptions are just that. They're barriers — legitimate or not — to our own goals of success.

Often, barriers are only mental obstacles. "Successful people are ordinary people with the resolution of purpose, who set a goal and work toward it," Bleier said.

In your own businesses, for example, if you think you'll never be able to grow your business or make the bottom line you won't. If you can't see the end results or envision success for your company, you'll never get there.

But be careful. Vision and envisioning success are different. A vision entails establishing goals and objectives and achieving them on a planned timetable. It doesn't happen overnight.

Too often, businesses enter the lawn and landscape industry with grand plans for making it big. Nothing wrong with that as long as growth is planned and achieved with balance. Time and again I've seen ambitious contractors hit it big in their first year in business. Customers are abundant, the money is rolling in and nothing else matters — at the time.

Eventually, uncontrolled growth must be reigned before it's too late. Vision should be established at the outset and areas that can be controlled should be controlled. Don't worry about situations and circumstances that can't be controlled.

What businesses will experience through the remainder of the 1990s and beyond is a paradigm shift, according to Bleier. "We must change our perception of ourselves and how we do business. You must believe in the values that got you into business and remove the barriers that say you can't do this."

In essence, remove the barriers — mental or not — that limit your growth and become what you want to become. Here's hoping for positive change in 1995. — *Cindy Code*

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USE READER SERVICE #81

How Much Is Enough?

The final product of composting can be used successfully as an organic fertilizer. But the question of quantity perpetually stumps users.

By Rod Tyler

THE 1990s HAVE been called the decade of the environment. Quite fitting, considering the waste dilemma facing the nation.

Many states have responded by enacting legislation requiring composting of organic residuals. Addi-

Compost, not often recognized for its nutrient value, is frequently used in combination with fertilizers to produce pleasing results. Top photo: Sea World.

tionally, certain regions of rural America are facing increasing pressure to develop disposal methods that reduce non-point pollution like nitrate and phosphate runoff.

Composting is currently a leading choice among many commercial

farmers, municipalities and private companies collecting organic residuals. The final product of composting or other sound organic residual manage-

ment options can be successfully used as an organic fertilizer. When this occurs, the most often asked

question is, "How much is enough?"

Manure has been used as an organic source of nutrients for centuries. Compost and organic fertilizers may be the organic source of nutrients for the next century. Yearly applications of biosolid compost have shown increases in soil fertility and organic matter. (Tester, 1990) How realistic is it for landscape contractors to use compost on a yearly basis in various applications? Perhaps an integrated approach is the wave of the industry's future.

Many organic residual management options have spawned numerous products available to the green industry. Many more will become available as other organic residuals are converted to marketable products. Biofermentation and anaerobic digestion are available in pelleted products that may be used in combination with commercial fertilizers.

Compost, on the other hand, does not seem to be readily recognized as a source of fertilizer, yet calculating the total available nutrients in average compost applications provides pleasing results.

The single fertilizer application is being rapidly supplemented with multiple applications and combinations of fertilizer and organic products that satisfy nutritional needs.

URBAN DESTRUCTION? Urban soils (those soils native to the urban environment) are most often disturbed and destroyed by the time they are used by anyone in the green industry. Even soils on the urban fringes often undergo this change when housing developments are constructed and the topsoil is buried under the subsoil excavated from the foundations of homes.

Expecting success from such a poor beginning is being optimistic at best. Adding organic matter helps improve the physical structure of the soil by reducing compaction, increasing drainage, aeration and moisture retention and helping recharge the soil with microbial life.

(continued on page 10)



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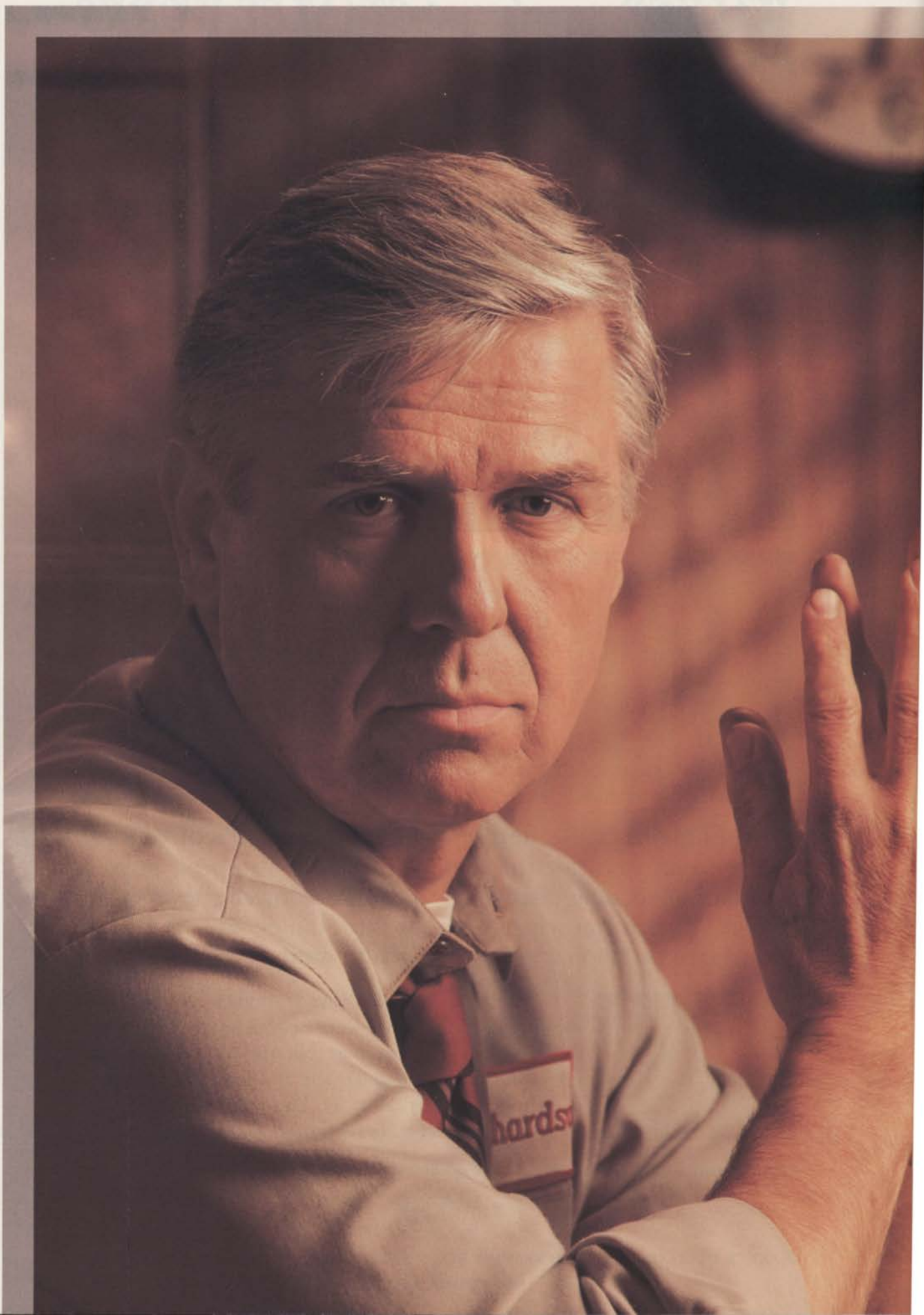
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USE READER SERVICE #44

COMPARISONS OF MINERAL SALTS AND COMPOSTS AS FERTILIZERS

FERTILIZATION REQUIREMENTS.

The equation is really quite simple. Experts have already performed thousands of research projects to determine the amount of nutrients needed for optimum plant growth for almost all landscape plants. (Look in any plant book to find a reference about ideal fertility conditions.) The hypothesis is this: We know what we need. From soil tests, we can find out what we have. The difference, logically, is what we need to apply.

The summary presented in Table 1 shows example fertilizer recommendations from The Ohio State University for various landscape plants. (See chart below.)

Keep in mind that even the experts get confused when fertility options in the landscape include organic and commercial fertilizers releasing at varying rates. (See Table 3 to identify fertility available from compost additions. The chart is based on fertility calculations of composts and is adapted from research

MATERIAL	ADVANTAGES	DISADVANTAGES
Mineral Fertilizers	Convenient	May be easily leached
	Lower transport and handling costs	Continuous use may lead to breakdown of soil structure
	Quick crop response	Supply major nutrients only
Composts	Improve soil structure	Dilute nutrient source
	Controls erosion	High transport cost
	Supplies wide range of nutrients	May be difficult to apply evenly
	Hygienic disposal of pathogenic waste	High C/N ratios may rob soil N

Table 2.

Source: Dick and McCoy, 1992

with a 1% N product, the calculation is: 67.5 yards x 800 lbs./yard x 1% N x 70% dry matter x 25% available = 94.5 lbs. N per acre or 2.2 lbs. of N per 1,000 square feet (94.5 lbs. per acre/43.56).

Several challenges exist in calculating fertilizer value properly. Vast differences among N availability in products, confusing yards (volume) and tons (weight), lack of label laws listing fertilizer analysis

with 1 percent N yields: (135 yards x 800 lbs./yard x 1 lb. N/100 lbs. compost x 70% dry matter x 25% availability in year one)/43.56 = 4.33 lbs. N per 1,000 square feet (or 189 lbs. of N/acre).

Understanding these fertilizer calculations from organic matter leads to the next question: "How much fertilizer do I need if I already applied compost? Since not all composts and organic fertilizers react

using 30 percent and 85 percent availability, respectively, per yearly application. Overwhelmingly, nitrogen fertilization seems to be the driving force behind many fertilizer purchases. Since the plants being fertilized cannot possibly use all the fertilizer at once, the delayed availability from organic sources is almost a blessing in disguise.

Consider another example of calculating the fertility of a soil after five seasons of compost applications. At a 1/4-inch application rate for five years, about 55 percent of the nitrogen for the whole five years is available in year five. For a 1 percent nitrogen compost, that calculates to 11.9 pounds of available N per 1,000 square feet (1.25 in. x 135 yds. per acre x 800 lbs./yard x 70% dry matter x 1% N x 55% availability/43.56).

Flowers growing in this soil won't need additional fertilizer and will be easier to keep alive because of the increased moisture-holding capacity of the soil. The only reason they don't burn from the high nitrogen is because the N is slowly available over the entire growing season. These calculations are estimates and field data to validate accuracy are scarce.

An equal level of fertilizer in the form of urea would surely be too much for the plants to handle. The natural slow release of organic N is the key to making compost a safe fertilizer option. Most composts contain most their nitrogen in the organic form. (Fricke, 1993)

ADDED BENEFITS. Organic matter can accumulate over time in temperate climates and increase water holding capacity of a given soil.

(continued on page 13)

Average nutrient needs for optimum plant growth	Fertility available in current soil	Fertilization application requirements
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on composts and manures.)

Here is a sample calculation for a percentage of available nitrogen (Assuming 1 yard=800 lbs. at 70% dry weight):

[(yards of compost applied/acre) x (weight of compost/yard) x (% N) x (% dry weight) x (25% available)]/43.56 = lbs. of N available per 1,000 square feet (43.56 is a conversion factor from acres to sq. ft.). For a half-inch topdressing,

and forgetting to calculate values on a dry basis have stumped even the brightest horticulturists at one time or another.

The calculation below takes these factors into account and can be followed in form by substituting appropriate numbers from any compost or organic fertilizer. (Remember some organic fertilizers are 90 percent dry matter.)

A 1-inch application of compost

the same, the answer is not as easy.

However, regarding the above example, few plants require more than 4.33 pounds of nitrogen per 1,000 square feet for the first season (Table 1). From year to year, decreasing amounts of nutrients are released from the organic matter.

The additive effect of yearly compost applications for total nitrogen is shown in Table 3. Available N (percentage available) figures are listed in the boxes, but keep in mind that their availability does not automatically render effectiveness. Theoretically, 100 percent of urea fertilizer is available. On a hot August day, however, just how much of that fertilizer actually gets used by the plant?

Organic fertilizers, on the other hand, are not prone to volatilization like some quick-release commercial fertilizers. Organic N, relying on moisture, microbes and favorable soil conditions for significant release, has extended staying vigor. Once the fertility is "used up," humus remains to further benefit the soil for many years.

Similar results can be calculated for phosphorous and potassium,

FERTILIZER RECOMMENDATIONS

LANDSCAPE PLANT	RANGE OF FERTILIZER APPLICATION NEEDED
Turfgrass	2-6 lbs. of N per 1,000 square feet
Annuals	1.5 lbs. of 5-10-5 per 100 square feet
Perennials	2-4 lbs. of 5-10-5 per 100 square feet
Woody plants (trees and shrubs)	5-6 lbs. of 24-8-16 per 100 square feet
Evergreens (narrowleaf)	4-5 lbs. of 12-4-4 per 100 square feet
Evergreens (broadleaf)	2-3 lbs. of 5-10-5 per 100 square feet (1/3 of N should be from organic form)

Table 1. *Source: "Fertilizing landscape and nursery grown crops," OCES, Bulletin 650, July 1989, Dr. Elton Smith*

Organic Composting

(continued from page 10)

Five yearly applications of compost increased soil water almost five-fold over control soils receiving commercial fertilizer treatments. Single applications almost doubled available soil water even after five years. (Tester, 1990)

As more and more concern over water conservation becomes apparent, this benefit increases in value. In slightly arid climates where water is scarce or watering bans are in effect, compost can be used more as a long-term water management tool than a soil conditioner.

In warmer climates, additional compost is needed due to the faster decomposition of organic matter. Organic matter generally decomposes slower if incorporated into the soil. (Dick and McCoy, 1992)

Although water is "held" in the soil, i.e., at field capacity, it is not held so tightly that plant roots cannot absorb the moisture. Implications are obvious that survivability is increased in drought situations by the use of compost.

Longer periods between waterings are possible and overall plant vigor is improved. Plant roots in upper soil surfaces have greater moisture availability due to higher organic matter concentrations. However, even soil below actual contact with organic matter is positively affected by increased moisture retention and nutrient exchange. (Dick and McCoy, 1992)

Substantial increases in CEC from compost applications help hold applied nutrients longer, leading to increased fertilizer effectiveness. Compost also releases "soil glues" as it decomposes which form new aggregates.

Most horticultural books list favorable soil conditions under soil fertility, or as a "well drained garden soil that is rich in organic mat-

ter and minerals." (Smith, 1989)

All fertilizer recommendations should begin with a soil test. Due to the seasonal nature of the industry, however, this does not usually occur.

For temperate soils with organic matters below 5 percent, assume that three consecutive, yearly, 1-inch applications of compost could be made without developing complications if the compost is properly mixed into the soil. Soil tests should be consulted prior to the fourth yearly application.

Once a soil reaches an organic content of about 8 percent (by weight), compost applications may be spaced every two or three years.

COMMON QUESTIONS. Below are three interesting situations portraying real-life examples for green industry professionals. The figures expressed are approximations from experience and observation of test results over a number of years.

Q. Should green industry professionals buy topsoil amended with 20 percent compost instead of a cheaper, non-amended soil for a 5,000-square foot project requiring 4 inches of topsoil?

A. Let the figures below be your guide. Assume compost has 1 percent N-P-K and compost weighs 800 lbs. per yard compared to soil at 2,500 lbs. per yard. For this project, 62 yards of soil are needed.

Instead of comparing strictly price, consider the convenience of the fertility in the amended soil. A soil amended with 20 percent compost with an analysis of 1 percent N will be sufficient to support most annual, perennial, tree and shrub growth for the first year without additional fertilizer.

Overfertilization may stunt the root systems because of the high amount of soluble salts. Additionally, these blended soils offer micronutrients contributed by the compost.

Q. How much fertilizer is needed when 1 inch of compost is used as

% AVAILABILITY OF N PER YEAR FOR THREE CONSECUTIVE YEARLY COMPOST APPLICATIONS CONTAINING 1% N EACH

App #	Year				
	1	2	3	4	5
1	25%	10%	10%	5%	5%
2		25%	10%	10%	5%
3			25%	10%	10%
Cumulative Total	25%	35%	45%	25%	20%

Table 3

a soil amendment for annual or perennial bed construction?

A. Generally, none for at least the first year. See figures below.

1 inch compost = (135 yds./acre x 800 lbs./yard x 1% N x 70% dry weight x 25% availability)/43.56 = 4.33 lbs. available N per 1,000 square feet. Most recommendations for annuals and perennials are from 2 to 4 lbs. N per 1,000 square feet.

Because N from compost is not as available in cool weather, contractors may want to consider applying small amounts of quick-release fertilizer at planting. This ensures adequate fertility until warm weather releases latent nutrients in the compost. If fertilizer combinations like this are used, it is wise to have, at minimum, 30 percent of N from each source. (Dick and McCoy, 1992)

Q. How much fertilizer should I add to my turf if I topdress after aeration with 1/8 of an inch of compost in the spring and fall?

A. General recommendations for turf maintenance range from 2 to 6 lbs. of nitrogen per 1,000 square feet depending on turf cultivars and maintenance practices. Consult one of the available guides on turfgrass cultivars and resulting fertilizer needs or contact your local county extension agent. Calculations be-

low should help identify additional fertilizer needs.

1/8-inch compost = (16.9 yards/acre x 800 lbs./yard x 1% N x 70% dry weight x 25% available)/43.56 = 0.54 lb. N per 1,000 square feet.

Since two applications are indicated, total N applied is 2 x 0.54 = 1.08 lbs. N. Assuming that 4 lbs. of N is adequate for average maintenance, an additional 2.91 lbs. of N should be applied in at least two additional applications. (4 lbs. N needed - 1.08 lbs. N available = 2.91 lbs. needed). Since 0.54 lbs. N is probably not sufficient to satisfy N needs for a single application, the contractor may consider doubling the application rate and applying topdressing after aerating in spring or fall. Commercial fertilizer could be used the rest of the year. ■

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LBS. OF AVAILABLE NITROGEN PER 1,000 SQUARE FEET

APP RATE	YARDS/A	TONS/A	% nitrogen in compost				
			.5%	1.0%	1.5%	2.0%	2.5%
1/8"	16.9	6.8	.27	.54	.81	1.1	1.3
1/4"	33.8	13.5	.54	1.08	1.75	2.2	2.7
1/2"	67.5	27.0	1.1	2.2	3.5	4.4	5.4
1"	135	54.0	2.2	4.4	7.0	8.8	10.9
2"	270	108	4.4	8.8	14.1	17.6	21.8

Table 4

Adapted from Tester, 1990 and Fricke, 1993

Controlling Compost Odor

Compostable materials have been known to emit less than pleasing odors, but when properly mixed and supervised no one should give a second thought to compost aroma.

By Rod Tyler



Professional companies always keep a supply of bulking agent to add to green waste as it comes in.

COMPOSTING IS considered a successful venture when no offensive odors are generated from the process, and the product is successfully used without causing safety or environmental concern.

For most contractors, handling the natural accumulation of grass clippings each spring is challenging, whether they are composting at their own site or taking the material elsewhere. The main issue is successfully controlling the earthy aroma generated by the process and the end product. Without odor control, little else matters. Odors can be avoided if a few key rules are followed throughout the season.

Odor is a negative term that describes what happens when the composting process does not have all the necessary elements. Insufficient oxygen levels, too much nitrogen (grass) or too much water have all been known to emit odors at various compost facilities.

While compost folks would prefer to associate the more positive term of aroma to their products, it can only realistically be used if compost is performed correctly.

Legislation around the country has mandated the diversion of yard trimmings from landfills. Composting these trimmings has been the number one management alternative, a process that should gain acceptance as landscape contractors are faced with full enforcement of yard-waste regulations.

As a result, landscapers will be forced to initiate their own composting facility or contract with another composter. For those opening their own facility some type of registration, permit or site approval is usually required. Some exceptions are made when materials composted are generated solely by company projects.

(continued on page 16)

IF THIS YEAR'S PROBLEMS LOOK LIKE THIS:



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Controlling Odor

(continued from page 14)

GETTING STARTED. Landscape crews generally deposit large amounts of grass at the end of a long work day. Crews that do not return until late may already have foul smelling grass on their trucks. To make matters worse, many of them simply drop grass clippings into piles that evening with good intentions to properly mix the grass into the compost pile with a bulking agent the following morning.

Rule #1: Don't let grass accumulate by itself any longer than you have to. Grass can heat up within a couple of hours, producing less than aromatic acids.

The easiest way to avoid problem odors is to mix the grass immediately upon arriving back at the office or compost site — it only takes 5 to 10 minutes. Mixing grass at the end of the day — tired or not — is easier than chasing down bulking agents the next morning before work begins. Besides, mornings are notoriously busy for most landscape firms.



The mixing process should involve at least four turns of the material to allow adequate mixing of the grass with the bulking agents. Additionally, each pile should be turned at least once per month to ensure adequate mixing and composting of all ingredients, and to

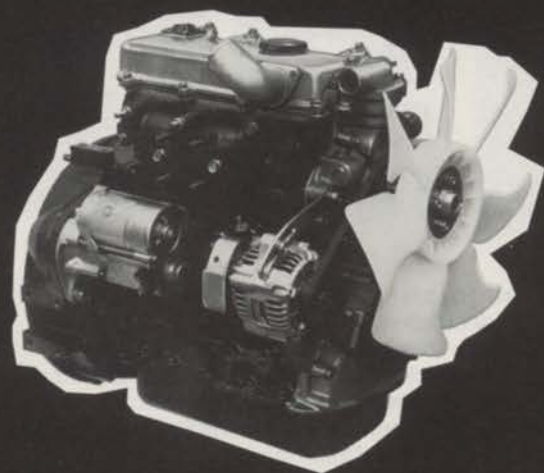
reintroduce new air and moisture.

Rule #2: Anticipate. Always store more than enough bulking agent on-site. Adequate bulking agents are sawdust, wood chips and the like. According to successful composters, the magic recipe for compost is 2 parts brown to 1 part

Prolonged storage of grass clippings without adding a bulking agent produces odors.

green (by volume). Piles constructed of more than one-third grass may develop problems, such as staying aerobic, especially if the grass

(continued on page 21)



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Controlling Odor

(continued from page 16)

reaches proportions greater than 50 percent of the initial mixture.

The density of grass tends to cause compaction in a pile, reducing pore space. Without adequate pore space, piles become anaerobic and the familiar sour odor occurs. Adding 20 percent fresh bulking agents to problem piles can help increase aeration and reduce odors.

However, a limit of about 40 percent sawdust has to be maintained to prevent piles from becoming too compacted. The mixture of sawdust and grass often turns to wet mush. A composter can provide structure to the pile and increase aeration by integrating wood chips or ground brush.

To calculate the need for bulking agents, determine weekly production of grass clippings based on your previous year's experience and multiply by 3. Then double it to make sure that adequate bulking materials are available even when spring rains create extra grass. If no data is available for these calcula-

tions, obtain 25 to 50 cubic yards of bulking agent and consider that amount a zero-based inventory. Reorder bulking agents accordingly when inventory drops below the imaginary "zero" level.

Rule #3 is to prepare a "receiving pile" of bulking agents so it is avail-

ing management factors requiring even more attention. The receiving pile may be constructed by the first team back or by office personnel during the day.

ONGOING STRATEGIES. Managing a receiving pile can be more challenging than you think. For instance, assume the receiving pile is 60 cubic yards and you intend to add a daily grass collection of 30 cubic yards to achieve the magic ratio for perfect compost.

What happens when the first day only produces 10 cubic yards of grass instead of 30? Should a new receiving pile be built? Can the old one be reused?

As long as volume calculations are available contractors should try (in this case) to add two more 10-cubic-yard days of grass clippings to the receiving pile before considering it "used up." Once contractors learn to make a mix that is ideal for composting, they will develop the eye for what that mix feels like.

Until that time, they will have to rely on volume calculations to approximate how much grass should be added at once to the receiving piles.

Contractors can easily measure the drop-off amounts by calculating the water level capacity of their trucks and counting the loads delivered. Most pickups average from 1 to 3 cubic yards depending on the presence of sideboards and how high they are.

On occasions when bulking agents are limited, use finished compost as a bulking material. This will help mask the odor of already decaying grass. In fact, if emergencies arise, finished compost can be added to cover grass piles until the following day when adequate bulking agents are obtained.

Most compost piles require water additions; however, this is a management practice that varies regionally. Generally, if the grass is mowed in August or in the afternoon sun, more water will be needed. Obviously, clippings collected in the spring will require less additional water throughout the season.

Most compost piles require watering; however, this practice varies regionally.

able for end of the day adding and mixing. Once the mixing has been completed, set up a receiving pile for the following day. Most contractors make receiving piles about 2 to 4 feet deep. Once mixed, add appropriate grass clippings to raise the pile height to 4 to 6 feet.

Avoid piles shorter than 3 feet and taller than 8 feet. Short and tall piles offer another set of challeng-

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A handful of week-old compost should neither spring apart nor stick together like clay when squeezed in the palm of your hand.

Grass will generally decompose rapidly and should be hard to find in the compost pile after three weeks. Turning is recommended if the pile cools down or becomes too wet. However, if any odor remains it's best to turn piles on cooler, clearer days than humid days without a breeze. Temperature inversions, especially in the spring and fall, can trap odors from compost piles and make them last long enough for neighbors to complain.

Compost made using the low-tech method above is generally available for use in 6 to 8 months. How-

compost piles build to high levels.

Contractors not willing to compost themselves use portable roll-off collection mechanisms which are removed to commercial compost sites when full.

Equipment needed for low-tech composting is usually already available at most landscape contracting sites. But finding the manpower to operate the equipment in an efficient manner is often overlooked. Since composting is new to many contractors, getting a feel for how much time and labor to delegate to compost activities can be a trial and error process.

For contractors interested in mapping out window sizes and required spacing, consider 2,000 to 7,000 yards per acre as a guideline. Don't forget to leave enough space between windows for adequate operation of the equipment.

Re-using the finished compost in landscape projects will complete the recycling loop for many landscape contractors. However, most will not produce enough compost on their own to fulfill even half of their internal needs.

Because of the nature of the composting process, the original material shrinks about 75 percent to the final form of a cured

Magic additives aren't needed to make good compost. All the average contractor needs is good management skills and the ability to focus on the crucial rules each day.

ever, screening may be necessary depending upon the contamination of inflowing materials. It's imperative when purchasing bulking agents to inspect loads to make sure no garbage is mixed in with the load.

Ideally, the final product should be tested for organic matter, pH, soluble salts, heavy metals, water-absorbing capacity, major nutrients and maturity. However, unless vast quantities warrant these testing expenses most contractors will settle for tests showing only major nutrients, organic matter, pH and soluble salts. Heavy metals are not usually a problem in green residuals because the possibility for contamination is remote.

DEDICATED PLOTS. The amount of land required for low-tech composting is not a lot, but it should be reserved specifically for composting. It is neither easy nor efficient to move hundreds of yards of materials when unplanned growth and the accumulation of

compost. Consequently, a contractor needing 500 cubic yards of compost per year to complete all projects will need to bring in more than 2,000 cubic yards of raw green residual materials.

For some residuals, such as brush, a reduction of as much as 100 percent occurs due initially to the grinding phase and then the composting phase. In addition to their own supply, most contractors will need to depend on commercially produced composts to complete all projects.

Magic additives to make good compost are generally not needed for the average contractor who is trying to responsibly manage one firm's residual stream. They just need to use good management skills and stay focused on following the crucial rules each day. ■

The author is a Certified Professional Agronomist and free-lance writer residing in Medina, Ohio. He is employed by BFI in Oberlin, Ohio.

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Maximizing Insecticide Performance

Selecting a pesticide is only half the battle when fighting pest infestations. Calibration, testing the pH and watering in the product are just a few of the considerations to a successful insecticide program.

By C. Neal Howell

SUCCESSFULLY identifying a pest is the first step in determining its control. It's not like there aren't any choices.

It's very much like the tourist on

his first trip to the Amazon jungle. "Guide," the tourist asked, "are there many snakes in the Amazon?"

The guide ruminated for a moment and replied, "Well, only about

a hundred. Ninety-nine are poisonous and the other one will eat you alive."

It may not be quite so bad in the turf and ornamental field. Out of

100 top insects, 99 will give you terrible headaches while the other one may eat your entire bank account.

Diagnosing the problem is the first and most important step. Often, disease or nutritional problems are misdiagnosed as insect problems and vice versa. Needless to say, an erroneous treatment rarely produces the desired results.

If you suspect a problem the only correct procedure is to find the insect, properly identify it, make certain it's present in large enough numbers to cause damage and then — and only then — plan your action.

If you detect a turf or ornamental insect, use your knowledge and reference tools to achieve proper identification. Consult your local extension agent for confirming diagnoses and recommendations. Base your treatment regime on knowledge, not suppositions.

Often, treatment programs are based on the need to limit damage rather than attempts to prevent infestation. Otherwise known as integrated pest management, these programs are designed to produce acceptable pest management while minimizing potential adverse environmental effects. This method relies on knowledge and technique rather than on blanket applications of pesticides.

For example, if there are fewer than four to six white grubs per square foot and the turf is healthy and not drought stressed, reconsider the need to treat.

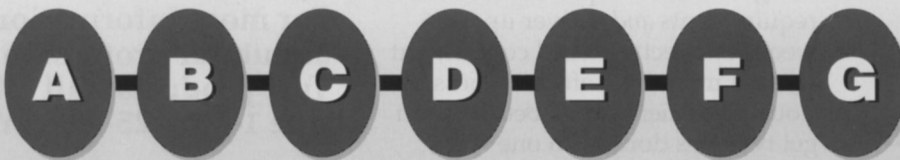
Adequate rates and proper timing based on the life cycle of the insect are critical for successful insect control. Refer to available information from your county extension agent and university research to guide you to the pest's most vulnerable stage and most effective method of insect control.

CHOOSING A CONTROL. Once the pest has been identified and the

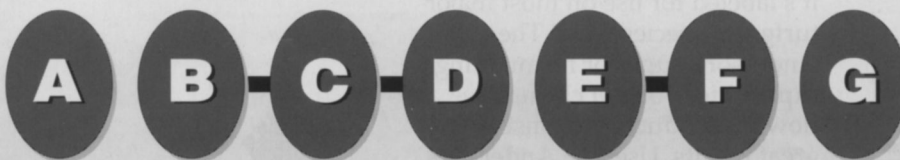
Pesticides are designed to break down. The trick is to make sure degradation doesn't begin before the application is made.

HYDROLYSIS

Long chain molecules = effective pesticide



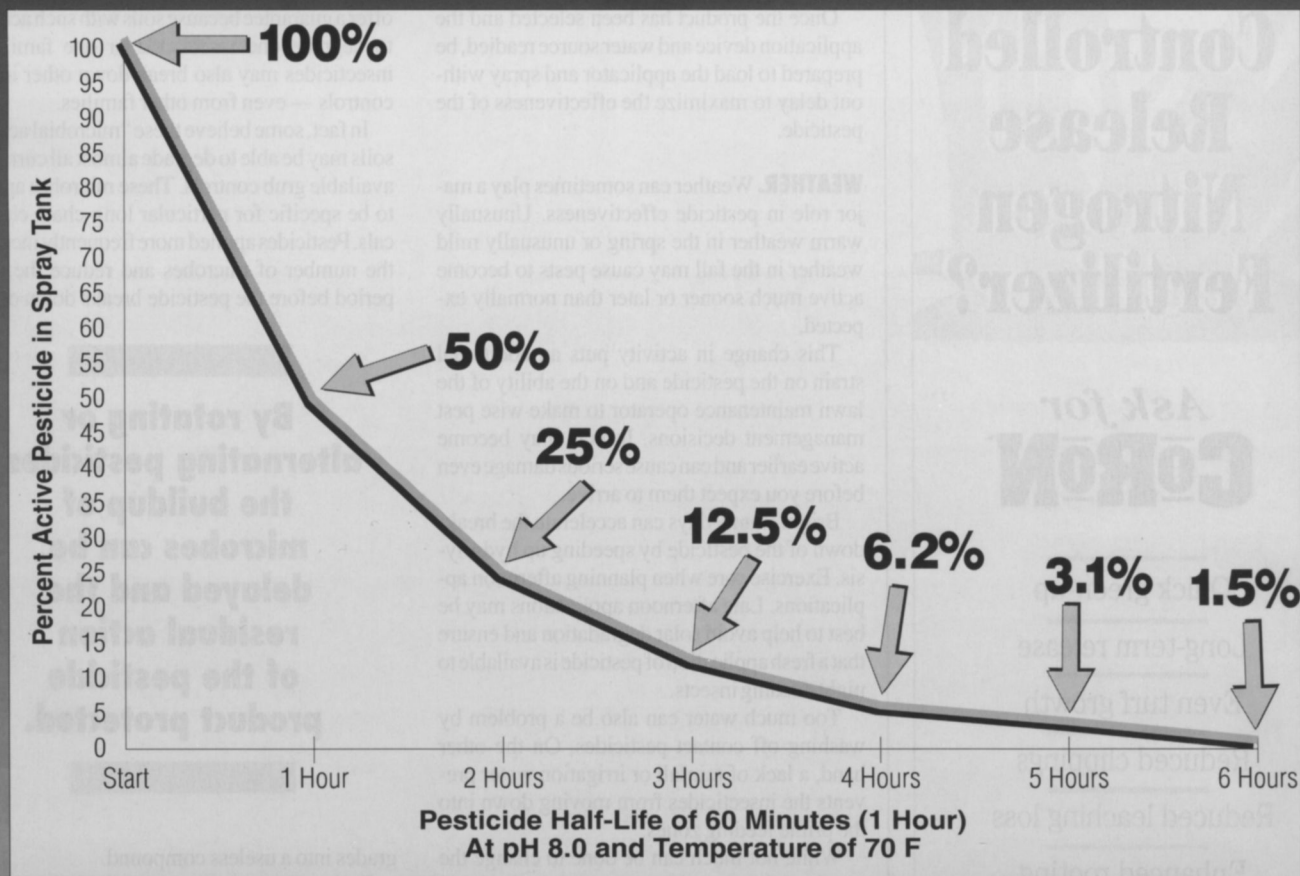
Chemical reaction in which water reacts with pesticides to form two or more substances



Pesticide no longer effective

PESTICIDE HALF-LIFE

The time required for 1/2 of a pesticide to hydrolize or become inactive



need for treatment determined, select the proper control product. Read the product label, making certain you understand the strengths and weaknesses of the pesticide chosen for the task.

Some insecticides have a low residual and require more frequent applications. Other more persistent pesticides have a wider window of application. Make certain a program has been designed to work on the pest at the appropriate growth stage, given the current temperature and moisture conditions.

Check the product for information regarding applicator safety and cost. Consider the available formulations. Check the label not only for target pests, but also for recommendations for mixing and pH requirements for liquid applications.

Pesticides are 100 percent potent only while they are in the bag, box

or can. When they are mixed with water, they begin the process of "degradation." Pesticides are, in fact, designed to break down; otherwise they build up in the food chain and cause grave problems in higher species. DDT, for example, was an excellent insecticide, but it was not biodegradable and its use has been prohibited since 1973.

The trick to ensuring that a pesticide is as effective when it is applied as it was in the package is to make sure it doesn't break down or degrade prior to application. This breakdown in water is called hydrolysis. The reaction between the water and the pesticide creates two or more new substances.

The time required for half of the product to break down into these new substances and become ineffective is called "half-life." Half-life can be expressed in minutes,

hours, days, months or years depending on the time required for half the product to degrade.

Remember, most city water sources are required to carry a pH of 7 to 9. This minimizes the effects of lead and solder in old pipes. Such high pH values can curb pesticide effectiveness by substantially reducing half-life.

Depending on the pH of the water supply, the process of degradation can be accelerated.

Remember that pH values range from a neutral 7 up to a very alkaline 14 or down to a very acidic 0. Most pesticides operate best (have the longest half-life) in a solution with a pH of 5 to 6.9.

Use a pH meter or litmus paper to determine the water pH. If the pH is above the optimal 5 to 6.9, add an acidifying agent like liquid iron, vinegar or a buffering agent.

When working with city water sources, it's particularly important to check the water's pH before mixing in a pesticide.

Start slowly, adding the pH modifier a little at a time. Baking soda or household bleach can raise the pH if it is accidentally dropped too low.

TANK MIXING. Since labor is often the main expense in any application, tank mixing of pesticides can be a great labor-saving device. Multiple pests are often encountered — with weeds and insects frequently plaguing the same turf stand — and tank mixing can maximize labor costs and results.

Tank mixes are not to be taken lightly, however. Read the product labels, check for warnings or requirements and make sure that the pH requirements do not differ dramatically. A jar test prior to mixing a

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batch of chemicals can prevent a product mix from producing a cottage cheese-like mess. (See page 135 for steps for performing a jar test.)

Next, make certain that the application device has been calibrated and is clean, and is ready for the pesticide. When in doubt about the condition of the sprayer or its last load, rinse out the applicator and neutralize the tank, pump, filters, hoses and nozzles with a tank cleaner.

Once the product has been selected and the application device and water source readied, be prepared to load the applicator and spray without delay to maximize the effectiveness of the pesticide.

WEATHER. Weather can sometimes play a major role in pesticide effectiveness. Unusually warm weather in the spring or unusually mild weather in the fall may cause pests to become active much sooner or later than normally expected.

This change in activity puts an additional strain on the pesticide and on the ability of the lawn maintenance operator to make wise pest management decisions. Insects may become active earlier and can cause serious damage even before you expect them to arrive.

Bright, sunny days can accelerate the breakdown of the pesticide by speeding up hydrolysis. Exercise care when planning afternoon applications. Late afternoon applications may be best to help avoid solar degradation and ensure that a fresh application of pesticide is available to night-feeding insects.

Too much water can also be a problem by washing off contact pesticides. On the other hand, a lack of rainfall or irrigation water prevents the insecticides from moving down into the prime feeding zones.

While not much can be done to change the weather or to provide water to non-irrigated areas, several products can enhance the contact between the pesticide and the plant leaves. Surfactants help break the surface tension of the liquid providing good coverage as it flows across the leaf. Stickers accelerate the drying of the pesticide and help prevent it from washing off if rain occurs too soon following an application.

ROTATION. Rotate insecticides frequently for maximum effectiveness. Dr. Harry Niemczyk of The Ohio State University described what he calls "active" soils. Niemczyk found that soils treated with isofenfos for three years without rotation, for example, had the ability to neutralize additional treatments of the chemical in a matter of days.

He advanced the theory of "enhanced degradation" and later isolated soil microbes which actually used the isofenfos as a nutrient source.

Enhanced microbial activity has been demonstrated even when a compound has not been used for up to three years. Such increased pressures dictate the need to alternate products even within the same class of pesticides.

For example, organophosphates (OP) are among the most widely used turf and ornamental insecticides. The OPs include acephate, chlor-

pyrifos, dimethoate, diazinon, ethoprop, isofenfos, malathion, oxydemeton-methyl and trichlorfon. Even switching from one OP to another can help prevent enhanced microbial activity as well as insect resistance.

Most universities now recommend rotating grub insecticides to prevent premature failure as a result of microbial degradation. This tactic may help ensure pesticide effectiveness, but does not offer a guarantee because soils with such activity to degrade one insecticide or one family of insecticides may also break down other insect controls — even from other families.

In fact, some believe these "microbial active" soils may be able to degrade almost all currently available grub controls. These microbes appear to be specific for particular long-chain chemicals. Pesticides applied more frequently increase the number of microbes and reduce the time period before the pesticide breaks down or de-

**By rotating or
alternating pesticides,
the buildup of
microbes can be
delayed and the
residual action
of the pesticide
product protected.**

grades into a useless compound.

By rotating or alternating pesticides, the buildup of these microbes can be delayed and the residual action of the pesticide product protected.

Sometimes, switching to another family of pesticides can be a real asset when problems occur with pesticide resistance. Insects begin to mutate and transform into a strain biologically resistant to the particular pesticide. The carbamate insecticide family is one of the oldest, but still highly effective group of insecticides. It contains compounds such as aldicarb, bendiocarb, carbaryl, methiocarb, oxamyl and propoxur. One of these chemicals may be used with great success if pests build up a resistance to an OP or another carbamate.

IRRIGATION. Don't overlook label instructions regarding irrigation. Irrigation moves the insecticide into the zone in which the pest is feeding. Unless the insect can ingest the insecticide, the pesticide will be unable to control the pest. Irrigation can be the most vital step in the process.

In residential insecticide applications the irrigation is often out of the control of the applicator. Few home owners realize the importance of applying a sufficient amount of water following the application, and either forget to water or do so

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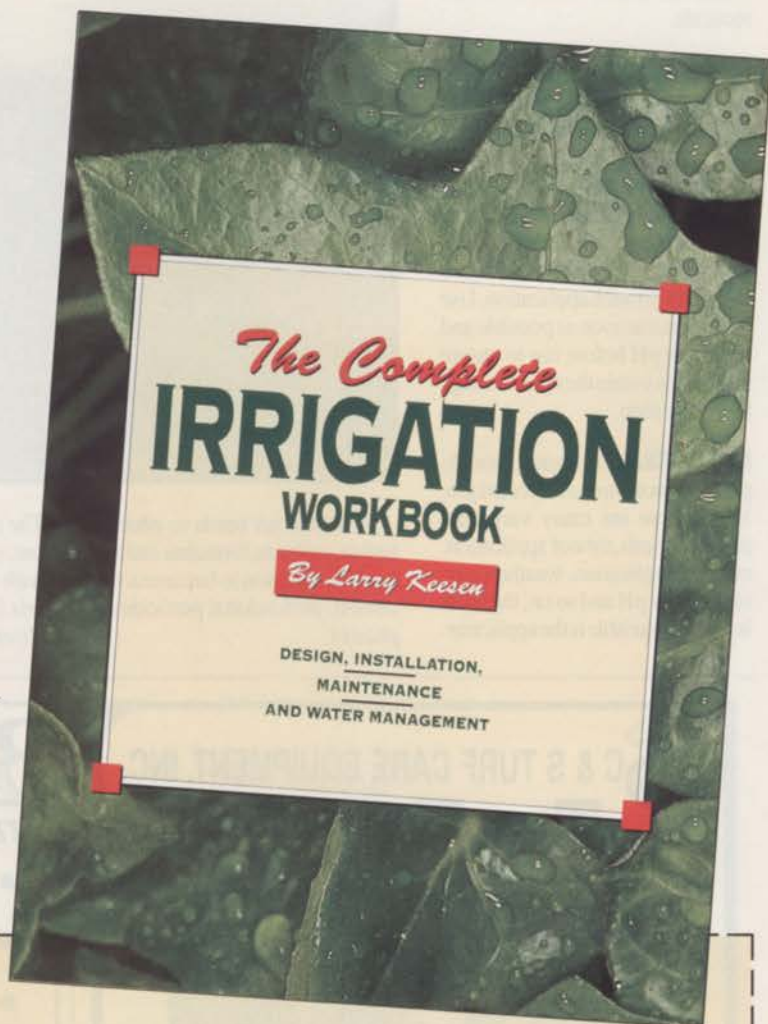
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Pesticide Efficacy

(continued from page 26)

inadequately. Doorhangers, statement stuffers and conversations with the homeowner may help enforce the necessity of irrigation to ensure the effectiveness of the insecticide.

DISPOSAL. Following the application of any pesticide it's important to safely handle any leftover product. Do not dump the remainder of the mix down the nearest drain. If surplus material remains after an application, place the remainder in a clean, labeled container for use with the next such application. Use the product as soon as possible and check the pH before use to ensure that it stays within the optimal range for application.

MAXIMIZE. Maximizing pesticide performance is a multi-faceted job. While there are many variables: products, pests, time of application, rates of application, weather, carrier, carrier pH and so on, the most important variable is the applicator.



A technician needs to educate, isolate, calibrate, formulate and analyze the situation to become a successful, professional pesticide applicator. ■

The author is an industry consultant, specializing in micronutrients, with Key Solutions, a division of Iris Sales & Solutions Inc., Rocky River, Ohio.

The lawn care technician plays a vital role in the success of any pesticide application. Not only must the operator properly mix the product, it must be used in the most efficacious manner.

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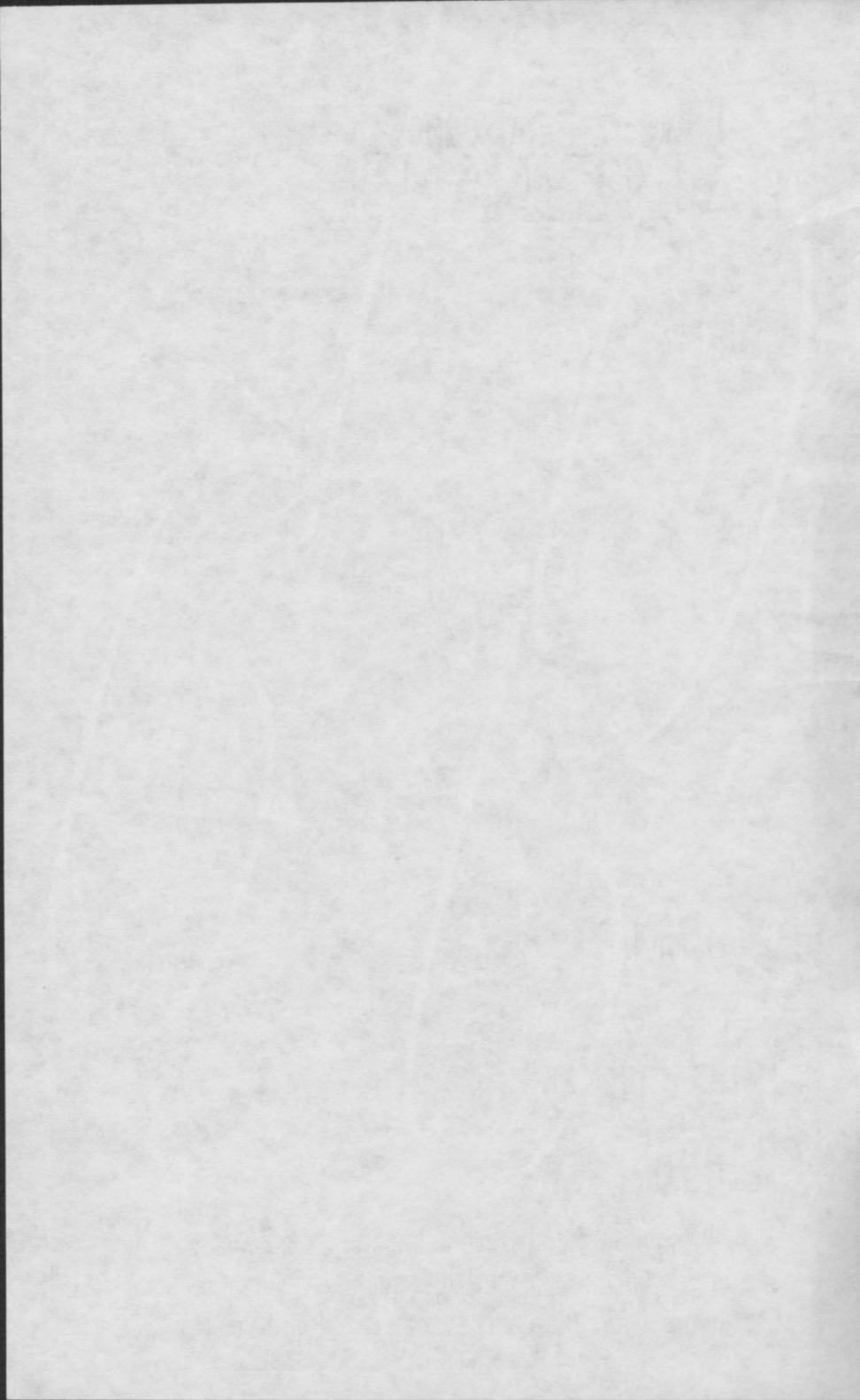
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Longhorn	17		

Automated Grass-Catcher Lifts & Dumps Debris

The All Seasons' Catcher Lift System is a fully automated loading system that lifts and dumps the Walker mower grass-catching box into pickup trucks, dumpsters, trailer or over fences. It is mounted to the Walker Mower Grass Handling System to handle 115- or 150-pound loads. Dump and go in less than 30 seconds.

All Seasons' system gives normal dumping in the down position or extends to a maximum height of 61 inches to dump grass clippings into higher vehicles or compost piles. Each unit comes 80 percent assembled and features heavy duty construction. Typical cycle time to lift and dump larger loads is about 20 seconds.

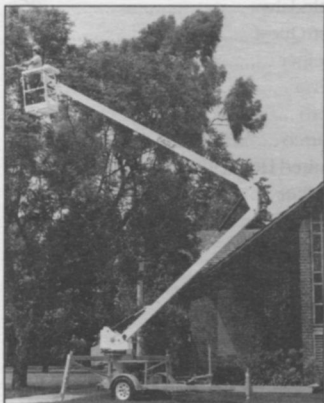


Circle 500 on reader service card



Eagle 44 Aerial Lift Gives Fast Access to Tree Limbs

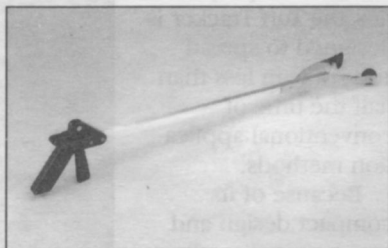
The EAGLE 44 from AmeriQuip is a trailer mounted, articulated aerial lift with a 25-foot side reach and 44-foot working height. It features positive bucket leveling and 360-degree continuous rotation. It also offers outstanding portability for easy access to a variety of maintenance tasks. A proportional control valve with neutral position interlock allows simultaneous two-function operation and complete feathering capability. Heavy duty, quick adjust outriggers are an integral part of the lift.



Circle 501 on reader service card

The E-Z Reacher for Grounds Maintenance

The E-Z Reacher® pick-up tool from **Arcoa Industries** is a versatile pick-up tool that can pick up anything from a sliver of glass to a 5-pound brick. Durably constructed, the E-Z Reacher is ideal for retrieving litter and debris without bending or stooping. The pistol grip style handle is of high strength plastic, the center stalk of extruded aluminum and the center straps are of stainless steel. The pick-up end features molded rubber cups mounted on stainless steel straps. The rubber cups close on, and conform to, the object being retrieved, assuring a non-slip grip. The E-Z Reacher is made in the United States, is fully guaranteed and sells for \$26. **Circle 502 on reader service card**



Protank Sprayers Are Built to Last

The Protank family of skid sprayers is available from **C&S Turf Care Equipment**. The sprayers are designed and built with the user in mind, and include both gas and electric models, as well as single- and multi-tank configurations.



A full line of sprayers is available for lawn, tree and shrub care professionals. All skid mount units are designed for quick and easy installation in any pickup truck or van. Electric reels are standard, and all units come complete with spray hose.

Circle 503 on reader service card

Spread and Spray in Half the Time

The SS8030 Turf Tracker from **C&S Turf Care Equipment** promises to increase productivity in making dry and liquid applications to turf. For use on residential and commercial properties, the Turf Tracker is designed to spread and spray in less than half the time of conventional application methods.



Because of its compact design and zero-turn radius, the Turf Tracker can treat even the most heavily landscaped properties. **Circle 504 on reader service card**



Ciba Offers Turf & Ornamental Products

Two of **Ciba Corp's** foundation products are **Primo®** turf growth regulator and **Banner®** fungicide.

At standard rates, **Primo** reduces turf growth by 50 percent for four weeks. The product is rainfast in one hour, breaks down to carbon dioxide and water and is more consistent than most other plant growth regulators. **Primo** has no effect on ornamentals or other non-target organisms. The product also creates a denser, healthier turf shortly after application.

Banner delivers effective systemic control of turfgrass and ornamental diseases. **Banner's** low prescriptive rates provide superior, economical control of dollar spot, brown patch and a variety of other diseases. **Banner** is now available in a gel and a 15-gallon **TurfPak™** unit, the industry's first electronic returnable/refillable pesticide container.

Circle 505 on reader service card



Unique Low-Voltage Outdoor Lighting

Corona Plastics offers the Unique Outdoor Accent Lighting line that eliminates mowing or trimming problems. It is a new lighting concept that facilitates landscape maintenance and eliminates interference with walkways and landscape features.

Lights remain hidden underground during daylight hours. At sunset, a photo cell raises each light on the circuit and turns it on for the cycle length you set. At the end of the cycle, the light retracts into the ground until the next evening.



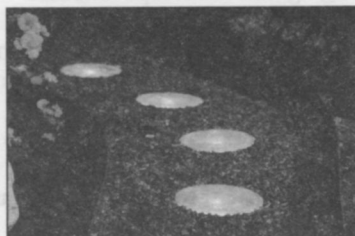
An 8-foot to 10-foot distance between lights is recommended, although this can be adjusted for individual landscaping needs. Now you can enjoy maintenance-free outdoor lighting that you can install with ease.

Circle 506 on reader service card



Glowing Step Stones to Light Your Way

Lumastones™ from Corona Plastics are a new concept in low voltage outdoor illumination — lighting that will guide you safely across a yard or through a garden. The easy-to-change bulb is weather protected so the Lumastones can be installed directly in a pathway or lawn and can be walked on like any other stepping stone.



Lumastones are durable and can withstand the most extreme temperatures from desert summers to northern winters. They resist lawn and garden pesticides and are not affected by harmful sun rays.

Lumastones can be installed in minutes to any existing 12-volt lighting system.

Circle 507 on reader service card

Wide-tread Pull-out Ramp Holds a Ton

Finally...There's a wide-tread pull-out ramp that holds a ton but doesn't weigh a ton...the Handy Hide-Away Ramp from **Creative Automobile**. No more back braking experiences loading or unloading lawn mowers or tractors. The Handy Hide-Away Ramp secures firmly in place without modification to the truck bed. Installation is quick and easy and will fit all trucks with a 48-inch clearance between the wheel wells. Its unique design makes loading on any terrain, including docks, a snap.

Creative Automobile also offers a large variety of other end-gate products including truck bed extenders. Call 800/783-1069 to receive your free brochure. **Circle 508 on reader service card**



Give Curbs A Creative Touch

Creative Curb Marketing distributes a small, self-propelling unit that produces extruded concrete curbs, edging and landscape dividers without damaging the existing landscape. Creative Curb machines are equipped with an electric motor (110-volt household current) or with a gas engine. The machines are portable and maneuverable, enabling them to form virtually any configuration. Accessories come in a variety of curb shapes, including mower strips.



Creative Curb operators offer customers permanent, continuous concrete landscape borders with curves, contours, shapes and colors at cost and time savings.

Circle 509 on reader service card

Designing Landscapes The Wizard's Way

Design Imaging Group introduces the Wizard, a Windows-based 2-D computer imaging software application. This easy to learn software enables the user to give potential customers a full-color, photorealistic rendering of their site. Take a photograph of the customer's property, scan the picture into your computer and use an image from the 1,000-image library that comes with the software to create a proposed design. **Circle 510 on reader service card**



Taking Charge By Computer

The full-featured billing program from Dillaware is designed for entry-level users who have little computer or accounting experience. The modular system's simple setup take the user through the billing process step by step.

Features include an unlimited number of customer transactions, prints on blank paper or preprinted forms, detailed invoicing, statements, multi-tier pricing, discounts, multi-rate tax calculations, aging, late charges, list management/ mailing labels, shipping labels and more.

Circle 511 on reader service card

Customer	Invoice #	Date	Due	Description	Amount	Tax	Balance
100-100	10-01-91	10-01-91	10-01-91	Tree Trimming	200.00	10.00	210.00
100-100	10-15-91	10-15-91	10-15-91	Shrub	80.00	4.00	84.00
100-100	10-15-91	10-15-91	10-15-91	Labor	40.00	2.00	42.00
100-100	10-15-91	10-15-91	10-15-91	Mowing	20.00	1.00	21.00
100-100	10-15-91	10-15-91	10-15-91	Fertilizer	20.00	1.00	21.00
100-100	10-15-91	10-15-91	10-15-91	Stitch & Cleaning	75.00	3.75	78.75
100-100	10-15-91	10-15-91	10-15-91	Request CASH 10%	120.00	6.00	126.00
100-100	10-15-91	10-15-91	10-15-91	Weekly Service	20.00	1.00	21.00
Totals					775.00	38.75	813.75

Free Pest Control Guides

DowElanco, manufacturer of insecticides, herbicides and fungicides, has produced

guides for responsible pest control, full of practical information on how you can manage pests more effectively and responsibly. If you'd like to receive a free copy, select the guide that best fits your needs and call the DowElanco Customer Information Service at 800/352-6776.

- * Cool-Season Turf Guide (#301-00-016-R94)
- * Warm-Season Turf Guide (#301-00-017-R94)
- * Nursery and Landscape Guide (#301-00-018-6/93)

Circle 512 on reader service card



Grinder Makes Fast Work Of Limbs, Yard Waste

The HD8 industrial grinder manufactured by **DuraTech Industries International** features an eight-foot tub and is ideally suited to grind tree limbs and yard waste into valuable compost. The HD8 features a 10-foot long conveyor with support legs.

The HD8 is completely portable and self-contained. It is easily pulled with a three-quarter-ton pickup. The HD8 is powered by a 110-hp diesel engine. Choice of 10-, 12- and 14-foot diameter tubs are available from DuraTech. Contact DuraTech

Industries International, Inc., P.O. Box 1940, Jamestown, ND 58402-1940; phone: 701/252-4601, Fax: 701/252-0502.

Circle 513 on reader service card



Jumbo-size Spreaders Cover Ground

Large, easy rolling jumbo-size spreaders from **EarthWay Products** roll on 13 x 5 NHS turf-tread pneumatic tires and noncorrosive rims. The large, 100-pound capacity hopper is totally rustproof and features twin stainless steel slide shutoffs.

Greaseable ball bearings and stainless steel axle are standard equipment. A side deflector and rain cover are optional. The enclosed parts are guaranteed for two years.

Circle 514 on reader service card

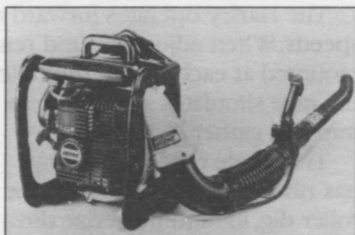


Echo Power Blower Gets CARB Certification

Echo Incorporated's PB-4600 backpack power blower was certified by the California Air Resources Board this year, the first power blower to be CARB-certified industry wide. This blower is the first to meet the new, stringent specifications for emissions and performance.

The 22-pound backpack blower has been designed with ease of operator use in mind. A tube-mounted throttle control offers exceptional directional control of the blower pipes with one-hand operation. A two-quart fuel tank provides extended operation time, and a purge-equipped, all-position adjustable diaphragm carburetor allows for fast, easy starts and dependable performance.

Circle 515 on reader service card



Encore's Compact, User-Friendly Rider

Encore's compact, hydrostatic rider offers unmatched easy handling. A true floating deck allows mowing on rough terrain and a unique trunion on the front axle frame assures a high quality cut and smooth ride. The 52-inch deck features three blades.

The Encore Rider uses a Kawasaki 20-hp liquid cooled engine and an Eaton 771 dual path hydrostatic drive system, giving smooth control.

Other features include warning lights for oil pressure, coolant temperature and charging; electric blade clutch brake; and foot operated deck lift with lock.

Circle 516 on reader service card



Power Box Rake for Skid Steers Benefits Landscapers

Harley Model S-6 Power Box Rake™ from Glenmac Inc. combines a wish list of features for skid-steer loader operators. The bi-directional unit creates left or right throw windrows of raked material.

The Harley operates forward or backward at normal operating speeds. When adjustable and removable heavy-gauge plates are mounted at each end of the roller, the rake simulates a box rake to trap and gather stones.

The single roller on the unit has ribs or studs. These help the roller dig, lift and pulverize dirt. The adjustable twin barrier bar mounted above the roller is made of wear-resistant urethane. The oil bath keeps the chain, sprockets and other moving parts constantly lubricated to reduce wear.

Circle 517 on reader service card

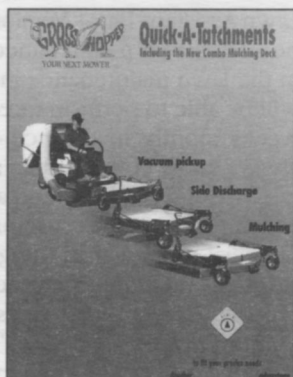


Grasshopper Attachments Offer Selectability

New Quik-D-Tatch® attachment literature for **Grasshopper's** complete line of out-front zero-radius mowers presents the new Combo Mulching Deck™ which converts from mulching to side discharge to vacuum pickup using Grasshopper's vacuum collection system. There are five deck sizes ranging from 44 inches to 72 inches.

The literature also presents the new spring-loaded Quik-D-Tatch deck feature that lets you remove and reattach decks quickly and easily.

Other features include: multi-purpose angle dozer blades, Sweepster® rotary brooms, heavy-duty snowthrowers, a new bedshaper, a dethatcher and a sun canopy. **Circle 518 on reader service card**



Affordable Software for Landscape & Irrigation

Green Thumb Software offers powerful design programs for landscaping and irrigation at an affordable price.

LandDesignerPro® and **IrrigatorJetPro™** are comprehensive CAD programs designed specifically for landscape and irrigation. New for '95 is the Pro Series Plant Library for CD ROM, with nearly 2,000 photographic images of plants. All programs run under Windows on IBM compatible computers.

Circle 519 on reader service card



Greener Pastures Upgrades Lawn Assistant Plus+

Lawn Assistant Plus+ Version 4 from **Greener Pastures** is the most powerful lawn maintenance software available today. With 10 years in the lawn maintenance industry, it has proven to be a leader. You will be able to perform forecasts of days, weeks, months in advance — you will always know your product and labor needs, call scheduling and auto-dialing, accounts receivable, automatic routing, financial reports, mail merging, invoice printing and employee production reports. This program saves information continuously — DataGuard™ protects data in a power loss and never requires indexing of the database. Lawn Assistant Plus+ is easy to learn and use — and it offers a complete on-call support system. Call 800/783-1069 to receive your free demo video and sample reports.

Circle 520 on reader service card



Hunter Introduces Residential Irrigation Line

Hunter Industries has introduced the Residential Series, a complete line of residential irrigation products for all turf and landscape sites. The Residential Series includes the popular PGP pop-up gear-drive, the PGM mid-range rotor, the PS spray head, the HPV plastic valve and the PSC-Z controller. Hunter products are designed for easy installation and adjustability, and offer many water-saving features. The PSC-Z controller simplifies irrigation programming with easy, one-touch buttons and a big, bright LCD display.



Circle 521 on reader service card

Selectedge Edging Units Install Easily

Innovative Concrete Design Corp. has introduced Selectedge™ decorative concrete edging units, an attractive and easy-to-install landscape edging system. Natural scale, colors and good looks allow Selectedge to blend comfortably with any landscape plan. Its modular, trapezoidal shape offers endless design options.

Selectedge can create a 40-inch diameter ring around trees, light poles, mailbox posts or planting beds. It also forms straight, linear edging of any length, and serpentine edging of any size or shape.

Raised Selectedge makes ideal curbing along sidewalks, driveways and patios. A flush Selectedge border along a fence, retaining wall or building foundation allows grass to be mower-cut right up to the border.

Circle 522 on reader service card



Jacklin Offers Improved Sheep Fescue

Jacklin Seed's MX-86 is one of the most improved sheep fescues on the market today with improved resistance to insects and disease.

MX-86 sheep fescue has the hardiness to withstand both drought and shade. MX-86's durability and low maintenance requirements make it ideal for golf course roughs; shady, low-maintenance lawns; and erosion areas. MX-86 is dark blue-gray in color, has low water and fertilization requirements and even tolerates transition zone conditions.

Circle 523 on reader service card



14SX 21-Inch Commercial Walk-Behind Mower

The **John Deere** 14SX commercial walk-behind mower is ideally suited for the lawn maintenance professional who desires a durable 21-inch walk-behind mower with many features. It uses a 5.5-hp KSeries 4-cycle engine with full pressure lubrication for long engine life. Self-propelled drive system has five speed selections from 1.2 to 4.1 mph to match walking speeds.



The 14SX is easy to maneuver with light, front wheel lift-effort for smooth turning and a short, 23-inch wheelbase for trimming along contoured surfaces. It also includes a rear discharge for trimming on both sides of the mower and a high performance mulching system. **Circle 524 on reader service card**



Kubota B-Series Redefines Compact Tractor

Redefining the meaning of "compact tractor," **Kubota Tractor Corp.** offers its B50 Series tractors — the B1550, B1750 and B2150 — for commercial, small farm and residential customers. An exclusive feature of Kubota's B50 4WD models is the "bi-speed turn," which allows for tighter turns and minimizes turf damage.



Circle 525 on reader service card

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Lawn & Landscape MAINTENANCE

What is your primary business at this location?

(Please check one.)

I. CONTRACTOR or SERVICES:

- 1. Landscape Contractor (maintenance & installation)
- 2. Chemical Lawn Care Company (excluding mowing maintenance service)
- 3. Lawn Maintenance Contractor
- 4. Ornamental Shrub & Tree Service
- 5. Irrigation Contractor
- 6. Landscape Architect
- 7. Other Contract Services (please describe) _____

II. IN-HOUSE LAWN CARE/MAINTENANCE:

- 1. In-House Maintenance including: Educational Facilities, Health Care Facilities, Government Grounds, Parks & Military Installations, Condominium Complexes, Housing Developments, Private Estates, Commercial & Industrial Parks.

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- 2. School, College, University
- 3. Trade Association, Library
- 4. Others (please describe) _____

What best describes your title?:

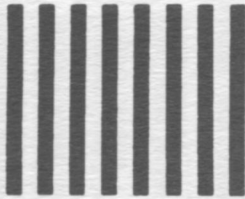
- Owner, Pres., Vice Pres., Corp. Officer
- Manager, Director, Supt., Foreman
- Agronomist, Horticulturist
- Entomologist, Plant Pathologist
- Serviceman, Technician
- Scientist, Researcher
- Company, Library copy only
- Other (please specify) _____

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Lawn & Landscape MAINTENANCE

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- 2. Chemical Lawn Care Company (excluding mowing maintenance service)
- 3. Lawn Maintenance Contractor
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- 1. In-House Maintenance including: Educational Facilities, Health Care Facilities, Government Grounds, Parks & Military Installations, Condominium Complexes, Housing Developments, Private Estates, Commercial & Industrial Parks.

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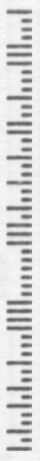
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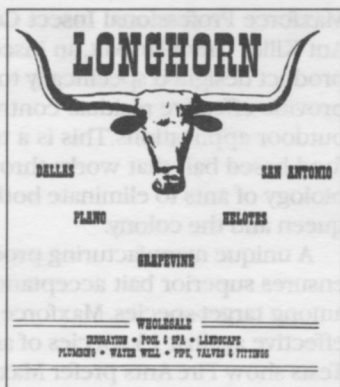
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1995 Catalog Highlights Longhorn's Equipment

The 1995 catalog from Longhorn highlights the company's complete line of landscaping and irrigation equipment. The company offers a diverse range of controllers, rotors, spray heads, valves and quick couplers for irrigation; tools, weed barrier, mulch and edging for landscaping; and weed barrier, mulch, mowers, edgers and chain saws for landscape maintenance. The catalog also displays shovels, rakes and other accessories necessary to the industry.

Circle 526 on reader service card



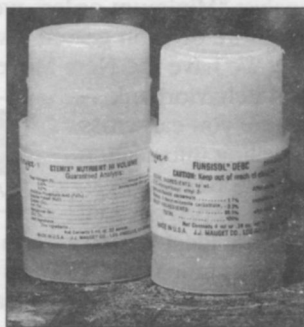
Micro-Injection System Keeps Environment Clean

Mauget micro-injection system uses the smallest and shallowest entry point for infusion of materials directly into the tree's sap stream. It is the only trunk-applied system with 11 different premeasured formulations to correct elemental deficiencies, control diseases, and stop chewing, sucking and boring insects.

Fungisol® debacarb fungicide demonstrates high activity against many damaging and economically important cankers, wilts, blights and declines of shade trees.

Stemix® Nutrient Hi-Volume contains a premeasured dose of primary and secondary elements to help maintain tree health. The Mauget Company offers several other chelated and sulfate based products to trained applicators.

Circle 527 on reader service card

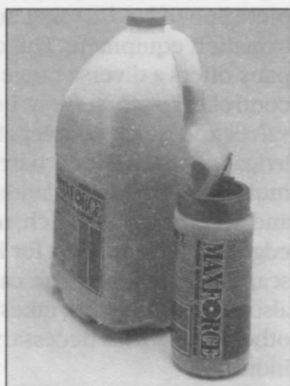


Maxforce Ant Killer Granular Bait is Irresistible

Maxforce Professional Insect Control recently introduced Maxforce Ant Killer Granular Bait, an insecticide product designed specifically to provide effective residual control in outdoor applications. This is a true-food based bait that works through the biology of ants to eliminate both the queen and the colony.

A unique manufacturing process ensures superior bait acceptance among target-species. Maxforce bait is effective against 13 species of ants. Tests show Fire Ants prefer Maxforce 3 to 1 over other baits.

Product literature is available from B&W Sales at 800/843-6334.
Circle 528 on reader service card



Metromail Offers Target Marketing Opportunities

Metromail Corporation provides targeted mailing lists to thousands of lawn and landscape providers across the country.

"Until recently, direct marketing lists were far too costly for smaller businesses to use," said Julie Springer, Metromail marketing analyst. "Minimum orders were for 10,000 or more names. We have an entire division geared toward smaller or specialized businesses."

"We have the New Movers list, New Homeowners, Realty file and BehaviorBank — where you can cross dwelling information with behavioral trends," Springer said.

Metromail
AN R.R. DONNELLEY & SONS COMPANY

"It's the ideal way to zero in on a market segment."

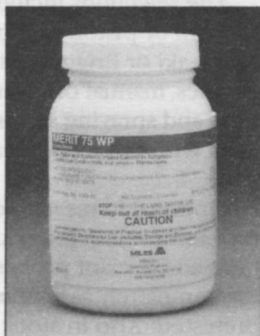
With more than 45 years of experience, Metromail is a recognized leader in the direct marketing field.

For more information on Metromail products call 800/523-7022.
Circle 529 on reader service card

Your Lawn Care Jobs Deserve Merit

In 1994, Miles Specialty Products introduced Merit insecticide, providing lawn maintenance professionals with an insecticide that is highly effective and poses reduced risk to humans and non-target species. Merit is effective at rates 85 percent to 96 percent lower than currently registered soil insecticides for use on turf. Merit can also be used to treat target pests on ornamentals, including trees, shrubs, evergreens, flowers and foliage plants.

For 1995, it will only get better. Merit is now available in 2-ounce jars for smaller application needs. Merit is also available in water soluble packets. Circle 530 on reader service card

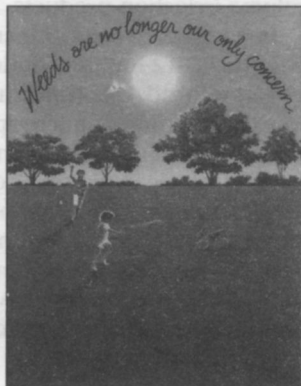


Monsanto Offers Free Marketing Information Kit

Monsanto is offering a free kit that's packed with helpful information for lawn maintenance professionals, landscapers and other grounds maintenance pros. It's called "Weeds Are No Longer Our Only Concern." Inside, you'll find six easy ways you can improve customer relations...info to help ease customer concerns about herbicide use...cost-saving tips for creating beautiful tree rings and trim lines...guidelines for turf renovation...four effective strategies for dealing with the media...and much more.

Plus, this free kit comes in a handy organizer folder for quick reference. Ask for yours today; offer good while supplies last.

Circle 531 on reader service card



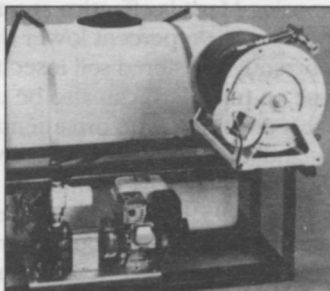
Catalog Details Oldham T&O Product Line

Oldham Chemical Co.'s turf and ornamental literature describes equipment, chemicals, lawn care sprayers and accessories. Sprayers vary in size from 15 gallons to 500 gallons and are built to order.

The selections include diaphragm or piston pumps, Kawasaki or Briggs & Stratton engines, manual or electric hose reels and spraying system lawn guns with three interchangeable tips.

Optional items include deep root feeders, injectors for small beds and fire ant probes. All units are completely assembled and pretested. Also in stock is a complete line of parts, safety equipment, pesticides and fertilizers for the turf industry.

Circle 532 on reader service card



Olson Offers Low Volume Irrigation Products

Just released by Olson Irrigation Systems is their January 1995 catalog covering their complete line of low-volume irrigation products.

In addition to the company's popular EH-12 multiple outlet drip irrigation head, Olson manufactures an extensive line of micro-spray jets, single- and six-outlet drip emitters, E-Z E11 flexible swing joints and the new TSR-1 Sprinkler Riser. The new 24-page catalog is available at no charge from Olson Irrigation Systems, 10910 Wheatlands Ave., Santee, CA 92041.

Circle 533 on reader service card



Aerial Lift Provides Flexibility

The Polecat bucket lift from Polecat Industries makes it easy to do grounds maintenance while it lowers operating and insurance costs.

It's fully self-propelled and hydraulically controlled by the operator in the bucket, giving it movement in any direction. The Polecat can be configured to suit any application. It is stable, has light weight and can go just about anywhere without damaging the terrain. For the full story, call 800/8POLECAT. In Florida, call 305/226-0621.

Circle 534 on reader service card



Professional Tree & Turf's New Guide

Professional Tree & Turf Equipment offers a 20-page catalog featuring a vast array of products including sprayers, tanks, pumps, engines, hoses, gauges, spreaders, pruners, ropes, arborist suppliers and more.

Professional Tree & Turf specializes in custom-built sprayers including booms, IPM sprayers and 12-volt systems. Operators choose the parameters to fit their needs.

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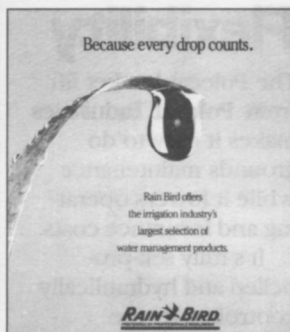


CATALOG

Rain Bird Updates Irrigation Catalog

Rain Bird announces its new Landscape Irrigation Products 1995-96 Catalog. The new catalog highlights many new and existing products such as the Xeri-Tube PC for convenient and uniform low-volume irrigation; the ESP-C for commercial duty water management; the ASVF Anti-siphon Valve for trouble-free, reliable remote control valve operation with built-in atmosphere backflow preventer; and the Falcon rotor for superior distribution and reliability.

Rain Bird's 1995-96 catalog offers performance data for a wide variety of sprinklers and rotors. We've also improved it to make it easier to read and more convenient to find application information. Circle 536 on reader service card



Rain Bird Software Solves Specialty Problems

Are you having trouble finding the right irrigation software to use? Let **Rain Bird**, the number one name in irrigation lead you to the number one software programs. RainCAD™ full-function CAD program for irrigation and landscape designs creates a complete bill of materials, estimates, proposals and more. Irricalc™ determines watering schedules as well as annual water estimates and average peak flow calculations. Xeri-Cal™ assists in emission device selections and low-volume hydraulic calculations. For more information, call 800/348-3243. Circle 537 on reader service card



The Mowing Assistant Moves to Windows

Ten years ago, **Real Green Computers** introduced the Lawn Assistant, a software package for the chemical lawn care industry. The Lawn Assistant quickly became the standard in software for the industry, outselling its nearest competitor two to one.



Now, we are excited to introduce the new standard for the mowing and landscape industry: The Mowing Assistant.

The Mowing Assistant is a Windows based program, making it one of the easiest to use and learn.

The program offers scheduling capabilities, work sheets, invoicing, job costing and many other functions.

Call 800/422-7478 for a free demo disk and 112-page booklet.
Circle 538 on reader service card



The Lawn Assistant II Makes a Debut

From **Real Green Computers**, the developers of the Lawn Assistant (the number one selling software for the lawn maintenance industry), comes the next generation of software for the industry, Lawn Assistant II! The speedy new Lawn Assistant II is 2 to 3 times faster than its predecessor, offering variable length data fields to conserve hard disk space.



Using pull-down menus and help boxes makes the system easier to use and also makes it very easy to move around inside the

software. Integration of the many different features that the Lawn Assistant II offers also adds to its ease of use. Call 800/422-7478 for a free 144-page information booklet.

Circle 539 on reader service card

Control Weeds With Tri-Powder Dry

Riverdale introduces Tri-Powder® Dry, a combination of MCPA, Mecoprop and Dicamba, packaged in water soluble packets. With the same components as liquid Tri-Powder, the dry formulation offers broad-spectrum, 2,4-D-free weed control with the benefits of reduced exposure to the mixer, reduced storage and handling, no triple rinsing and convenience. Tri-Powder Dry is packaged in convenient, water-soluble bags that treat approximately 50,000 square feet.

Information on Tri-Powder Dry and other herbicide alternatives Riverdale has to offer is available in the product brochures "2,4-D-Based Broadleaf Herbicides" and "D-free Broadleaf Herbicides." Brochures will be sent promptly in time for specifying your 1995 broadleaf programs.

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Sandoz Agro's Barricade® herbicide gives turf managers consistent, season-long control of the most weeds of any leading pre-emergent - at rates three to four times lower than other products. Available in water soluble packets for sprayable applications and in dry granulated fertilizer formulations, Barricade is effective on turf and in and around more than 100 species of landscape ornamentals. Unlike many competitive herbicides, there are no staining concerns with Barricade.

For a brochure that explains Barricade's application advantages, or the name of your nearest Barricade distributor, call 800/435-TURE.
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The Mavrik® from Sandoz Agro you know and trust to control insects in ornamentals is now the choice for surface feeding insect management on lawns and other turf areas. New tested, proven rates make Mavrik tough on everything from chinch bugs, cutworms and bluegrass billbugs to sod webworms, beetles and mites. Now available in convenient gallon containers, Mavrik is the cost-effective choice for odorless insect control.

For a Mavrik brochure, or the name of your nearest Mavrik distributor, call Sandoz Agro at 800/435-TURF.
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Scag's Total Focus — Commercial Mowers

Scag Power Equipment offers a complete line of both walk behind and riding mowers for the commercial cutter. Belt drive and hydro drive walk behind mowers deliver unsurpassed productivity, durability and quality of cut.

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Scag's only business is commercial mowers; our focus is always to be "Simply the Best." To receive a copy of our current full line literature, please circle the number below.

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Shindaiwa's Premium Hand-Held Equipment

Buyers of premium hand-held power equipment will find a complete selection of commercial-grade products in **Shindaiwa's** latest 16-page catalog. Shindaiwa products — available through independent servicing dealers — represent the pinnacle in 2-cycle engine technology and deliver the highest power-to-weight ratios in the industry. The catalog details grass trimmers, including the T-230 and T-250 Series; edgers; brushcutters; hedge trimmers; blowers; water pumps; cut-off saws; and gas-powered chain saws headed by the 757, specifically designed for heavy-duty use. Learn about the training, service and support from Shindaiwa.



Circle 544 on reader service card



The Windows Revolution Hits the Industry

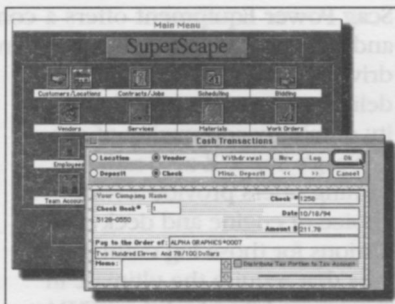
Well over 30 million PC users have discovered that computers don't have to be hard to use. They are revolting against DOS character-based applications and switching to Windows.

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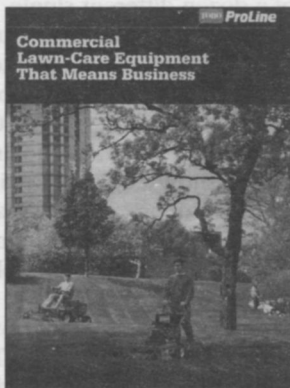
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Turfco's Aerator Converts to a Lawn or Sod Roller

Turfco Mfg. has a Sod Roller kit available for the Aerator that installs in less than 30 minutes by removing four bolts and one cover. Roller kit converts it into a sod or soil roller, excellent for installations and all season use. No longer will it sit idle during the summer months after the spring aeration is finished. The drum, which can be filled with water, other fluids or sand, adds roughly 100 pounds, making it an excellent roller for new sod or seeding. The roller drum is chain powered like the front drum for easy handling.

The roller kit fits all 20-inch Turfco Aerators. It is available as a kit or can be ordered complete as a lawn roller.

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New Fertilizer Technology From UHS

ESN precision controlled nitrogen from **United Horticultural Supply** represents the latest in scientific advancements that allow turf managers a vastly improved method of maintaining healthy, vibrant turf.

Much more than a slow-release fertilizer, ESN allows the release of nitrogen based entirely on temperature, the same temperature pattern that regulates a plant's growth and demands for nutrients.

The ESN technology reduces the potential for wasted nitrogen associated with other fertilizer products. With ESN's ability to precisely release nitrogen, the volume of clippings are greatly reduced while overall turf color and vigor improves.

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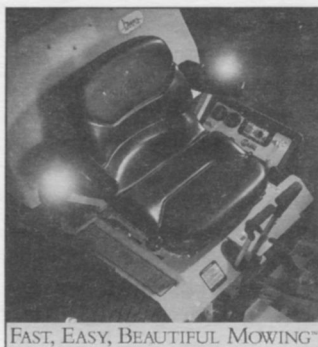


Walker Publishes New Product Line Brochure

Just off the press is a new, 12-page complete product line brochure for **Walker** mid-size riding mowers. All five tractor models and the range of interchangeable mower decks and implements are described along with product design features and benefits.

The brochure also includes complete product specifications, options and accessories.

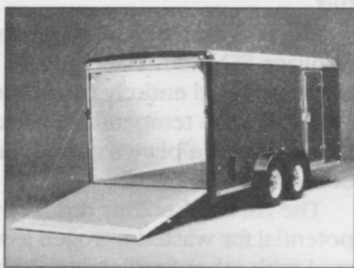
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Wells Cargo Enclosed Landscape Trailers

Wells Cargo manufactures a complete line of enclosed, steel utility trailers for landscape and lawn maintenance. The 100+ models are available in both Ball Hitch and 5th Wheels models. Lengths: 6 feet to 48 feet. Widths: 4 feet to 8 feet (plus Wide Body models). Payload is 1,320 pounds to 19,910 pounds.

Wells Cargo custom builds to specific requirements. Choose from an extensive list of interior and exterior options including rear ramp door, flow-through vents, pressure-treated floor/sidewalls and work benches. Model shown has 102-inch wide track axles with 6-foot 9-inch flat interior floor (no wheel boxes). Three-year warranty. Call toll-free: 800/348-7553. Fax: 219/264-5938. **Circle 552 on reader service card**



Walker Product Line Brochure



Just off the press is a new 12 page complete product line brochure for Walker mid-size riding mowers. All five tractor models and the range of interchangeable mower decks and implements are described along with product design features and benefits. The brochure also includes complete product specifications, options and accessories. **Circle 551 on reader service card**



Lawn & Landscape
MAINTENANCE

PESTICIDES IN THE URBAN ENVIRONMENT

PART 13

Personal Safety

Pesticide labels are the first source of information on application methods, protective clothing and safe handling procedures. Personal safety also requires plenty of common sense and careful preparation for the job at hand.

By Barbara G. Howell

Ed. Note: This is the final installment in our 13-part series on effectively using and promoting specialty pesticides in the urban environment.

SAFETY FIRST. Always read and follow label directions when applying any chemical. Use pesticides safely.

These cautions are familiar to the lawn and landscape manager. Each day, as thousands of pesticide treatments are made, applicators need to turn these general principles into specific actions.



PESTICIDES IN THE URBAN ENVIRONMENT

Safety managers at major companies explain that their employees undergo extensive training and must pass internal and state certification requirements before going solo into the field. This includes safe application, mixing, loading, storage and spill clean-up techniques.

Practically speaking, personal safety includes three major concerns: following label directions, wearing proper clothing and equipment and following safe handling and hygiene practices.

FOLLOW THE LABEL. Instructions on product labels specify the type of clothing and equipment required to protect workers from inhalation, ingestion and dermal contact from pesticides. The Environmental Protection Agency mandates that worker exposure be minimized and that labels advise workers of precautions.

A program by the Maryland Cooperative Extension Service defines "hazard" for an applicator as "the toxicity of the pesticides you handle and how often you are exposed to them." Because the toxicity of pesticides varies (as indicated by the terms Caution, Warning and Danger) and the likelihood of exposure varies, safety instructions on pesticide labels vary.

Many labels suggest "Applicators must wear

long-sleeved shirts and long pants, shoes, plus socks."

The customary applicator clothing and personal protective equipment (PPE) goes one step beyond these basic requirements. According to Dr. Roger Yeary, vice president for health, safety and environment with TruGreen/ChemLawn, standard PPE for applicators includes a long-sleeved shirt, long pants and water-resistant, chemical-resistant boots.

Some labels mandate additional protection for use in enclosed areas: "Use a respirator with either an organic vapor-removing cartridge with a prefilter approved for pesticides or a canister approved for pesticides. For exposure outdoors, use a dust/mist filtering respirator. Mixers and loaders must wear long-sleeved shirt and long pants, waterproof gloves, chemical resistant footwear plus socks, protective eyewear and a chemical-resistant apron when mixing or loading." The labels also require a respirator for mixing and loading.

Goggles or protective eyewear often are required. Phenoxy herbicides, for example, are particularly irritating and require eye protection.

The term "eye protection" is becoming more common on labels, replacing the term "goggles." Many applicators, particularly during warm weather, find goggles too hot and difficult to use, and their compliance is often sporadic.

"Eye protection" suggests that other equipment, such as safety glasses or safety shields, is acceptable. Often, compliance levels using these alternatives is better.

Company Safety Checklist

MANAGERS OF LAWN care or ornamental care companies should already know that pesticides are not the only potentially hazardous materials in the workplace. Fuels, some fertilizers and other shop chemicals must be handled with care and included in a safety program.

The Professional Lawn Care Association of America prepared this checklist to help managers survey their safety readiness:

- ✓ Know what you have in inventory. What are the hazards and storage requirements of each product? What precautions and protective equipment must be used? How should accidents or spills be handled?
- ✓ Set up a thorough safety training program to avoid problems, accidents and emergencies. Do your applicators get enough thorough safety training? Are they required to use proper protective clothing and equipment?

Are products stored properly? Are untrained people kept away from hazardous materials?

- ✓ Observe product restrictions. Are the products you use registered in your state and locality? Are "Restricted Use" products clearly identified? How to do DOT regulations affect your operations?
- ✓ Have an emergency plan. Have you posted emergency telephone numbers in the facility and in all vehicles? Can your employees handle emergencies properly? Does your local fire department know what hazardous materials you handle? Do you comply with community right-to-know regulations?
- ✓ Maintain good community relations. Are your employees prepared to answer questions and demonstrate a responsible level of knowledge to the public? Do you keep good records and file required reports on time? Do you follow safe waste disposal practices?

Some labels require even more protection. A label for diazinon wettable powder, for example, requires that applicators and other handlers wear "coveralls over short-sleeved shirt and short pants; waterproof gloves; chemical-resistant footwear plus socks; protective eyewear; chemical-resistant headgear for overhead exposure; chemical-resistant apron when cleaning equipment, mixing or loading; and a dust/mist filtering respirator."

Industry sources note that there is an increasing tendency for labels to require additional PPE. Even on products that have been in use for 30 years, PPE requirements are becoming more strict. Some observers suggest that registration and re-registration goes through EPA more quickly and smoothly with more worker protection listed on the label.

For the application of fertilizers, a training module provided by the Professional Lawn Care Association of America suggests using a disposable mask when filling and mixing, and wearing boots and gloves when making applications.

THE RIGHT STUFF. Lawn care applicators should select protective clothing and equipment with care. Below are some suggested guidelines provided by the PLCAA for selecting acceptable PPE for various tasks.

• *Boots*

Boots should be rubber or neoprene — not leather — and should be 10 to 12 inches high. They may be the type that are worn over the top of shoes or worn without shoes. Boots that leak should be replaced immediately. Boots should not be worn in a customer's home and should be decontaminated weekly with bleach or household ammonia.

• *Gloves*

Gloves must be made of neoprene, rubber or viton without any inside or outside parts made of absorbent cloth material. Gloves that leak or have become contaminated inside should be discarded immediately. Wash gloves with soap and water before removing them whenever possible. Otherwise, remove gloves exposed to pesticides in such a way as to avoid contact with skin. Decontaminate weekly by soaking in bleach or ammonia. Rinse thoroughly with water and dry.

• *Clothing*

Coveralls and aprons used for filling should be disposable or washable. Long-sleeved shirts, long pants or coveralls should be changed and washed or discarded immediately after contamination with a pesticide concentrate, or if they are wetted with drift, spills or leaks from defective hoses or



equipment. Washable coveralls should be laundered weekly. Disposable coveralls should be replaced weekly.

• *Eye Protection*

Use protective plastic goggles with a vented template or a full-face shield attached to a headgear to protect eyes from splashing while filling. Goggles are suggested for spraying tall trees.

• *Headgear*

A hard hat with washable, non-absorbent exterior surface or waterproof headgear such as a rain hat should be worn during filling or spraying trees and limbs overhead.

• *Respirators*

By definition, a respirator is a device that protects the wearer from inhaling toxic materials in the air. It must cover the nose and mouth and must filter out toxic material. It may be either an air purifying or air supplying design (with self-contained breathing apparatus). It must provide a good face seal to be effective.

Filters and cartridges have a limited effective period and should be changed periodically. Some

Proper safety clothing protects eyes, feet, hands and body from hazardous materials.

Photo: SafetyWear

PESTICIDES IN THE URBAN ENVIRONMENT

record keeping system should be used to note the times of use so that the recommended use period is not exceeded. Respirators worn by more than one person should be disinfected after each use.

Respirators require regular maintenance and fitting. Only respirators and cartridges with NIOSH approval should be used. Disposable masks used for dusts and mists are not the same as respirators.

A disposable cartridge respirator should be used when filling with powdered pesticides. While the wearing of a respirator may not be required by a label, experts suggest making one available to any employee who wishes to wear one. Employees should wear a dust or mist mask where the inhalation of drift cannot be avoided.

Store respirators where they will not be contaminated by pesticides.

COMMON SENSE HANDLING. Lawn service operators and applicators should always observe proper handling procedures when making pesticide applications. The first step is to always put on protective clothing and equipment.

Industry experts also agree that it is critical to review the label before opening the pesticide container, to become familiar with the mixing, use directions and caution warnings. Do not mix pesticides above the recommended rate.

It is easy to ingest material orally, so remember never to eat, smoke or chew gum when handling pesticides. Wash hands thoroughly before touching your face, putting on your gloves, going to the restroom or driving to a new site or home.

Several steps will ensure safe mixing:

- Mix in a designated, properly-designed, well-lit and well-ventilated area.
- Do not leave the spray tank unattended.
- Wear the proper eye protection when pouring concentrates from a container below your eye level.
- Measure accurately and mix only what can be used during an application or on a daily route.
- Rinse all measuring devices and put the rinse

(continued on page 34)

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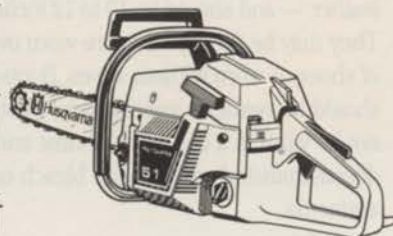


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Barricade Herbicide
THE PROFITABLE PERFORMER

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USE READER SERVICE #87

PESTICIDES IN THE URBAN ENVIRONMENT

(continued from page 32)

water into the spray tank. Mark and store these utensils in the pesticide storage area.

- Triple or power rinse the pesticide containers as you empty them.
- Wear clean clothes each work day.
- Remember to wash pesticide-application work clothing separately from your other laundry.
- Shower at the end of each work day.

Lawn service operators should also have a source of fresh water available by the service vehicle or at the mixing site. Always have a first aid kit and eye wash station at each mixing location and a first aid kit in each vehicle. Discourage applicators from wearing contact lenses when making pesticide applications because the lenses may entrap chemicals and may, in fact, absorb chemicals. This could result in sustained exposure even when

away from the workplace.

Operators should also use cholinesterase testing for employees exposed to pesticides containing cholinesterase inhibitors (including many commonly used insecticides such as Dursban, Diazinon, Oftanol, Sevin and Dylox). PLCAA recommends that pre-exposure levels be taken for those employees, and that they be tested every three weeks when those chemicals are used.

All employees working with pesticides should be familiar with the signs of poisoning due to cholinesterase inhibition or poisoning from accidental or intentional exposure to other pesticides.

The key to good personal safety practices is to be thorough and methodical. The potential for problems occurs when employees ignore label directions, dress inappropriately and handle pesticides in a cavalier manner. They should be trained to understand that the rush to be productive must be balanced with careful, orderly preparation for the work of the day. ■

The author is an industry consultant with Key Solutions, a division of Iris Sales & Solutions, Rocky River, Ohio.

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With Barricade you'll have more satisfied customers because Barricade doesn't stain. Tested on shoes, cedar fences, floor tiles, asphalt, carpet, and concrete, Barricade left no staining problems when used at recommended rates. This makes controlling crabgrass in high-pressure areas along curbs, drives, and fences easier. Barricade controls crabgrass and other tough weeds for a full season from a single application. Plus, it allows you to overseed in the fall. Barricade herbicide. It's the best way to clean up this spring. To receive your **FREE** brochure and product label, call 1-800-435-TURF (8873).



Barricade Herbicide
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USE READER SERVICE #88

Monitoring Landscape Moisture

To avoid over- or under-watering a landscape, rain shutoff devices and soil moisture sensors can help monitor individual sites and keep watering in check.

By Brian E. Vinchesi



Rain shutoff devices and soil moisture sensors can help prevent over- or under-watering of turf, which can save clients money.

MOISTURE SENSORS and rain shutoff devices are common components of today's landscape irrigation systems. Both are used to reduce water use and, hopefully, to save money for property owners.

Because it's perceived that the two products have similar qualities, contractors often ask "When should you use a moisture sensor?" or "When should you use a rain shutoff?" Typically, a contractor will then query, "Should they both be used on the same irrigation system?" or "Is it a choice of one or the other?"

Rain shutoffs are generally installed on an irrigation system to inhibit its operation once a predetermined amount of rainfall occurs. The point of shutoff can be adjusted on most systems from 1/8 of an inch to 1/2 inch of rain.

There are two kinds of rain shutoffs available at reasonable prices on today's market. One kind uses a catch-type mechanism to collect the water. Shutoffs of this type are made by Rain Bird, Water Conservation Systems and Weathermatic to name a few.

Other kinds use a cork-type disk that absorbs water by a wicking action. These shutoffs are marketed by Glen-Hilton Products and Toro, for example.

Rain shutoffs inhibit irrigation by breaking the connection on the common side of the valve wiring. Although the connection has been disrupted, the clock continues to operate. In fact, when using a basic irrigation system, it does not even know the system has shutoff because the signal is still being sent from the controller, but it never completes the circuit to the valve.

Moisture sensors, which track soil moisture, are more technical devices and come in different types ranging from tensiometers to gypsum blocks. The sensors can be programmed to shut down an irrigation system once soil moisture reaches a certain level, or they can

(continued on page 38)

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USE READER SERVICE #89

Landscape Moisture

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be set to turn on an irrigation system when soil moisture reaches a specific dryness.

MOISTURE DETECTION. Over the past several years the irrigation industry has seen many types of moisture sensors come and go with each sensing moisture a little differently.

Basic moisture sensors inhibit the performance of the zone valve within the irrigation system when a predetermined soil moisture level is attained. Some sensors are adjustable; an attractive option when customizing moisture sensors for a specific project site.

Most moisture sensors work on the principle of electrical conductivity. Consequently, the sensor is made of a porous material in which electrical resistance is measured. A signal is sent across wires embedded in the sensor. The wetter the material, the less electrical resistance. The dryer the porous material, the greater the electrical resistance.

Tensiometers measure the soil tension directly. They show how hard the root system of the plant material has to work to get moisture out of the soil. The tip of the tensiometer is also made of a porous material allowing water to flow in and out of the instrument from the neighboring soil. In this way, the tensiometer acts much like the plant root zone.

The installation and performance of individual moisture sensors will vary with each individual irrigation installation. As such, moisture sensors need to be specifically calibrated for each project. Failure to do so will result in inaccurate readings.

Calibration can be achieved through oven dry tests or comparisons to more sensitive measuring instruments such as a neutron probe or lysimeter. Because calibration is so important, adjustable sensors usually work better for landscape and turf irrigation systems. Subsequently, sensor accuracy can be fine-tuned for each installation, making calibration less critical.

Moisture sensors can be installed on individual control zones or in primary groups of control valves. The more variables an individual system has determines the number of sensors needed. For instance, sensors need to be installed based on different levels of sun exposure, types of topography, varying irrigation methods, landscape materials and soil types.

Sensors also need to be installed over the entire root zone of plant materials. For example, to adequately measure the soil moisture of a large deciduous tree, moisture sensors or tensiometers may need to be installed at depths of 12, 18 and 24 inches.

Moisture sensors are used in irrigation systems as a water management tool to apply the proper amount of water and to provide healthy plant material. Moisture sensors are also used as monitoring devices to automatically track soil moisture without influencing the operation of the irrigation system.

MAKING A CHOICE. How should a professional landscape contractor make the choice between a



Moisture meters are an important component to today's landscape irrigation systems.

moisture sensor and a rain shutoff device?

A moisture sensor is generally more expensive to install, requiring a greater degree of knowledge among both the system installer and manager. Sensors need to be installed properly, adjustments may be required and wire connections should be maintained. Additionally, the type and location of the sensor will determine if it has to be removed for the winter and installed and calibrated again in the spring.

High-end systems often call for moisture sensors because expensive plant material is specified and replacement is expensive. Moisture sensors may also be used in areas where water is either scarce, expensive or both.

Moisture sensors can typically keep soil moisture at optimum levels — not too much nor too little — or can be adjusted to maintain slightly less than desired levels to minimize water use. Additionally, moisture sensors are good for drip or subsurface irrigation systems for which visual confirmation of water application is not possible, yet proper soil moisture content remains extremely imperative.

In short, a soil moisture sensor can be used in any instance where the soil moisture needs to be monitored to prevent over- or under-watering of the landscape material.

Properly adjusted, the moisture sensor can also reduce the need for reprogramming of the irrigation controller. Because soil moisture levels are kept at a desired level, the controller can indefinitely operate on the same program resulting in significant labor savings, especially on larger systems.

Rain shutoffs are not too expensive — although some on the market are — and are relatively easy to install. Often, the hardest part of the installation is deciding where the sensor should be located, and whether the building architect will allow it on site.

The sensor needs to be installed in direct contact with rainfall, but in a spot where it's not influenced by irrigation water. Rain shutoffs can

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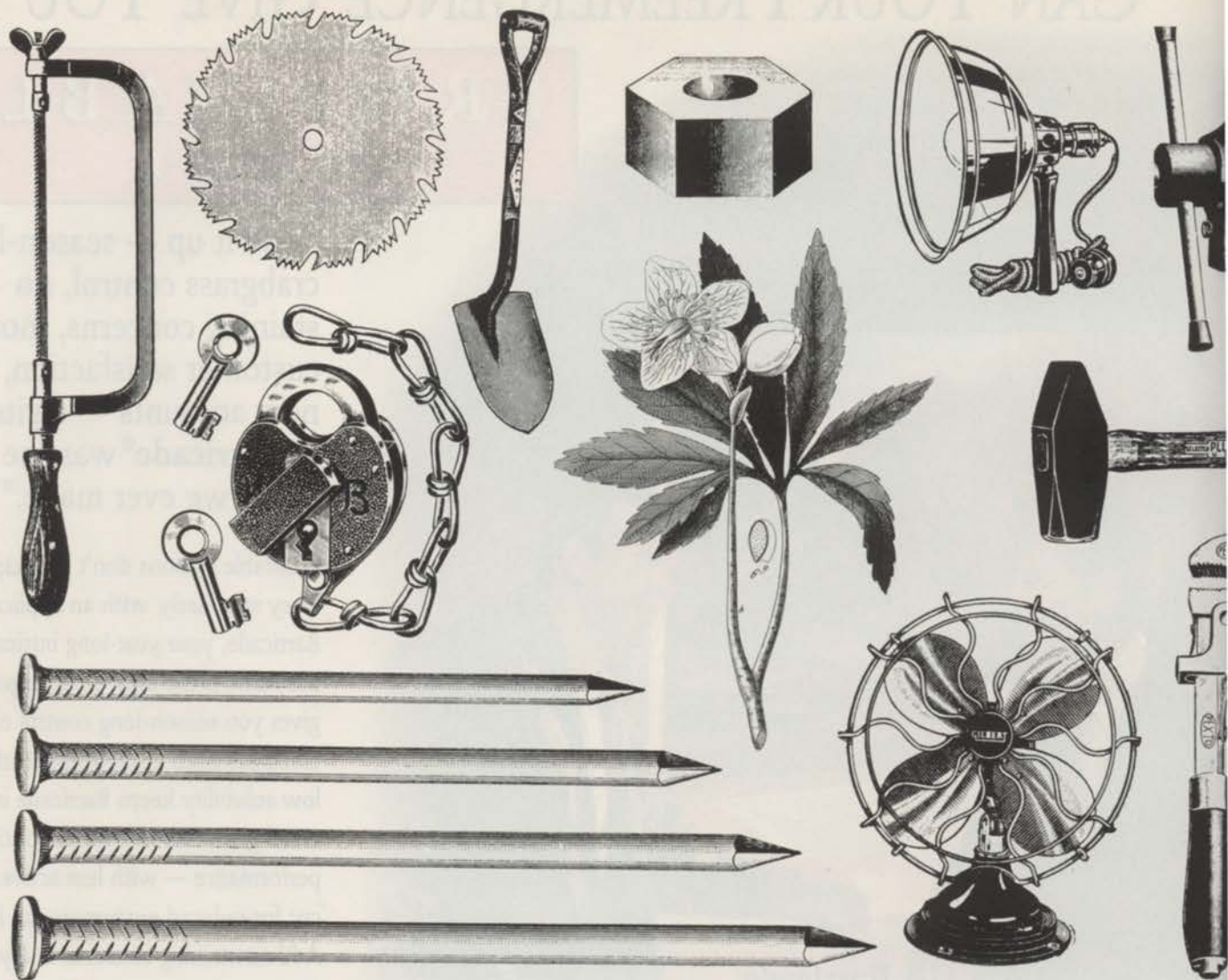
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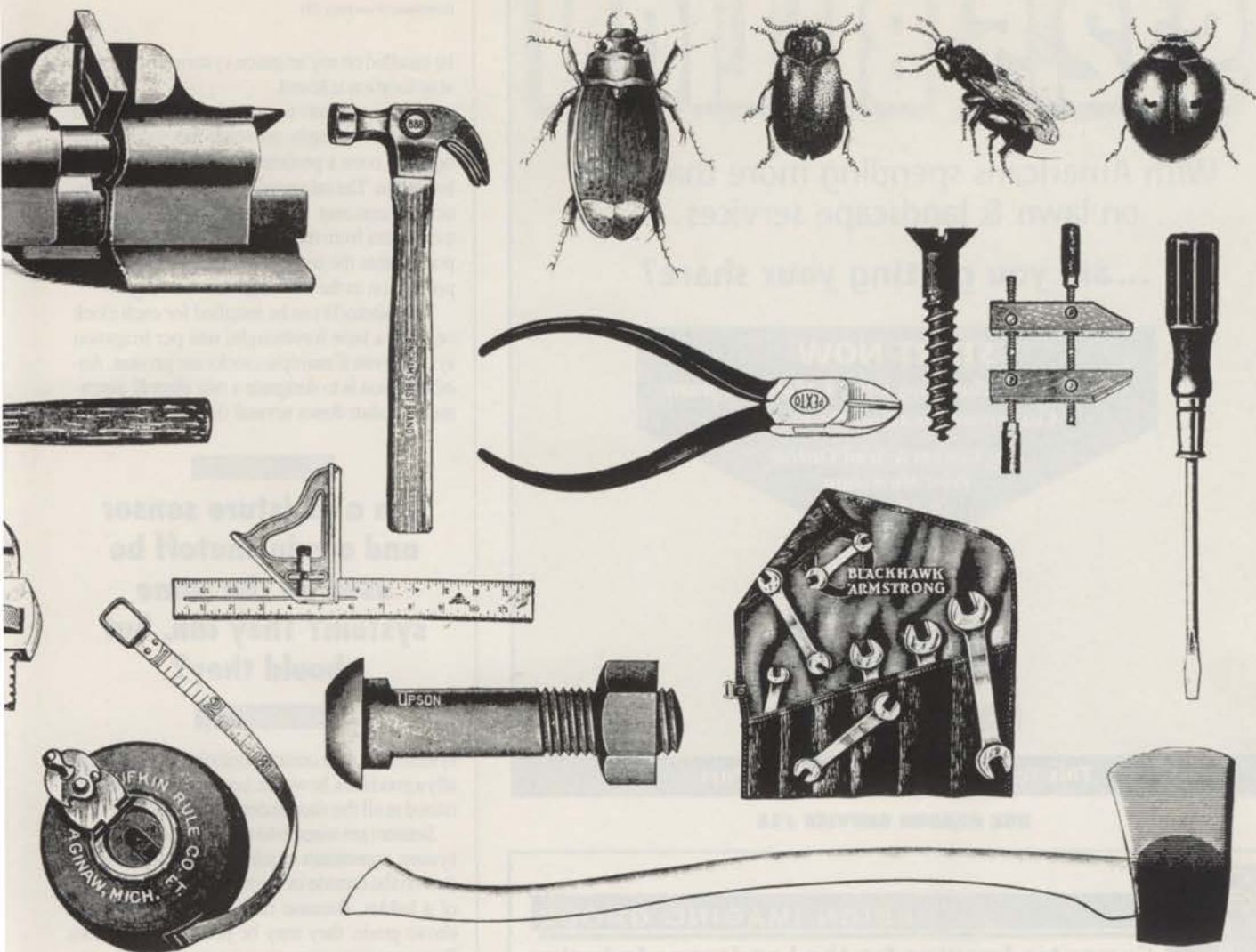
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Landscape Moisture

(continued from page 38)

be installed on any irrigation system, once a suitable location is found.

The rain shutoff has nothing to do with soil moisture. It simply prevents the valve from opening once a predetermined amount of rain has fallen. The rain sensor will not allow irrigation to continue until the collected moisture evaporates from the system. Therefore, it is important that the sensor also receive sunlight in proportion as the landscape it is serving.

Rain shutoffs can be installed for each clock or, with a little forethought, one per irrigation system even if multiple clocks are present. Another option is to designate a rain shutoff instrument to shut down several different irrigation

Can a moisture sensor and a rain shutoff be used on the same system? They can, but should they?

systems through central control. This is not usually a good idea, however, because it may not have rained at all the sites under central control.

Sensors are wired into the valve common wire system, sometimes requiring installation in conduit on the outside of the structure and/or the use of a ladder. Because rain sensors are installed above grade, they may be prone to vandalism. Proper precautions must be taken to prevent damage.

COMBINATION EFFORT? Can a moisture sensor and a rain shutoff be used on the same system? Of course they can, but should they?

Consider this example. An irrigation system is installed with a rain shutoff wired into the controllers to stop the irrigation cycle when 1/8 of an inch has fallen. In addition, the system has several sets of moisture sensors installed to control moisture. If the system is set to come on and the soil moisture is low, the sensor will let the system begin operating.

Suppose it begins to rain after the system has operated for 43 minutes. The system is operating on zone two and the rain shutoff inhibits operation of the system. Initially, the system should apply 1/4 of an inch of water in one application and the system is not scheduled to come on for two days. As a result, the system has only applied about half the intended water and it will not come on again for quite some time.

Because the rain shutoff does not know the soil moisture, it can prematurely shut down the system even if it needs water. Unfortunately, the lack of water will stress the landscape material.

The quick solution is to get rid of the rain shutoff and just use the moisture sensors. That

(continued on page 44)



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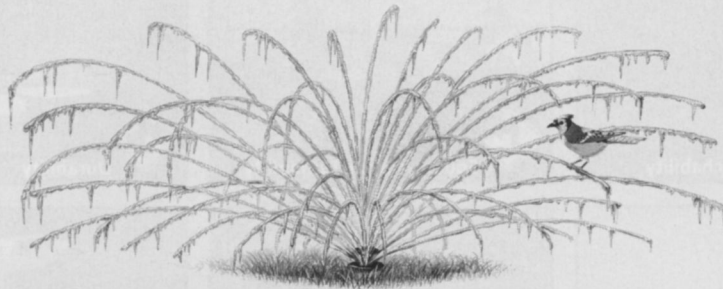
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Landscape Moisture

(continued from page 42)

way, the soil moisture will be kept at appropriate levels and the landscape material will never be stressed — the perfect and easy solution.

However, let's change the scenario to one in which the irrigation system is in a city park, in an area of the country where water is expensive. During a rainstorm a city official drives by the park and sees that the irrigation system is running. When he arrives at the office, he immediately calls the parks director and lets him know he doesn't like wasting water, as well as the taxpayers' money.

Or in another situation, suppose a city water official drives in the rain through a new subdivision and observes a number of irrigation systems

When using shutoffs and sensors in combination, be aware of systems with automatic controls.

running. At his next board meeting he motions that automatic irrigation systems be banned for wasting water and the board unanimously passes it.

The rain shutoff is an important device to make sure that the system doesn't operate when it's raining. But what about the original problem of not stressing the plant material? It's simple.

When installing soil moisture sensors, controllers should be programmed to provide frequent short waterings. This allows the moisture sensors to control the application. If multiple start times are used, the rain shutoff will inhibit the system if it has enough water. If the moisture sensor indicates that it needs water, then the irrigation system will operate.

When using rain shutoffs and moisture sensors in combination be aware of irrigation systems that also use a controller to automatically start a pump. The pump shouldn't be running when the system is not operating. In this situation, there are two different devices asking the system to remain off. Subsequently, the wiring to the pump needs to be studied carefully.

If this situation isn't handled properly, the moisture sensors may turn the irrigation and pump off. Then when it rains, a signal from the rain sensor turns the pump back on by sending another message. Qualified personnel need to be consulted when setting up a sophisticated on/off system for this type of installation.

In reality it is not a question of whether to use a rain shutoff or a moisture sensor. Both can and probably should be used on the same irrigation system. A good understanding of how each device operates and how each needs to be installed is required for proper operation. ■

The author is president of Irrigation Consulting & Engineering Inc., Pepperill, Mass.

MANAGEMENT GUIDE TO PGRS

If you're an innovative and savvy lawn and landscape contractor, you know what it takes to complete the job efficiently and within budget — not always an easy task. But today's contractors have a new plant growth management tool in their service arsenals to lend them a helping hand. On the following pages you'll read about the technical benefits of Primo as well as share the field experiences of your peers.

CIBA: MAKING A DIFFERENCE

Dear Lawn Care & Landscape Professional:

If you're reading this letter, you've probably already expressed interest in our exciting new product, Primo.[®] It regulates turf growth and can help you manage your business more productively and profitably. This booklet is meant to illustrate how Primo can help you achieve your goals.

Included in these pages are three supplements that appeared originally in *Lawn & Landscape Maintenance* magazine. We've got a technical introduction to plant growth regulators generally, and Primo specifically. We've got a detailed analysis of a typical property and how PGRs can maximize profitability on that property. We've got a map that shows where our field representatives are located.

Maybe most importantly, though, we've got a number of case histories from your peers. Many of them were skeptical about PGRs before they tried Primo. You'll see from their comments that the results they achieved with the product changed their minds.

We're excited about Primo, we're excited about the future of your industry and we're committed to you. Ours is the first PGR that can truly make a difference to lawn care and landscape professionals. We hope you feel the same way after reading this booklet.

Thank you for your interest in Ciba and Primo. We look forward to serving your needs.

Sincerely,
Bill Liles
Director
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ACHIEVING SUPERIOR TURF MANAGEMENT

Today's business environment calls for a professional business partner to help manage the intricacies of growing and maintaining quality turfgrass.



Turf growth management products - commonly referred to as plant growth regulators - can represent a healthy part of any turf program. Often misunderstood, PGRs are most commonly associated with regular use on hard-to-mow areas, low maintenance turf sections and remote traffic patterns such as airports, cemetery reserve acreage, highway medians and parks.

PGRs were once thought to be exorbitantly priced products that controlled turfgrass growth at the expense of color, consistency and density. The prevalent theory was that once applied, the landscape manager could remove himself from the care of the property while the turf was in a dormant state, so to speak.

Naturally, this runs contrary to the typical thought process of turfgrass managers whose job it is to provide healthy, thick-growing turf. While PGRs are currently more prevalent on golf courses, landscape contractors are checking out today's vastly improved growth management tools. In fact, nearly 20 percent of the respondents to a recent *Lawn & Landscape Maintenance* magazine survey said they were currently using PGRs on the properties they maintain.

Of the 20 percent, PGR use is fairly evenly divided between applications to entire turf areas and in edging and trimming situations. However, the majority of the survey's respondents said they use PGRs most often on bushes and shrubs.

According to the survey, 80 percent of those using PGRs are applying them to commercial/industrial properties, 35 percent to

residential turf, 15 percent on roadsides, 10 percent on golf courses and 5 percent for other uses.

Although aware of PGRs, just more than 80 percent of the survey's respondents said they weren't currently using the products. Why? Nearly 61 percent said they did not understand the benefits of PGRs, 32.9 percent said growth regulators were not applicable to their businesses, 21.1 percent were worried a PGR would reduce their mowing income and 11.8 percent said PGRs are too expensive for them.

Other respondents said they previously had a bad experience with yellowing and/or striping, and some claimed they didn't find currently available products effective.

What it boils down to is that most turf managers are depriving themselves of a natural, industry partner because of a general lack of understanding.

The vast turf market, estimated at more than 5 million residential acres in addition to about 9 million commercial, industrial and other non-residential acres, provides an enormous field of opportunity for managing turf growth.

By keeping an open mind, PGRs can be your most valuable company asset - and not just for low maintenance lawns. Today, PGRs are being used on both cool- and warm-season turf, fine ornamental turf and on both commercial and residential properties throughout the United States.

This treatment, used in conjunction with one or several other management tools such as regular pesticide applications, fertilization, mowing and trimming/edging services and irrigation, help maintain density and green color of the turf while slowing the growth of the turfgrass.

A NEW GENERATION. Today's PGR's - including the industry's newest, Primo, from Ciba Turf & Ornamental Products, Greensboro, N.C. - are generally not associated with discoloration. Discoloration was a downside risk that had to be overcome to prepare PGRs for acceptance in well-maintained lawns.

While the PGRs introduced in the 1950s, 1960s and 1970s struggled with control today's PGR products claim varying rates of growth reduction and control, and are becoming more widely accepted. Using Primo on highly managed turf, for instance, allows the grass to be kept in its best condition.

Ciba's Primo was commercially available one year ago, but the product itself has undergone nearly six years of field testing, both during product development and, since 1991, under the guidance of experimental use permits.

Since 1987, Ciba has had a dedicated U.S.-based turf and ornamental department. Although well-known products Triumph, Subdue and Banner were introduced in the late 1980s, Primo is considered a flagship product for Ciba's turf and ornamentals business.

While Primo is a non-food product requiring fewer tests and considerations by the U.S. Environmental Protection Agency, Ciba's corporate culture calls for exceeding EPA expectations and requirements to ensure thorough and exacting research.

Primo was thoroughly tested for nearly 10 years - including 22,000 different tests for U.S. EPA registration and 400 independent trials - before becoming commercially available. Among others, Primo was part of field dissipation testing, risk assessment examinations, acute toxicity studies, metabolism, animal tests and worker exposure studies.

In fact, since Primo is foliar absorbed research shows the PGR has virtually no chance to render soil ineffective or leach through to groundwater. Once it hits the soil, it's inactivated.

Even though the product is federally registered, research is ongoing. To understand Primo's influence on turfgrass water use,

additional research is investigating Primo-treated turfgrass under limiting and non-limiting moisture conditions. In addition, further research is being devoted to Primo's mode of action in cool- and warm-season turf.

Primo is considered a flexible product. As such, innovative turf managers can plan growth reduction from anywhere between a couple of days and eight weeks depending on how much product is applied. Less product equals less regulation for a shorter period of time. Conversely, more product provides more growth regulation over a longer period of time.

While Primo is capable of regulating turf growth to varying degrees, Ciba research advocates a standard rate promoting 50 percent growth reduction over a period of four to six weeks. To achieve 50 percent reduction, depending on the turf type, 1/4 of an ounce to 1 ounce per thousand square feet is recommended.

Primo is currently available only as a liquid, but Ciba expects to introduce a wettable powder in a water-soluble bag in the near future.

MANAGING GROWTH. PGRs are commonly distinguished as Type I or Type II. Type I, or mitotic toxicants, inhibit or suppress growth by stopping cell division and differentiation. These are generally the older PGRs.

Type II PGRs - with more sophisticated capabilities - temporarily reduce gibberellic acid biosynthesis. Gibberellic acid is a plant hormone that is responsible for cell elongation.

The application of Primo, for instance, results in a decrease in cellular elongation and internode length, but does not in any way stunt the growth of the plant in the long-term. Since it doesn't inhibit production of plant cells, the process can be reversed with an application of gibberellic acid.

Primo is absorbed directly into the leaf upon application. It requires no watering in and is rainfast within one hour. Others, however, may require irrigation or rain to activate absorption through the root system.

Primo begins affecting plants immediately, but the results are usually not apparent until approximately three to four days after application when new growth appears with shortened internodes. Also, a user will notice that the turfgrass appears to be growing more slowly than turfgrasses in untreated areas.

It's important to note that the turf is growing, although at a much slower rate. Used according to label directions, Primo manages turf growth, rather than eliminates growth.

Turf managers may notice a color change in grass treated with a PGR. With Primo, turfgrass color will appear to change when the PGR reduces cellular elongation. Although color differences vary depending on turfgrass species, a darker green color may be evident two to six weeks after an application.



Plant growth regulators are being adapted to a variety of uses in the professional landscape industry including trimming and edging around ornamental beds.

ACCEPTING THE RECYCLING CHALLENGE

In 1983, when the Primo molecule was discovered, no one was talking about a landfill crisis or water conservation efforts. Today, more than 26 states and the District of Columbia have enacted or are in the process of establishing legislation to limit the amount of materials dumped in traditional landfills.

It's estimated that half of the 16,400 U.S. landfills will be closed by the year 2000. Landscape waste accounts for nearly 20 percent of the trash in landfills. Legislation in individual states varies from a total ban to only limited acceptance of yard-waste materials.

This presents quite a challenge for mowing maintenance contractors whose job it is to remove clippings from residential and commercial turf. But ready or not, the responsibility for development, implementation and policing of recycling programs has landed square with individuals serving the green industry.

Consequently, reducing the amount of clippings being removed from properties - better yet, leaving clippings on the ground - falls to the discretion of the lawn and landscape contractor.

Short clippings - removing only one-third of the grass blade during each cut - deteriorate quickly and return nutrients to the soil. Although professional mowers have readily jumped on the grasscycling bandwagon, obviously, it's not the answer all of the time. Particularly

in the spring when grass grows at an incredible rate, beginning to cross over driveways and sidewalks. If it's not removed, the established grass can be choked.

Many firms are striving to do away with collecting and hauling grass clippings. PGRs can accomplish this task without significantly cutting into the number of times a property is mowed.

Applying a PGR, such as Primo, on a property after the first mowing, enables the grass to be mowed on a regular schedule, but results in fewer clippings, reduced labor costs and improved profit margins.

Whether charging customers on a per-cut or annual basis, Primo represents a tremendous cost savings for the mowing contractor. The turf growth management tool enables the contractor to control spring growth, as well as unwanted top growth. As a management tool it also gives contractors the opportunity to perform grasscycling or don't bag-it programs.

In fact, before Primo was debuted to the lawn and landscape industry, Ciba's experimental use permit enabled it to test the product in all market segments. It actively took part in Texas' Don't Bag-It program, using Primo on about 8 acres of residential and commercial turf. Similar programs were conducted in Dayton, Ohio, Greensboro, N.C., and Tulsa, Okla.



Mowing maintenance contractors must educate the consumer on managing turf growth to minimize clippings.

A PGR offers a real benefit for turf managers with commercial accounts, especially those which are bid on an annual basis. The cost of the application could be more than made up with faster mowings or a reduction in mowings.

For those functioning on a per-cut basis, a PGR treatment results in reduced clippings, speeding up the mowing cycle. Instead of decreasing the number of cuts, it gives the contractor the flexibility in scheduling mowings at a time when a crew may otherwise be confronted with its heaviest workload, peak grass growth and rainy day interruptions.

It can be particularly beneficial to those contractors using mulching mowers.

Contractors have also expressed a considerable amount of interest in Primo as an edger, as a service to homeowners planning extended summer vacations and as a aid to homeowners who prefer to mow their own lawn, but don't want to be stuck in their yard every weekend.

The color change generally results from the shift to more compact cells and less total leaf tissue; a darker green color of the maturing turfgrass leaves not removed by mowing; or by a more compact turf canopy.

Historically, PGRs have been associated with turf injury such as yellowing and leaf-tip bronzing. When combining standard application rates with a healthy turf foundation, Primo avoids these problems. However, if discoloration does occur, the effects

are temporary and last only about one week. Research concludes that turf stressed from extreme dry or wet weather conditions before an application is made may be subject to injury.

Primo doesn't decrease root mass or root length. In many instances, root mass increases, usually about four to six weeks after application. Greenhouse research at Texas A&M University on Tifway bermudagrass demonstrates Primo significantly increases root mass and contributes to longer roots. ■

IT'S ALL IN THE APPLICATION

Applied every four weeks, up to seven times a season, Primo provides 50 percent growth reduction for four to six weeks.

Primo can effectively manage the growth of bentgrass, Kentucky bluegrass, red fescue, tall fescue, annual and perennial ryegrass, bahiagrass, common and hybrid bermudagrass, centipedegrass, St. Augustinegrass and zoysiagrass.

Best results are achieved when PGRs are applied to high quality turf which receive adequate moisture and fertility. In fact, Primo is easily tank-mixed with nearly all currently available pesticides and fertilizers which eliminates two trips to one property and also reduces costly application expenses.

Primo should be applied after the first mowing of the season and then every four weeks up to seven times per season. Once growth slows in preparation for dormancy, Primo shouldn't be needed.

A late summer application may be desired when turfgrass growth increases during cooler temperatures after the hot, dry summer months.

The number of applications, the amount of Primo applied and the repetitions will vary depending on the turf species to

which it is applied. Most dramatic differences can be seen between cool- and warm-season turf-grasses. Generally, warm-season turfgrasses have been found to react faster and provide quicker green-up with a smaller dose of Primo than in cool-season turf.

It's also been found that Primo, at rates equal to or higher than the standard application rate, will provide seedhead suppression of hybrid bermudagrasses and partial seedhead suppression of common bermudagrass, bahiagrass and St. Augustinegrass. Applications should be made prior to seedhead formation.

In other turfgrasses, Primo can effectively reduce the height of the seedheads, but does not provide complete regulation of seedhead development. One exception, according to research, Primo does not effectively suppress annual bluegrass seedheads at standard application rates.

Color differences vary depending on turfgrass species. Since turfgrass color is a subjective evaluation, preferences differ between individuals.

Primo is absorbed by leaves and shoots, and activity from root absorption is non-existent. By following Ciba's recommended use rates, no plant growth regulating activity has been observed following soil applications. Products applied in a soil-drenching application are said to be inferior to foliar applications by a factor of at least 10.

Because Primo is an ester, it has the ability to move rapidly into the plant making additives completely unnecessary. If not fully absorbed into the leaf surface, the remaining material on the leaf surface is said to rapidly degrade with a half-life of less than four hours.



Primo is offered in conventional packaging – 1-qt. and 1-gallon containers – as well as closed systems.

Primo
New Turf Management Tool

Above-ground effects
Reduced clippings
Reduced mowing
Reduced cell elongation
More compact growth
Denser turf
Shorter stems

Application
Foliar absorbed
Rainfast in one hour
No mowing restrictions
Allows tank mixing
Grass must be actively growing
May be applied to all major turf species

Below-ground effects
Enhanced rooting
Improved drought tolerance

DON'T BAG IT.

Primo is foliar absorbed resulting in the temporary decrease in cellular elongation.

Although Primo can control turf growth from a couple of days to three months, Ciba recommends going for 50 percent reduction over a four- to six-week period. Best scenario: Make an application every four weeks for a 50 percent growth reduction.

The translocation of Primo occurs mainly from the stem to the apex to areas of formative plant growth where cellular elongation occurs. Primo is then responsible for inhibiting internode length in the plant.

Ciba reported no loss of activity when Primo was applied to turfgrass foliage and mowing was performed within one hour of application. Therefore, translocation to meristematic regions is relatively fast. Mowing varying turfgrasses does not affect its activity.

Primo is foliar absorbed within one hour. On turfgrasses whose meristems are at the base of the plant, Primo's effects are not as easily recognized since the shortened internodes are not visible.

Any Primo sprayed on the soil is inactivated. That is the reason why Primo has no residual or carryover activity in the soil. This feature allows Primo to be used in overseeding programs to promote the establishment of new seedlings.

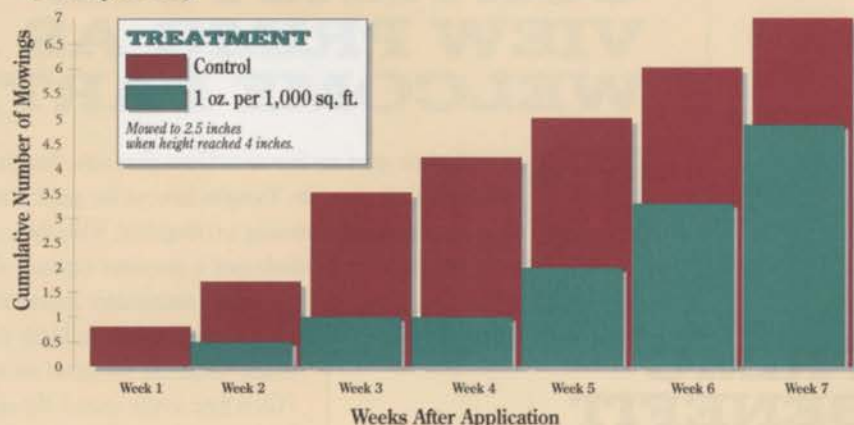
Leaching studies indicate that Primo has little chance to leach to groundwater, which means there are no cumbersome label restrictions.

Users will find that Primo takes on a personality of its own; adapting to each individual property. It's not at all like treating an insect or a weed. Instead, the turf manager must learn how it works in each setting and adapt the PGR application, along with pesticide and fertilizer treatments, to create an ideal turf setting. Irrigation timing may need to be adjusted to avoid overwatering slower-growing grass.

Water savings may be an added benefit of using Primo. By limiting shoot growth, evapotranspiration of the turfgrass may be reduced, resulting in less water usage. Because the turf manager is removing fewer clippings from the turf, more water stays in the ground where it is intended.

MOWING REDUCTION

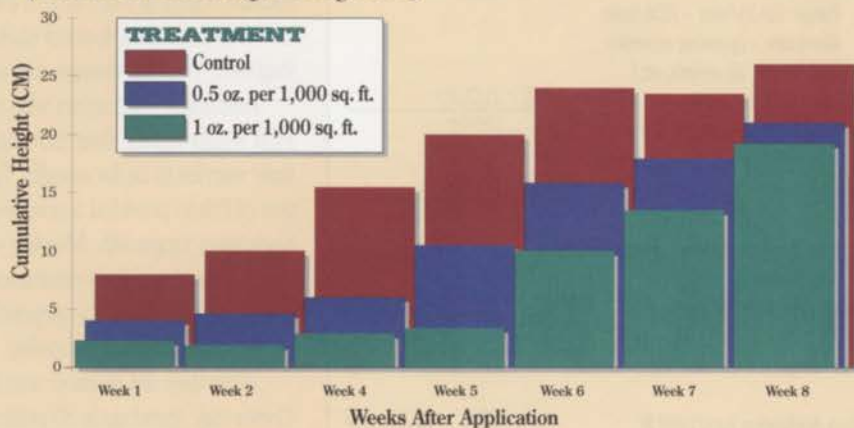
The effect of Primo 1E on number of mowings (Tall fescue)



Application rates can be adjusted to achieve the desired effect from the turfgrass.

LENGTH OF EFFECTIVENESS

(Baron Kentucky Bluegrass)



Primo can reduce turfgrass growth during the entire growing season giving contractors more flexibility

The addition of an additive or adjuvant is not needed with Primo because all formulations of Primo demonstrate similar efficacy either with or without an additive.

While its use in both cool- and warm-season grasses has brought tremendous satisfaction to a variety of lawn care and landscape contractors across the United States, operators in California and New York are still waiting for state registration. ■

LANDSCAPE CONTRACTORS VIEW PRIMO AS A WELCOME PARTNER

Those who have spent any time on turf have given some thought to reducing the time it takes to mow any given site. Thoughts have run the gamut from robotic mowers, dwarf turfgrasses and eliminating turf altogether. While these concepts have worked in isolated instances, they cannot be effectively used in prominent expanses of turf.

Today's maintenance contractor has a legitimate option not previously available on highly visible turf — the PGR. In fact, contractors can almost not afford to be without a PGR in their service arsenal. Not only are lawn and landscape contractors saddled with intense competition, labor difficulties and equipment breakdowns, they have to comply with environmental regulations surrounding yard-waste disposal. But compliance is made easier by the use of Primo in the landscape.

Unlike earlier PGRs, Primo is foliar absorbed. Primo's sophistication gives it the ability to temporarily reduce gibberellic acid biosynthesis. The application of Primo, for instance, results in a decrease in cellular elongation and internode length, but does not stunt a plant's growth in the long term. The PGR manages turf growth, at a slower rate.

Landscape contractors who originally feared a PGR would reduce their mowing schedules found their worries to be for naught. Typically, an application of Primo provided a several-day reprieve from aggressive topgrowth. Mowing schedules, however, didn't change much as contractors sent their crews out every 7 to 10 days — depending on the site — to perform the scheduled mowing.

What they did discover was increased efficiency. Crews may spend up to 50 percent less time on a property because double cuts, the raking of clippings, edging, trimming and overall cleanup was reduced or eliminated. Primo ultimately puts more money back into your pocket. Instead of two hours spent mowing an acre, it might be one hour.

This year, professionals are showing a renewed interest in PGRs. Read on to learn more.

PRIMO BENEFIT ANALYSIS

Required Variables

Size of Property in Acres	50	Acres
Number of Mowings Per Evaluation period	10	Mowings
Acres Per 10-Hour Day (Crew)	10	Acres
Labor Cost Per Crew Hour	= \$ 36	Per Hour
Equipment/Fixed and Variable	= \$ 36	Per Hour
Range: \$10.25/hour - \$250/hour (fixed rate + operating expenses such as gas, oil, repairs, etc.)		
Expenses (may be \$0.00)	= \$ 5,000	Lump Sum
Range: Highly variable (e.g. travel, taxes, subcontractors)		
Contingencies (may be \$0.00)	= \$ 3,600	Lump Sum
Range: 5% - 20% of Total Cost (e.g. lost time, guarantees, unique specifications)		
Overtime hours (total job)	12	Hours
Profit Margin in Decimals (e.g. 25% = 0.25)	.25	
Primo Application Rate/1,000 ft ²	.75	oz./1,000 ft ²
Number of Primo Applications	2	Applications
Cost Per Gallon of Primo	= \$ 325	
Application Cost Per Acre (may be \$0.00)	= \$ 0	
Additional % Increase in Productivity With Primo, in Decimals (optional) (e.g. 60% = .60)	.6	

(Sample Ciba analysis.)

PRIMO: FIELD REPORTS FROM THE FRONT

Today's business savvy landscapers are saving not only time but money on the properties they manage.

PRIMO PROMOTION CONVINCES NAYSAYERS



or Steve Leisring's customers, seeing is believing.

Leisring, vice president of operations for Greenlon Lawn Care Services, Cincinnati, Ohio, spent the better part of two years testing and retesting Primo, educating his technicians and his customers on the benefits of Primo and, perhaps most importantly, convincing the area's mowing maintenance firms that he was not out to eliminate their business.

"We're trying to educate all parties involved. We started with mowing contractors because we were initially concerned about their reaction; we do a lot of work with them," Leisring said. "We had some resistance then we took it to the property managers. They understood a little better. No one agreed to the idea right away, but most were willing to sit down and talk about it more."

Leisring and his technicians explain not that they're reducing mowing by 50 percent, but that they're reducing the amount of time spent mowing by 50 percent. "It's important to know the difference. A contractor may be on the property the same or close to the same number of times a season, but they won't spend as many hours or as much time on the property."

Greenlon provides lawn, tree and shrub care services for

their own clients as well as those of many area mowing firms. Although Greenlon has used Primo on both residential and commercial properties, Leisring thinks they will have more success with commercial customers.

"Managers of commercial properties are better able to identify maintenance costs. Using Primo truly comes down to a dollar and cents situation," he said.

Greenlon put out acres and acres of Primo "freebies" in 1993 to show property managers how it works. On some accounts, with the customer's permission, the firm established 2 by 2 feet check spots where Primo was not applied. If they had questions about the effectiveness of Primo, all they had to do was check the untreated patch of turf.

Greenlon applies Primo about three times a season at 3/4 of an ounce per 1,000 square feet and a cost of \$1.85 per 1,000 square feet. The result is about a 50 percent growth reduction.

The firm's application schedule is mid-April and the first week of June, followed by a third application the second or third week of September. On irrigated properties, a fourth application may be made sometime during the summer. Fifty percent of the time Primo is applied in combination with a fertilizer.

"Primo enhances the color of the turf. It reminds me a lot of putting down an iron product," Leisring said. "The color improves within five to seven days and holds for five to six weeks."

Although the staff of Greenlon is convinced of Primo's effectiveness, they're still taking steps to educate mowing contractors and property and purchasing managers.

"When we approach a mowing company our general rule is this: One cost of Primo is equal to one mowing cost," he said adding that Primo is not generally cost effective for the industry's low-ballers.

"Progressive mowing maintenance companies in the Cincinnati area are buying into the PGR concept," he said. "On the other hand, those being paid on a per cut basis are a little scared."

So along with promoting Primo to his commercial accounts in

Cincinnati, Leising has taken it upon himself to educate the contractors and property managers alike, about job costing.

"I've strongly encouraged property managers to switch to annual contracts. If a contractor is working from an annual budget, he can work with the property manager to reduce the overall cost," he said. "Otherwise, there is no incentive for the mowing company not to mow."

"Local cemeteries we're working with have realized that they've reduced mowing time, now we're helping them figure out man-hours and calculating related numbers. Then they'll have a base from which to do comparisons. Right now it's real subjective," he said.

When using Primo, Leising said, he has generally found that property managers subbing out mowing realize a net savings anywhere from 16 percent to 20 percent. Properties using in-house crews receive similar savings although exact numbers are harder to identify.

Mowing firms find Primo to be most beneficial on hard to mow properties, during the rainy season and when they're short on labor. Contractors dealing with clippings disposal will find Primo a godsend. For instance if a contractor was mowing every seven days and bagging the clippings, he can maintain that same seven-day schedule with Primo, but clippings aren't an issue.

"When I tell them they'll reduce their mowings, they're

A WINTER TURF GROWTH HABIT IN THE SUMMER?

Dealing with southern turf-grasses can be a challenge. So Roger Kadlac, technical support superintendent for Environmental Care Industries, Tampa, jumped on the opportunity to work with Primo three years ago.

The full-service landscape firm, bogged down with about 44 cuts per year on each of the properties it serves, relished the opportunity to create greater efficiencies yet maintain ECI's reputation of quality service.

"What we really wanted to do was reduce maintenance and cleanup," Kadlac said. "Now we incorporate Primo into turf sprays where mowing is a problem such as wet areas and jobs that tend to have a lot of topgrowth."

1993 was spent integrating Primo into the company's service schedule. While specific dollar savings aren't yet available, Kadlac said, one mowing was eliminated immediately after a typical application of Primo. Additionally, mowing efficiencies increased over time as the turf took on almost a winter growth habit.

"The cost of the material is about the cost of one mowing," he said. "We save in mowing frequency by mowing every 10 days and in fewer labor hours spent mowing, edging and cleaning up each and every property. The product pays for itself."

With Primo in its service arsenal, ECI reduced its mowings per property from 44 to 40. Additionally, instead of facing 5 inches of topgrowth in seven days workers now handle about 1/2 to 2 inches of topgrowth and reduced on-site cleanup time.

After this season, his second full year of using Primo, Kadlac anticipates more definitive data. To date, the product has been mainly used on St. Augustinegrass. That will change this year as ECI aggressively plans to integrate Primo on bermudagrass properties.

Kadlac applies Primo at a rate of 4/10 of an ounce to 1/2 of an ounce on St. Augustinegrass depending on the time of year, using more in the spring and less in the fall. His ideal schedule calls for applying Primo first in May targeting the heaviest period of general growth and topgrowth. In total, Primo is applied about two to three times a season with the final application coming in mid-September.

Primo is applied with a boom sprayer to ECI's commercial properties which average about 100,000 square feet in size.

"After missing the first mowing following an application, we generally try to stay on our traditional mowing schedule," Kadlac said.

Discoloration, often associated with the PGRs of old, hasn't materialized on St. Augus-

tinegrass. "The key is in the calibration," he said. "It can't be applied haphazardly. If it's set for 1/2 ounce that's what you'll get. But some companies aren't committed to making this (proper calibration) happen yet."

ECI usually incorporates iron or a very small amount of nitrogen with a Primo application because it keeps the iron levels up in the grass and translates into a nice, green color. In some tests, ECI found that applying up to 1 pound of nitrogen with Primo showed no dramatic differences in topgrowth. In this instance, "nitrogen gives you the color, but not the growth."

While Primo is now firmly entrenched at ECI, initially it wasn't so. It took field test after test to convince a skeptical operations manager.

"With most PGRs, quality is the major issue," Kadlac said. "We observed a winter habit of growth in the summer which is desirable. We also saw noticeably fewer disease problems because Primo gives the turf a winter cell wall. It's the same thing that happens to turf in the cool weather."

After convincing ECI employees of Primo's assets, the rest was easy.

"Most of our clients don't care how we maintain their property as long as the quality is there," Kadlac said.

obviously a little leery. But I recommend that if they reduce mowings by eight times over the course of a year, whatever profit they are missing should be factored into the mowings that are taking place."

For instance, if they perform 18 mowings instead of 26, contractors should adjust budgets to realize the same profit with eight fewer mowings. Those firms will gain the added benefit of using that same labor in other areas of the business.

Leisring believes whether you're mowing 26 times a year or 52 times a year, mowing should be treated as an annual contract.

"With an annual contract, all the property manager wants to know is that his annual cost is going down. If the average mowing was seven days before Primo, the average now is 10 days for 18 cuts. So instead of paying \$2,600, for instance, it's \$2,100. They get the same results, i.e., the grass is the same height, there's no unsightly clippings and so on. They also save \$500 or 19 percent off their mowing budget."

Leisring, who has been in the lawn maintenance business for 20 years, said he had always been disappointed in PGRs until Primo came along.

"Most PGRs called for stipulation after stipulation. I couldn't guarantee the customer it would work," he said. "With Primo, which is foliar absorbed, I feel reasonably comfortable it's always going to work."



Primo plant growth regulator has a number of uses in the landscape such as both large and small turf areas, edging around ornamental beds and difficult to reach sections.

OUTSMARTING THE FORCES OF NATURE

Don Pafford of Adsit Landscape Co., Memphis, Tenn., knows workers. He knows that on any given day, he can expect two to three of his 24-person work force to call off. So he's taken measures to keep his maintenance schedule on track. He started using Primo.

First experimenting with Primo in 1992, he increased its use to 30 acres of commercial property in 1993. And current plans call for Primo to be used on most all Adsit properties this year - mainly aggressively growing bermudagrasses - covering anything from

turf strips in parking lots to edging to entire turf areas on other properties.

"It's provided our workers with greater efficiency. They have time to take on more projects," Pafford said. "And our guys who do the mowing like Primo because no one likes to rake turf."

Adsit uses Primo in both highly visible areas the public walks and sees every day, as well as the hard to cut areas, hillsides and open terrain.

Pafford applies Primo once every four to six weeks beginning June 1 - that is if the bermudagrass is cooperating and has filled in by then. Primo is then applied up to three more times per season depending on the individual property. About 98 percent of his properties are mostly common bermudagrass or bermuda 419. The rest are zoysiagrass.

"The first year we noticed some discoloration and last year a little bronzing, but generally we've seen nothing but nice green turf," he said.

Primo is normally applied one day after a property has been cut. Its next cut comes about five to seven days later.

Pafford markets and uses Primo not as a tool to reduce mowing, but as a valuable method of staying caught up during inclement weather and/or equipment shortages and breakdowns.

"We don't just put it out and say we're not going to mow. We continue to cut the property once a week," he said. "When it rains, some companies get 10 days to two weeks behind. With Primo we never get behind even with people shortages and environmental conditions because the grass is growing at a reduced rate."

Adsit workers use only mulching mowers, so Primo has an added benefit in that it slows the growth of the grass preventing a buildup of topgrowth which leads to clogged mowers. Instead of mowing one property two and three times per visit, workers need only worry about one pass over the grass because they are only cutting off a fraction of the leaf surface each time they return to the property.

Landscape maintenance represents about 75 percent of Adsit's business. Thousands of man-hours are spent mowing each property which totals anywhere from 28 to 32 mowings per season. Adsit employs about four, three- to four-man crews to

handle the brunt of the mowing responsibilities.

And mowing crews are responsible for more than mowing. They also perform weeding, pruning, edging, trimming...the whole works.

Mulching mowers became a mainstay at Adsit several years ago when yard-waste disposal became a controversial issue. The mulchers performed well for Adsit crews, but have stepped up since Primo has been around.

SELLING GREEN, IT'S THE NAME OF THE GAME

Green is what sells, so Don Campbell will try anything to give his customers green grass and increased satisfaction.

Campbell, owner of Don's Lawn Maintenance, the full-service firm based in Wimauma, Fla., just south of Tampa, began using Primo last year on nearly all accounts. That amounts to 1,000 cop and condominium jobs covering about 125 acres of mostly bermudagrass and some St. Augustinegrass.

"During the summer our growth rate is so fast, in most cases

I have to hire additional help to get through the primary growth period," Campbell said. "But last summer, after using Primo, I didn't have to hire additional help."

Instead, Campbell's crews survived the summer without any seasonal labor and a more manageable workload, performing the kind of mowing previously only thought of in the winter months - non-collection. Consequently, his workers were happy and his customers were pleased with the improved appearance of the turf.

"I had customers come up to me and say the grass looked good, greener and tighter than in the past," Campbell said. "It had to be a result of the Primo because that was the only thing I changed in my routine."

In 1992, Campbell employed 12



Beauty is in the eye of the beholder. Lawn and landscape professionals who are using Primo have noticed an increase in turf density, a greener color and significantly less topgrowth. Their customers have noticed too.

FULL-STRENGTH PRIMO REDUCES MOWING BURDEN

Using Primo primarily on AT & T switching stations, Ken Wentland, production superintendent for Lied's Nursery Co., Sussex, Wis., applies the PGR at full strength.

By contract, the seven- to eight-acre low-traffic sites are only to be mowed twice a month. On that schedule, every time a Lied's crew showed up to mow the turf, they had to double mow, rake and pick up clippings from the properties. It wasn't real fun, according to Wentland.

But applying Primo at 1 ounce per 1,000 square feet enabled Lied's to save a tremendous amount of time.

"With Primo things went exceptionally well," he said. "It just saved us a lot of time. We really found out how well it worked when a worker miscalibrated an application before it was sprayed in a ditch. As a result, that one ditch took him three times as long to mow as

anything else. We all learned a lesson."

One commercial crew of three to four handles the switching sites. That hasn't changed since Primo entered the picture, but the crew gained greater efficiencies in their work.

When evaluating the cost of the material, Wentland said, they figured they would have had to cut mowings back by about three to break-even. In reality it saved the firm four and a half to five mowings.

Primo was applied once in the late spring and once in the early fall.

"It really helped us with the spring flush of growth. Interestingly, it definitely had a strong color enhancement. You could see the difference almost instantly. It's a much darker, more consistent green color."

Lied's properties are predominantly bluegrass with a little fine fescue and ryegrass thrown in here and there.

Lied's applied Primo with a broadleaf herbicide. Although they didn't include a fertilizer in the mix, a granular fertilizer was applied shortly after a Primo application.

In this its second year of use, Wentland expects to increase the number of commercial sites it's used on. Factors that will help determine which accounts to use Primo on include site traffic, the visibility of the site and how intensely it's managed. For instance, if it's a site where a crew is always there because the customer wants to see people, it probably won't be used. All other sites are likely candidates, however.

Line trimming is another important use Wentland found for Primo. Trimming along fences and other difficult to reach areas is a tedious job for a contractor. With an application of Primo, however, trimming need only be done every month or so.

full-time and 5 seasonal workers. Handling the same workload in 1993, it wasn't necessary to hire any seasonal help. The difference: Primo.

Averaging a 40-hour work week, five seasonal employees equaled 200 hours a week for 12 weeks in 1992. That's 2,400 man-hours spent mowing and related tasks. And that's 2,400 hours he didn't have to job-out in 1993.

"My advantage is staying on a weekly schedule, whereas most people - including me prior to Primo - seldom stayed on a weekly schedule through the growing season," he said. "Delays such as rain, heavy growth and grass collection turns into a 10-day cycle. That calls for customer dissatisfaction."

Campbell applies his first application, at a rate of 3/4 of an ounce per 1,000 square feet, in mid-March and then applications every six weeks through August. "I like to stretch it out as much as I can. I usually get about four weeks out of an application with a little bit of grow-out over the last two weeks," he said.

With the lateral growth habit of bermudagrass the grass has a tendency to become matty and thick, in need of regular de-thatching. Over heavy growth periods, Campbell received complaints because the grass turned brown after every mowing. Last year, he gained 30 days before receiving such a complaint

because the grass was smooth and green.

Campbell generally applies Primo with a preemergent herbicide. The combination has made his preemergent more effective as well. Previously, the company applied a minimum of two broadcast applications of a herbicide followed by necessary spot spraying. Now, he generally sticks to spot spraying.

Overall, he hasn't had any problems explaining the use of the plant growth regulator to his customers which pay a monthly average on an annualized account.

"I have a handful of people that have shown resistance to anything that regulates growth," Campbell said. "But I've been in the industry long enough that most of my clients trust me. If I say it's good, they'll go along with it." ■

For those interested, Ciba offers a computer disk containing a "Primo Benefit Analysis" program to help determine job costs. To obtain your copy, contact Ciba directly or your area Ciba representative found on page eight of this insert.

CIBA TURF & ORNAMENTAL PRODUCTS

P.O. Box 18300
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PRIMO: MAKING THE GRADE

Competing in the 1990s is rewarding yet challenging for most lawn and landscape contractors. Landscaping is a business and as such contractors must price services to earn a profit.

Performing the actual landscape service is just part of the job. Contractors today must allow for marketing, bidding, estimating, customer service and follow-up not to mention the landscape job itself. Consequently, maintenance contractors can not afford to be without a PGR in their service arsenal.

Compliance with yard-waste regulations oftentimes requires changing a 30-year-old mind-set that grass clippings have to be removed from a property to achieve proper turf maintenance. This trend is made easier by the use of Primo in the landscape. The product's sophistication gives Primo the ability to temporarily reduce gibberellic acid biosynthesis in turf. Gibberellic acid is the plant hormone responsible for cell elongation. Primo simply decreases cellular elongation and miniaturizes the plant cells. This results in a more compact plant with less leaf tissue.

Its primary features include:

- Primo is absorbed directly into the leaf upon application. It requires no watering in and is rainfast within one hour.
- It's important to note that the turf is growing, although it's producing less leaf tissue. Used according to label directions, Primo *manages* turf growth, rather than eliminates growth.
- Foliar absorption is the key to Primo. The plant growth regulator will control turf growth only in those areas desired by the contractor.
- The translocation of Primo occurs mainly from the stem to the apex to areas of formative plant growth where cellular elongation occurs.
- Ciba reports no loss of activity when Primo was applied to turfgrass foliage and mowing was performed within one hour of application.
- Primo is easily tank-mixed with nearly all currently available pesticides and fertilizers which eliminates two trips to one property, and also reduces costly application expenses.
- Its mode of absorption renders the product inactive once it hits the soil. Primo has no residual or carryover activity in the soil, and has virtually no chance to leach through to the groundwater.
- Ciba research shows 50 percent growth reduction over a period of four to six weeks. Depending on the turf type and fertilization program, 1/4 of an ounce to 1 ounce per 1,000 square feet is recommended.
- The number of applications, the amount of Primo applied and the repetitions will vary depending on the turf species to which it is applied.

Lawn and landscape contractors have incorporated Primo into their maintenance schedules to achieve greater overall efficiencies in both people and general business operations. Read the following case studies to see how it has performed for some of the industry's leading contractors.



GAINING ECONOMIES FROM PRIMO

Primo gives lawn and landscape contractors flexibility in the often unpredictable business of maintaining landscapes.

EFFICIENT MOWING CREATES LABOR SAVINGS

Communications is one of the keys to the successful incorporation of Primo into a lawn and landscape maintenance program.

Convincing employees that the PGR will curtail certain aspects of labor is the easy part. Conveying to customers that they're not getting ripped off is more difficult.

"Even though it's a good PGR, our problem is how do we use it and convince our customers that we don't owe them any money. That's a challenge," said Dave Hanson, manager of technical support for Environmental Care Industries, Calabasas, Calif. "On sites where Primo has been used, we'll devote our efforts to getting other projects done on site."

For instance, if ECI takes on a job in mid-summer and the weeds are growing out of control or the trees need trimming, they'll apply Primo to manage turf growth and spend the extra labor time getting the entire property in shape.

ECI, based in California, operates and maintains commercial sites in eight states

including Florida where Primo is currently being used to handle the aggressive growth habit of St. Augustinegrass, in particular. Hanson has been experimenting with Primo since 1991.

"The degree of acceptance in our branches has varied. Some have taken more advantage of Primo than others," he said. "Any new product has a learning curve that you have to work through."

Primo is used in a number of ways on a variety of ECI-maintained commercial properties and golf courses. The Florida branch office, for instance, selects the jobs where Primo can do the most benefit. And then, only after the property manager has been informed about the features of Primo.

"When we do select a site, we tell our clients we've done extensive testing on Primo and it's probably the best PGR available today in terms of compatibility," Hanson said, adding that ECI is actively working toward incorporating Primo into more of its job sites.

ECI client sites selected for Primo applications were determined by how it would fit in the current maintenance program, customer communications and so on.

"Property managers are concerned about the end result. If it looks good and it's cost competitive, that's what they're interested in," he said.



Previously, PGRs weren't commonly used on home lawns because of the potential for striping. Today's consumers like Primo's even growth pattern.

SPRING APPLICATION TACKLES TRADITIONAL SURGE GROWTH

Chris Randall, manager for the commercial maintenance division of Bland Landscaping, Cary, N.C., liked the results Primo showed on low-maintenance turf so it didn't take much to convince him to give the plant growth regulator a shot on some Class A office properties - the bread and butter of this southern landscape firm.

Following a good experience in 1992 when using Primo as an experimental use permit, Randall decided to use Primo on some high maintenance properties in 1993, but only on a small scale - less than an acre. Still satisfied, Randall used Primo extensively this year, increasing use to six or seven acres.

"I've been following Primo for a long time. We had some good results on low maintenance turf so it was natural to try it on more visible turf," Randall said. "We haven't seen any color loss and received five to six weeks of control. We went from heavy raking on each property to no raking at all."

Although Bland provides a full-service program to his customers, the firm chose to initiate Primo on the properties of two long-time commercial clients.

"They (clients) weren't new to us. Most of the property managers we deal with aren't involved in the landscape, we take that away from them. They trust us to do what is needed," he said. "We cut our labor use on both projects."

Randall applied Primo once around the beginning of April, but not before his crews had mowed the properties eight times over two months. The application was timed to control



Primo is offered in conventional packaging — 1-quart and 1-gallon containers.

the growth surge fescue turf-types show at the end of May.

"Primo took care of the problem for us at the recommended rate. We still have to mow the grass the same number of times, but we don't have to rake," Randall said. After five to six weeks, crews began raking again.

In all, Bland crews generally mow most properties 42 times a year. They bag the small areas and bag, rake or blow the large properties - whatever works.

One, five-man crew is dedicated to the 4-acre property on the I-40 corridor in Durham where Primo was tested. The on-site crew handles everything but the flowers. One spray technician is responsible for nearly all the pesticide application for the firm.

Primo was worked into Bland's traditional preemergent program scheduled for April because of the good mixability and the savings

in labor by combining two applications into one.

That was just the beginning of the savings.

While the crew stuck to a once every seven-day mowing schedule, the raking of the clippings was minimized. "We mow every seven days in the early spring, but we do a ton of raking," he said. "We cut our labor costs - whether it be from raking or bagging - by 12 to 13 percent or an hour per crew a week."

Since Randall's been in business, he's been interested in what PGRs could do for a business. While he claims he wasn't a skeptic, he was still surprised by Primo's performance.

"The control and coloring both surprised me. They outperformed everything we've used in the past," Randall said. "We didn't see yellowing or thinning. If anything, the grass got greener. The clients didn't notice anything unusual."

Randall's current plans call for expanding Primo use next year. By how much depends on Mother Nature. For instance if North Carolina has a wet spring, Bland Landscape will use it more.

Whether the use of Primo will be expanded to non-commercial sites or even non-irrigated properties is still up for debate.

"Money's not the issue," Randall said. "It's an expensive product and some are turned off by it but, used when needed, it's worth the cost."

While he hasn't tapped the residential market, it's an area he hopes to pursue in the future. "From a homeowner perspective, I think it would be the best selling thing ever, particularly those who don't like to repeatedly cut the grass."

Historically, PGRs caused extensive discoloration, a problem not encountered with Primo. However, to avoid any speculation about turf blemishes, ECI combines Primo with a micronutrient product to mask any potential color problem. In addition to micronutrients, ECI has tank-mixed Primo with insecticides.

Hanson stresses that Primo doesn't eliminate mowing, but it enables workers to mow faster and more efficiently. In some instances, mowing schedules can be cut back from seven to 10 days, but more importantly, Primo provides crews the opportunity to be more labor smart and management intensive.

Not only do the crews look good, but their properties do too. Turf growth is curtailed, decreasing chances of shaggy appearances and overall residual clippings.

Hanson is pleased with the year-round potential of Primo. He noted the fall application when the PGR virtually "stopped growth in its tracks."

"We saw good results when applying Primo in the transition period before dormancy," he said. When applied in September/October it stopped turf growth for four to five weeks.

On golf courses, Primo improved the bermudagrass making it more dense, as well as improved the playability of the ball by making the turf stand up.

Hanson expects Primo use to increase at ECI branches next year, particularly in Texas and Georgia.

FIGHTING FIRE WITH FIRE

The use of Primo may be more widespread on golf courses, but superintendent Don Sweda said he thinks it's a sure thing in residential lawn maintenance.

For the last three years Sweda, superintendent at Columbia Hills Country Club, Columbia Station, Ohio, has familiarized himself with Primo. Originally starting on a 1/2-acre fairway, the results were impressive enough to boost the program to 26 acres this year, applying Primo in the spring, summer and fall on 18 holes.

"I started some experiments on my own under green conditions, including an overseeding program for the rough," Sweda said.

The purpose of using Primo in overseeding golf or non-golf turf is to try and lessen competition for new developing seed. "The nice thing with Primo is you can apply it at the time of seeding and it won't affect the seed," he said.

But what his employees - and some members - notice most is more efficient time management and a more playable turf. The same efficiencies and aesthetics apply to non-golf turf as well.

"Every landscaper should buy a gallon, give it a try and see the results for himself," Sweda said. "He'll save on labor, reduce clippings and have a pretty nice looking turf. I really believe it's the way to go for turf maintenance."

At Columbia Hills, five applications were put

down over a five-month period beginning in May with three to four weeks between applications.

"My guys were generally the best indicator of when we needed to put down another application," Sweda said. "As the clippings built up and they were dumping more baskets they began to grumble."

Sweda employs two workers who mow 18 holes every three days. Average time: four hours with two riding mowers - a Jacobsen and a Toro.

Columbia Hills posted a 20 percent reduction in mowing time and related clipping removal. The labor savings more than compensated for the price of the product.

"In addition, the overall beautification justified the move," he said. "I truly believe we've experienced less disease because the turf is healthier and better able to ward off disease. Primo reduces the load the plant had to go through during the hot summer months."

The result: more controlled growth and less stress on the plant. Additionally, Sweda said, he noticed that fewer clippings on the fairway helped to eliminate some of the heat naturally generated by turf.



Primo helps manage turf in hard to maintain areas such as street medians.

PRIMO: A RESIDENTIAL SUCCESS IN NEBRASKA

Ted Schafersman, owner of The 5th Season, Fremont, Neb., sold Primo to his residential customers this year as an additional service offering. The response was good – more than 300, or 1/10th, of his customers requested the application.

5th Season, which operates in small cities within a 75-mile

radius of its headquarters, targeted Primo as the weapon to help manage the flush of growth Nebraska natives come to dread every year. That cool, moist spring when plants grow like there's no tomorrow, and mowing takes place every fourth day.

"Most people we experimented with had a favorable reaction to it, especially in anticipation of heavy mowing. We targeted these properties for a Primo application to slow growth down. We couldn't wait to get out and see it," Schafersman said. "It has a bright future. The fact that most landfills won't accept yard waste or clippings is one good reason, but it also gives you a cushion if you can't get out and mow because of rain or other obstacle."

Schafersman, who maintains between 4,000 and 5,000

COMING OUT AHEAD OF THE PACK WITH PRIMO

ProLawn ProScape deals mainly with high visibility turf in and around commercial properties in Cincinnati, Ohio. This market segment requires not only labor efficiencies, but cost-controls to meet the competitive bidding structure.

Though the landscape business is tricky at times, Clayton Sheeler, vice president of operations, thinks he found a product to help his properties gain an advantage. ProLawn ProScape applied Primo to 75 percent of its commercial properties, averaging nearly one acre in size, in the beginning of May.

"It worked well for a six- to eight-week period and by the end of June it started to wear

off," Sheeler said. "It definitely suppressed turf growth so we could mow every week to 9 days."

Sheeler added that the turf thinned out slightly, eliminating the need for double-cutting. Any discoloration he attributed to a drought in May and June. In some instances, liquid iron was mixed in with Primo to boost color.

In other cases, a broadleaf herbicide was tank mixed with Primo to save on labor costs associated with pesticide applications.

"We got the extra service out of it," he said. "We don't charge the customer for it, rather we eat the cost of the material, but we save enough on the back end and come out ahead."

ProLawn ProScape, a firm handling only

commercial properties, recognized increased efficiencies when Primo was incorporated into its service program. Sheeler estimated his crews saved 20 percent on its mowing labor this year.

"We have a contract to keep the grass cut. The contract price doesn't change if it takes us two hours instead of two and a half hours to cut," Sheeler said.

Sheeler's crews liked it so much they wanted to reapply Primo in June after the first application wore off.

"We thought about applying Primo again in June, but typically July and August are our two driest months. It made more sense to do it in September," Sheeler said.

In general, ProLawn ProScape crews bag very little grass except on some properties requiring lots of trimming. Instead, crews are trained to mow and blow clippings away from beds and curbs.

ProLawn ProScape previously used other PGRs with fairly good response, but said the results from Primo were better than they had ever seen. They experienced little striping, if any, which was attributed to faulty application techniques rather than the product itself.

Sheeler plans to increase the amount of Primo his crews use next year.

"I'd like to use it on a few ornamentals, such as ground covers," he said.



Because it is foliar absorbed, Primo has no residual or carryover activity in the soil. Leaching studies indicate that Primo has little chance to leach to groundwater.

accounts, asked his customers to sign up for the program upfront; coinciding with the renewal of annual contracts. He charged \$35 to \$40 an application based on a 7,000 square-foot yard; similar to what he charges for a pesticide or fertilizer application.

"I was upfront with them, telling customers it would reduce mowing and clippings but not eliminate them," he said. "80 percent of those who accepted were residential. The commercial end was more leery of it, but I intend to get more positive communication going there."

While Primo performed to expectations on the Nebraska bluegrass, an unusually dry season brought most mowing activities to a standstill and didn't allow the firm to experiment with a second application. Most applications of Primo were applied in mid-April.

"Our market is far enough North that our growing season is like a roller coaster," he said. "We usually have a cool, wet spring in which grass grows quite fast. Then as we approach mid-June into July we get dry and hot and the grass doesn't grow as fast."

Schafersman's firm isn't in the mowing business, but his crews work closely with the homeowner and mowing contractors on mowing issues and product choices.

"The majority of homeowners are conditioned to bag clippings," he said. "It's a hard transition to get them to mulch because they don't want to mow more often. It's a very different story with a plant growth regulator."

Once the homeowner understands the PGR concept, Schafersman finds himself trying to explain the relationship between fertilizers, which make the grass grow, and PGRs, which slow it down.

As for the mowing firms The 5th Season subcontracts to perform mowing services, Schafersman said, more communication is needed to avoid any misunderstanding of the product's purpose in the landscape.

The 5th Season credits its customer loyalty for its success in introducing new maintenance concepts.

"We do a lot of communication things that make for a friendlier atmosphere," he said adding that the firm calls its customers before servicing their properties so there's no miscommunication or interference with personal activities.

"We'll continue to actively sell Primo," Schafersman said. "I



Primo is often applied in combination with a pesticide or fertilizer program.

feel good about the product."

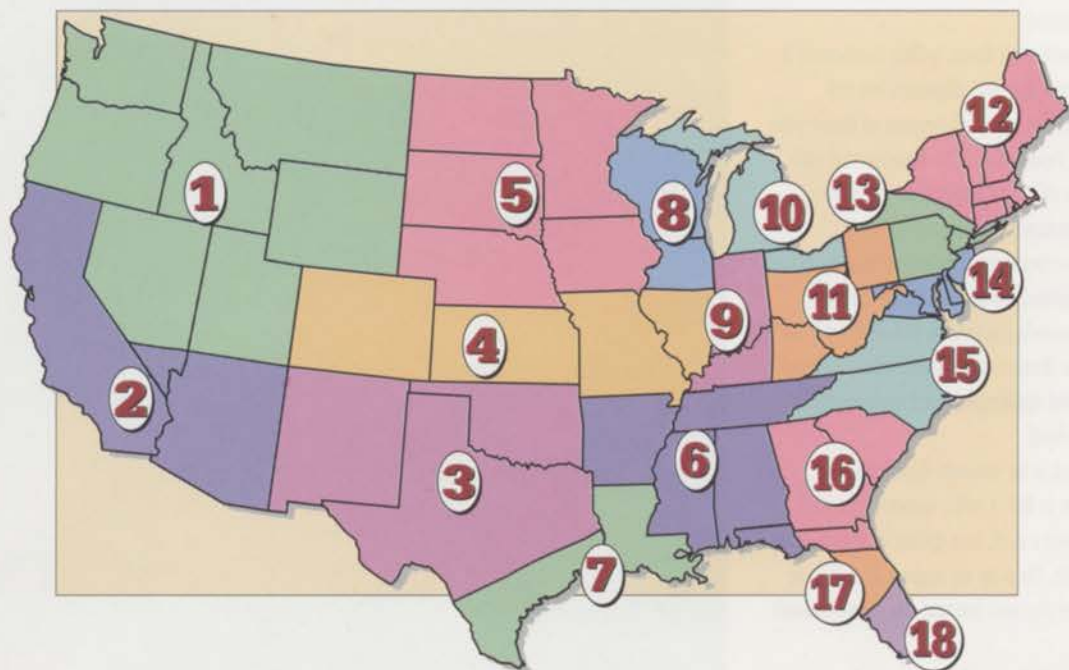
The 5th Season also provides underground irrigation system services, tree services and a gift and patio shop in addition to lawn maintenance. ■

For those interested, Ciba offers a computer disk containing a "Primo Benefit Analysis" program to help determine job costs. To obtain your copy, contact Ciba directly or your area Ciba representative found on page eight of this insert.

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Water Purveyors: Friends or Foes?

Water suppliers often restrict the use of landscape irrigation systems based on misconceptions about system viability. Contractors need to educate purveyors in their region on how modern irrigation systems can actually reduce water usage when properly installed and maintained.

By Brian Vinchesi

TURF AND LANDSCAPE irrigation systems consume a large portion of the domestic water supply in the United States. Although estimates vary, outdoor water use can account for as much as 50 percent of household water use. In some areas, such as Southern California, Florida and Arizona, the percentage jumps higher.

Consequently, both the public and water authorities sometimes perceive irrigation systems as water wasters. The common notion is that the systems increase water use, thus draining available water sources.

Irrigation systems are designed to apply a uniform application of water over a given area. Usually, the better the design, installation and continued operation of the system the more efficient the water use.

Other factors such as wind and time of operation also come into play. For instance, if you compare the identical landscapes of two adjacent homes — one with an irrigation system and one without — what are the differences in water use?

To compare water use, you first have to ensure that the same number of people live in each house. If the home without the irrigation sys-

tem never waters its lawn, then the irrigated home will always have a higher water use no matter how efficiently the system operates.

Without comparing apples to apples, some people automatically — albeit wrongly — view this irrigation system as a water waster.

Proper head selection, placement and pressure settings all play a role in the effective use of water resources.

But what if the home without the irrigation system was manually watered by the owner as much as the house with the irrigation system, i.e., the same amount of water was applied to each lawn? What would the water use look like then?

On average, the house with an irrigation system will use about 40 percent to 60 percent less water than a manual watering system. This illustrates how an automatic irrigation system saves water.

But how does the water supplier look at these two situations?

Water purveyors — typically water districts or quasi governmental agencies — send mixed signals on this topic. Some water purveyors strongly support landscape irrigation by promoting water conservation practices, i.e., allowing exclusion meters (which help reduce costs for irrigation) and

assisting home owners and contractors their efforts to to schedule the irrigation system that will promote proper water use.



In contrast, other water suppliers try to prevent irrigation system installations at every turn by prohibiting exclusion meters, establishing expensive backflow regulations, barring permits for tap water supplies and banning any type of automatic irrigation system. No wonder homeowners and contractors are confused.

WATER REGULATIONS. Water bans imposed by local or regional water authorities can deter irrigation contracting businesses. Many times the bans are imposed based on bias or misconceptions about irrigation systems.

Water bans are constructed in many different ways. Some prevent outdoor watering altogether; others just prohibit watering during certain hours. Yet others allow for odd and even day watering — residents with even-numbered street addresses water on even days of the month and odd-numbered street addresses water on the odd days. Other bans control irrigation by prohibiting taps from running to the potable water system, by allow-



ing only alternative water systems such as wells or by outlawing automatic irrigation systems.

Some watering bans can benefit the irrigation industry. A watering ban that only allows outdoor water-

ing from 10 p.m. to 5 a.m., for instance, actually promotes the purchase of an automatic irrigation system, which can easily be programmed to water during set hours.

Bans discriminating against automatic irrigation systems hurt the irrigation industry the most. Irrigation contractors, however, generally understand and won't dispute a ban imposed for defensible reasons such as a town having low water supplies or poor water distribution systems.

Water purveyors impose bans for various reasons. Watching irrigation systems run in the rain may be one reason. Excessive water use may be another.

Some purveyors allow exclusion meters, which benefits the contractor, resident and the community. An exclusion meter monitors irrigation water use separately from the main water meter, often at a

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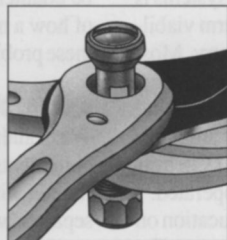
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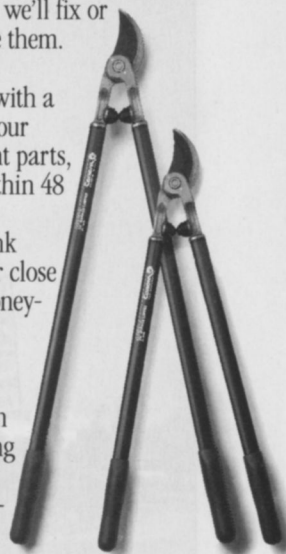
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21-inch AL 6620 cuts limbs up to 1½ inches thick.

Water Conservation

(continued from page 66)

lower pay rate. Water districts which don't allow exclusion meters are missing out on possible cost and water savings.

Sewerage charges tied to the water use are not usually billed on the regular water statement. Depending on the location of the proposed irrigation system, there can be significant savings in water and fees. In some municipalities, the sewerage charge is more than 75 percent of the water bill.

Backflow prevention requirements, which usually come under the local water purveyor's authority, are almost standard throughout the United States on a state by state basis. Unfortunately, they vary drastically from one municipality or water district to another. Costs of backflow prevention devices vary by type. Requiring expensive reduced-pressure devices for residential installations significantly increases the cost of the irrigation installation.

Additionally, friction losses associated with the reduced pressure device on some may require the

installation of a booster pump, which again raises costs. Less expensive devices, such as pressure vacuum breakers, are more suitable under proper conditions.

Water purveyors also can affect the irrigation industry by charging for the installation of new water taps or for water tap permits. These charges vary with the size of the meter, but can run as high as \$25,000 for a 2-inch tap. Installation of the meter, backflow, etc., is an additional charge.

Although only one-time charges, these astronomical fees are prohibitive to the irrigation industry, especially on large commercial projects. The high prices promote poor irrigation design, lengthening run times by suggesting the designer use a smaller meter to save the installation or operating cost.

Lastly, irrigation systems can be particularly impeded by high water costs. Even some areas with abundant water supplies can charge prohibitive rates.

JOINT EFFORTS. How can irrigation contractors and water suppliers work together? In many regions, especially the Southwest

This spray head is installed too low in the ground to do its job. Landscape contractors need to work with water authorities on effective use of water year-round.

where water is scarce and irrigation most prevalent, the irrigation industry and water suppliers work hand in hand.

Many water authorities in Southern California, Nevada and Arizona have installed education programs to teach end users and irrigation contractors proper scheduling of irrigation systems which ultimately reduces water use and operation costs for the consumer. They also promote good turf management practices.

National efforts such as the Irrigation Association's Certified Landscape Irrigation Auditor program and California's AB235 law also help promote water conservation by ensuring proper irrigation scheduling techniques are practiced.

Educating water authorities on the benefits of irrigation systems is important for the long-term viability of the irrigation industry. Most water authority personnel know a lot about water meters, pumps and distribution systems but are naive about how an irrigation system is designed, installed and operated.

Many times a little education on system design goes a long way. For example, many water authority personnel think that when a residential irrigation system is in operation, all the sprinklers come on at the same time. They are not aware that an irrigation system runs in zones, thus reducing the amount of water required per minute.

Because of their ignorance, these municipalities may require that a separate water line be brought in from the street, and that it be sized to run the system all at once without interfering with household water use. These requirements significantly add to the cost of the irriga-

When used properly, automatic systems save money. When they're not, water is wasted and the industry looks bad.



tion system, discouraging many buyers.

Another example is a town that requires an irrigation system installation pre-approved by the board of health to ensure sprinklers are not installed over the drain field of the septic tank. The reasoning is that a sprinkler could break and flood the drain field, causing an unpleasant odor or potential health hazard. This argument can easily be countered with an explanation of how a master valve can correct these problems.

UNREASONABLE REGULATIONS.

Water authorities impose many requirements that can be successfully refuted with education. To justify separate water supplies, for example, a water authority must first understand how the zone size of an irrigation system is determined.

For educational purposes, irrigation professionals can provide adequate information on the three rules for safely sizing irrigation system zones operating from municipal water supplies. In addition, standards exist on how pressure losses are calculated into the system. Once they are explained, the rationale for separate water supplies may help sway a water authority's position.

Some water authorities simply believe irrigation systems waste water. This misconception can be reversed by explaining the benefit of rain shut-offs, which inhibit an irrigation system's operation once

(continued on page 70)



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Ongoing education is needed to promote the benefits of automatic irrigation systems beginning with the initial installation.

Water Conservation

(continued from page 68)

a certain amount of rain has fallen. A shut-off ordinance helps reduce water use and promotes good public relations for irrigation systems. It also opens a dialogue of cooperation and communication between irrigation contractors and the water authority.

Gray water is fast becoming a potential source

Gray water is fast becoming a potential source of water for irrigation systems. This technology needs to be discussed with water purveyors.

of water for irrigation systems. Currently regulated at the state level, this future technology needs to be discussed with local water purveyors to prepare them for its use.

Water suppliers and irrigation professionals at times have diverging goals. However, with proper education and cooperation, an understanding of each group's problems and solutions can be obtained. Maybe then, the question of whether water purveyors are a friend or foe will be not open to debate.

The author is a consultant for Irrigation Consulting & Engineering, Pepperell, Mass.

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**PESTICIDES
IN THE URBAN
ENVIRONMENT**
PART 7

Staying On Target

Growing public concern over the over use of pesticides has helped evolve the concept of plant health care — including cultural and pesticide practices — for trees and shrubs.

By John Ball and Murdick McLeod

Ed. Note: This is the seventh in an ongoing series on effectively using and promoting specialty pesticides in the urban environment.

TREE AND SHRUB pest management has gone through many changes over the last several decades. While DDT and an array of other synthetic organic pesticides were common in the 1940s and 1950s, the early 1980s introduced products with



PESTICIDES IN THE URBAN ENVIRONMENT

shorter half-lives and the concept of integrated pest management.

IPM is a decision-making process used to maintain pests at tolerable levels through strategies that are economically and ecologically efficient and socially acceptable.

An important part of IPM is the use of target or spot sprays. These sprays are not applied indiscriminately, but when and if needed to maintain the health and appearance of the plant. Target sprays are applied to a specific plant, or a portion of a plant, to control a particular pest.

While target sprays are appropriate for most insect and mite pests, many diseases — particularly foliage diseases — can generally only be effectively treated by blanket sprays.

TARGET PRACTICE. There are four important prerequisites to effective target spraying: Knowing what to treat, when to treat, where an application is appropriate and whether treatment is actually necessary.

What to treat is dependent on the key plants and key pests in a particular service area. Key plants are those that dominate and contribute aesthetic and functional value to the landscape. Key pests are serious, persistent insects that routinely require management.

These two groups can vary greatly throughout the country. For example, in a Maryland survey of residential landscapes, rhododendrons and hollies were the most abundant plants, while dogwoods and cherries incited the most pest problems. In a similar study in Minnesota, arborvitae and junipers dominated the landscape while Tatarian honeysuckle, European white birch and American elms displayed the most pest activity.

These key plants may have many pest infestations, but only a few will fit the definition of key pests. In the case of the Minnesota study, the three plants most heavily infested were actually afflicted by only a few types of insects — honeysuckle leaf-folding aphids (Tatarian honeysuckle), bronze birch borer and birch leafminer (European white birch) and elm leaf beetle (American elm).

The number of tolerable key pests in any given area is relatively small compared to the number of

plants in a community and their potential pests — usually about 10, although some landscape maintenance firms target 20 to 25.

When to treat trees and shrubs is a critical question in target spraying. Target sprays generally involve using insecticides that do not have long residual lives; thus, the window of effective treatment is measured by number of days rather than weeks or months.

Applications must be made during the insect's most vulnerable life stage. In some cases, this is not necessarily the damaging life stage. Target spraying for phloem-feeding borers requires that application be made during the adult stage. The larvae spend most, if not all of their entire life, feeding within the tree safe from sprays. Timing the spray application is critical for control of these and many other insects.

Timing can be determined through a variety of methods, the most common of which are degree-day forecasting, phenology forecasting and trapping.

Temperature plays a key role in determining the development rates of insects. As temperatures decrease, development proceeds at a slower rate. Conversely, as temperatures increase, development increases.

Insects have an upper and lower threshold temperatures above or below which development does not occur. Any temperature below the lower threshold, or base temperature, is too low for insects to develop.

For example, birch leafminer development occurs in the spring whenever the temperature is above 50 degrees F. One degree day is accumulated for each degree F the average daily temperature is above the base of 50 degrees F.

If the day's average temperature is 60 degrees F, then 10 degree days ($60-50=10$) have accumulated that day. If the day's average temperature is 40 degrees F then that day produced 0 degree days since the average temperature never rose above the base.

Cumulative degree days are used to predict when a particular insect development event has occurred (i.e., egg hatch, first adult, first damage). Using the birch leafminer example, it takes 310 degree days (base 50 degrees F) for the mines to become apparent.

Degree-day charts have been published for a wide variety of ornamental pests. The charts are regional or national, however, often leaving too wide of a degree-day range for some insects. For example, one shows that Bronze birch borers



emerge after 440 to 880 degree days. The birch leafminer range is 190 to 310 degree days.

Because of the wide variances and because many insects do not have degree-days calculated yet, landscape maintenance professionals may need to develop their own charts. Weather data to develop a degree-day forecast can be collected from the local weather service or newspaper. They need to keep track of the number of accumulated degree days above a base of 50 degrees F and then note the total accumulation for the critical event in the life stages of key pests.

Degree-day forecasting is extremely precise, and requires accurate local temperature data. Many landscape operations may cover a wide service area or areas near large bodies of water that can create a wide variety of microclimates. The company may find it less time-consuming to predict pest emergence based on plant phenology.

Plant development stages such as bud break and flowering can also be predicted from degree days. Applicators can use this process to time their target sprays for particular insects. This method is not as precise as tracking degree-day accumulation — plants and insect development phases are not always well synchronized — but it is easier to

perform. Birch leafminer adult emergence occurs about when common lilac begins to bloom; bronze birch borer adults emerge when black locust shows its blossoms.

As with collecting degree-day data, companies should keep track of plant development at the time of critical insect events. Within a few years, they will have a fairly accurate chart by which they can time their target sprays.

TRAPPING. A variety of contraptions are used to trap insects, including pheromone traps, sticky traps and pit-fall traps. These traps are used to monitor activity of the pest to appropriately time a pesticide application.

There are few, if any, examples of traps being used to control insect populations. Similarly, the number of insects captured in a trap does not necessarily correspond with the potential severity of the infestation. The greatest value of traps is to discover the occurrence of an insect's vulnerable life stage and time a pesticide application against it.

A pheromone is a chemical emitted by an insect (pheromones are released by other organisms as well) that triggers a response in another insect of the same species. Insects generally use phero-

Sticky card traps capture insects by chance or allure them by color. The traps are used to monitor several different species of insects.

PESTICIDES IN THE URBAN ENVIRONMENT

mones to attract each other to a particular tree, or to scatter from a tree.

Pheromones are also an important means for females to attract males. These sex pheromones have been synthesized and are now used to monitor a variety of insects including pine tip moth and many clear-winged moths.

The traps are sticky boards impregnated with the pheromone and placed in key areas before adult insects are expected to emerge. Since the traps are used to determine when the insect is present, applicators need only prepare a few traps unless their service areas are quite large and encompass many different microclimates.

The traps should be placed in convenient locations since they need to be checked daily to get an accurate insect count. In some cases, target sprays begin 10 days after the first capture (ash/lilac borer) and with others, 10 days after the peak

catch (pine tip moth).

Sticky traps are simply cards or boards covered with a sticky adhesive. Unlike pheromone traps, where placement is based upon convenience for monitoring, sticky traps should be placed in the pest's habitat.

Sticky traps — used to monitor several different species of aphids, apple maggot and scale crawlers — either capture insects by chance, or more commonly, draw them because the insects are attracted to their color, which is usually yellow.

Trap counts tell an applicator when the insect is present, and if monitored over a long time, can also indicate whether the insect population is increasing or decreasing.

Pit-fall traps are placed so that insects walking across the soil fall into them. These traps can be constructed using two plastic cups. Both cups should have roughly the same diameter at the top, but one should be shorter and have a narrower base.

The bottom of the smaller cup is cut off and the cup is placed inside the larger one, acting as a funnel. The cups are buried so that the tops are flush

(continued on page 76)

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PESTICIDES IN THE URBAN ENVIRONMENT

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with the soil surface. Insects crawling on the ground simply blunder into the "pitfall."

Pheromone traps, placed for convenience, help determine when insects are present.

Pit-fall traps are effective for monitoring the activity of ground-dwelling insects, especially the black vine weevil. This insect is active three weeks before egg laying occurs and the pit-fall traps are used to detect first activity of adults and subse-



quent timing of insecticide applications before the egg laying stage begins.

WHERE AND IF. Where to spray is another key aspect to effective pest management.

The term "target" implies taking aim, and target spraying means just that. Rather than spray the entire plant with the insecticide, target a particular portion for treatment. Insects do not feed randomly throughout a tree or shrub, but on or in a particular plant part and on or in a specific location.

Spruce needle miner, for example, attacks the new needles just after the foliage matures, so target sprays are made to the exterior of the spruce tree. Zimmermann pine moth, on the other hand, lays its eggs on the trunk and the newly hatched larvae burrow near the juncture of the trunk and a branch. To control this insect, the insecticide must be applied to the interior of the tree so that the trunk is thoroughly treated.

Whether or not to spray is the last question that needs to be answered. The mere presence of an insect, even a key pest, does not necessarily mean

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Staying On Target

(continued from page 76)

the tree should be treated.

Many landscape firms that believe they are using an IPM-based target spray program are really operating a see-and-spray service. The companies have developed insecticide lists and spray schedules for their key pests, but they base their decision to treat on whether the insect is present rather than how many are present.

The decision of whether to treat or not should be based on injury and action thresholds. The injury threshold is the population size, above which the resulting plant damage is unacceptable to the client. The action threshold is the population density at which control must be initiated to prevent the injury threshold from being reached.

For example, many clients can detect foliage damage as low as 5 percent or 10 percent and surveys indicate many home owners initiate control measures when

plant damage reaches 7 percent of the foliage. This means a landscape maintenance service must establish what population density will cause about 5 percent or 10 percent damage to the foliage and determine at what population density control must be initiated to prevent the unacceptable damage from occurring.

Action thresholds have been established for several key pests: for pine needle scale it is two to four per needle and for the bronze birch borer it is the presence of one D-shaped emergence hole.

But action thresholds are dynamic and influenced by several factors. A healthy tree can withstand a higher pest population than a weak tree. Weather conditions that can stress a tree, such as drought and flooding, will lower the action threshold since these stressing agents tend to make a tree more susceptible to insect attack. The location of the plant in the landscape will also influence the action threshold.

A tree near the front entrance way of the house will be more noticeable than a

similar tree tucked away in the back. Thus the front tree will have a lower action threshold. Because of these reasons, action thresholds are difficult to establish and are not yet available for most of the key insects in the landscape. Landscape maintenance companies need to take careful observations and develop their own action thresholds. These thresholds need to be conservative since clients are expecting good results, but should be initiated in a timely fashion.

Target sprays are an important method of effectively and safely applying pesticides. The use of these sprays benefits the company and the client. By "staying on target" the landscape maintenance industry can maintain attractive landscapes with a fraction of the pesticides that would be necessary with cover sprays. ■

Ball is an assistant professor for the Extension Forestry department at South Dakota State University; McLeod is assistant professor for Extension Entomology at SDSU.



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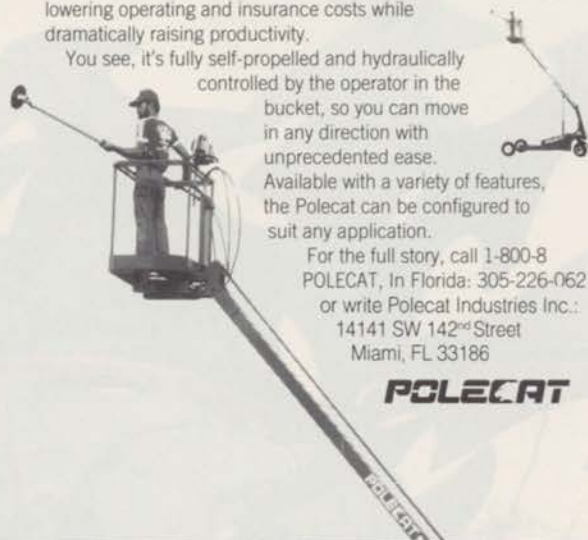
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Approaching Turf Weed Management Through IPM

WEED MANAGEMENT is a component of any sound turfgrass program and is dependent upon the maintenance of a dense and healthy turf. A thin, weak turf is an invitation to weeds. Consequently, a weed management program is dependent on successful maintenance of a dense and healthy turf.

The first step in stopping weed invasions is selecting the most appropriate turfgrasses for the site, preparing the seedbed properly, optimizing turfgrass maintenance practices (fertilization, irrigation, mowing, etc.) and controlling insect pests and diseases.

Regardless of the maintenance regime, some weeds will encroach. But an effective weed management program will optimize the competitiveness of the turf to minimize the number of weeds encroaching. Control guidelines can then be developed for the remaining species based upon knowledge of the weeds, the turf management system and the available control options.

To develop a pest management program the pest problem must be understood. First, develop a historical account of the turfgrass and weed management program and problems. Second, scout the property. Record the turfgrass species,

Scouting and mapping turfgrasses for weed infestations can provide lawn service contractors with historical information to better control unwanted outbreaks.

By Joseph C. Neal, Ph.D.

management practices (particularly fertilization, irrigation and mowing practices) and previous pests and pest management practices.

Develop a map of the property identifying historical "hot spots" for weeds as well as other pests and thin turf (each of which will lead to weed encroachment). This historical account will make weed scouting efforts more efficient and effective,

and provide a basis for evaluating the success of future weed management decisions and actions.

Weed scouting is the tool with which the remaining information will be accumulated to develop a customized and effective weed management program. Once current weed species have been identified and documented and their distribution, abundance and possible

reasons for occurrence have been listed, more effective weed management decisions can be made.

WEED SCOUTING. Identify and map all weeds and thin turf areas. Identify current weeds paying particular attention to those which escaped previous control procedures, species known to be troublesome, those which occur in patterns and species new to the site.

If an unknown species is encountered, take a sample for identification. Also learn to recognize "diagnostic weeds," or those which by their presence may indicate correctable soil, site or management problems. It is often helpful to refer to the history for guidance on what to expect and where to look for the first and most severe weed outbreaks.

On the scouting map, record the following:

- the weed species, location, distribution, relative abundance and patterns (if present),
- areas of thin or damaged turf, and
- drainage patterns, dense shade from trees or other factors which might directly or indirectly affect turfgrass vigor and the grass species present.

(continued on page 84)



Common turfgrass weeds (left to right), dandelion, Florida Pusley, ground ivy, hawkweed and henbit. Illustration: Wilbur-Ellis

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Weed Control

(continued from page 80)

It's not necessary to record every species encountered. Some knowledge of control procedures can help streamline the scouting process. For example, if a property is infested with a complex of easily controlled broadleaf weeds, identify them on the map as broadleaves. On the other hand, if a single weed species dominates the population, it should be identified and mapped separately.

Additionally, species requiring different management procedures should be individually identified. For example, a mixed population of crabgrass, foxtail and panicum could be recorded as summer annual grasses; however, goosegrass generally requires a different management strategy and should be recorded separately. A scouting form can be designed to facilitate these groupings.

WHEN TO SCOUT. Weed scouting (or mapping) is a continuous process; each time a representative from

a company is on a property, pest and turf problems should be reviewed. A comprehensive weed scouting once or twice a year will provide an assessment of how effective a weed management program is. This assessment will also

High priority areas will have a more intensive maintenance regime and a lower threshold for weed infestations.

identify serious weed problems while they are small and more easily managed.

The timing of the comprehensive scouting is critical. Timing advantages include:

- summer annual, winter annual, biennial and perennial weeds are all

present and easily identified;

- site modification or repair work can be accomplished and turf reseeded in the fall;

- winter annuals are young and more easily controlled in the fall than in the spring;

- perennial broadleaf weeds are also more easily controlled in the fall; and

- ample time is available during the winter to reassess your current weed management program.

Less comprehensive scouting should be conducted in the spring and summer months to assess the effectiveness of fall treatments, identify immature seedling weeds when they are more easily controlled (particularly important for summer annuals such as crabgrass, goosegrass, spurge, etc.), and to gauge the density and quality of the turf.

More frequent scouting may be necessary in regions with longer growing seasons to accurately document the weed infestations in warmer climates.

HOW TO SCOUT WEEDS. The actual scouting process can be simplified

by dividing the property into management units. In a home lawn, these units might be as simple as the front, back and side yards. On commercial properties, campuses and parks, the management units should reflect the priority status of the area. High priority areas will have a more intensive maintenance regime and a lower threshold for weed infestations; whereas, low priority/lower maintenance areas may have a higher threshold for weeds.

Walk or ride the area in a zig-zag pattern, stopping at key indicator areas for a closer look when early detection is essential. If you encounter an unknown weed, take a sample for identification. High priority areas require a more comprehensive procedure, with lower priority areas requiring less. On the property map, record the information previously described. By mapping the species and locations, you build a "picture" of the weed population and distribution, as well as identify patterns which might suggest an underlying reason for the weeds' presence.

Weeds occur in turf for several

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Birdsfoot trefoil
Prostrate knotweed
Bracted plantain

WET SITES

Moneywort
Annual sedge
Annual bluegrass
Alligatorweed
Pearlwort
Moss
Liverwort
Rushes (*Juncus* spp.)

the presence of which may indicate soil, site, environmental or management problems. For instance: the box to the left features species which are well adapted to extremes in soil moisture conditions, drought-prone or excessively moist sites.

Encountering one or more of these species as the predominate weed(s) can signify that the site conditions may be too dry or too moist for optimum turfgrass growth. However, remember that the presence of one or more of these weeds is not proof of a moisture problem as they will grow well under optimum water availability.

Also, there may be other reasons for a weed's presence. For example, annual bluegrass presence does not prove that the site is too wet; other factors make this species more competitive than the desirable turf, such as compaction.

The following weeds are adapted to the shallow rooting conditions associated with compacted soils:

- Annual bluegrass
- Corn speedwell
- Annual sedge
- Goosegrass
- Annual lespedeza
- Prostrate knotweed
- Broadleaf plantain
- Prostrate spurge

Several of these species are better adapted to compacted, dry soils, like annual lespedeza, goosegrass and spurge, while annual bluegrass and annual sedge are better adapted to compacted, moist soils. Either extreme results in shallow rooting and poor turfgrass vigor, leading to a competitive advantage for the weeds.

Core cultivation is used to alleviate compaction. Under most conditions, herbicide efficacy is not reduced by this procedure. Likewise, no increase in weed germination should occur when aeration is done when the turfgrass is growing vigorously.

However, if coring is done when turf vigor is low and weed germination

is high, some increase in weed germination can be observed. For example, core cultivating Kentucky bluegrass in early summer will often lead to increased crabgrass emergence. When core cultivation must be done at non-optimal times, use a smaller diameter tine (about 1/4 inch); the turf will fill the smaller holes more quickly, minimizing the opportunity for weed emergence.

In general, core cultivation will improve turf vigor and competition, effectively offsetting any increased weed emergence which might occur. The hydroject system is less destructive and may not increase weeds; however, this has not been investigated.

Soil pH and fertility can affect turfgrass vigor and the weed species present. The presence of red sorrel often indicated acid soil conditions (however, this species has been observed growing in pH 7 soils). Nitrogen is one of the most important elements to consider when examining the effect of soil fertility on turfgrass vigor.

The following species are well

reasons. The weed may be well adapted to persist in the closely mowed plant community (like annual bluegrass); exploiting a unique niche created by management procedures (like pearlwort in a heavily irrigated green); or the turfgrass has been weakened by some site, environmental, or management factor(s) consequently favoring weed growth over that of the desirable turfgrass.

Many weed infestations can be minimized by altering the site or management practices to tip the competitive balance in favor of the turfgrass. How do we identify such instances? One way is to take your cues from the "diagnostic weeds,"

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USE READER SERVICE #34

USE READER SERVICE #33



Common turfgrass weeds (left to right), spurge, violet, white clover, wild garlic and wild onion. Illustration: Wilbur Ellis

adapted to extremes of soil fertility, very low to very high nitrogen:

LOW N	HIGH N
Birdsfoot trefoil	Annual bluegrass
Black medic	Chickweed
Broomsedge	Moss
Clovers	Ryegrass
Common speedwell	
Hawkweed	
Moss	

Phosphorous and potassium have also been shown to influence weed populations; however, in each case the impact of nutrient treatments on weediness can be linked to the overall health and vigor of the turfgrass. In other words — fertility regimes can be designed for optimum turfgrass health and vigor, based on soil test results and the optimum fertility recommendations for the turf type and use.

Altering the fertilization program to favor the desirable turfgrass is the first step in managing weeds. Weeds at low fertility sites can eventually be controlled strictly through improved turfgrass management. This may also involve overseeding with a turfgrass that is better adapted to the site.

In contrast, those species adapted to high fertility sites can be reduced but generally not eliminated by cultural means alone. Some other control procedure(s) will be necessary to eliminate these species. Mowing height and frequency also alter the weed population. The following species are adapted to different mowing regimes:

The species adapted to high/in-frequent mowing are common roadside weeds. If these species are present in abundance in a lawn situation, it's important to evaluate the

current mowing regime. These latter species also will grow well at higher cutting heights but tend to be less competitive with turf as mowing heights are increased.

As with fertility, mowing height should be optimum for the turfgrass species, management and site conditions to ensure the maximum competitiveness and quality.

Close examination of these lists reveals that several weeds are adapted to a range of conditions. This is often associated with the broad adaptation of a species to many ecological niches. Examples include annual bluegrass tolerance of shallow rooting caused by excessive moisture or compaction, and black medic tolerance of drought-prone and low fertility sites.

The presence of one or more of these weeds is not proof-positive of the stated conditions, but rather suggests potential reasons for their presence. Evaluate these conditions and correct them if possible.

In summary, turfgrass management procedures and site conditions can increase or minimize weed problems, depending upon how well the conditions and management are optimized for the turfgrass.

Turf management procedures or conditions which promote weed invasions include:

- Wear (foot, tire, use, etc.),
- Environmental stresses (drought, waterlogging, etc.),

HIGH/ INFREQUENT	CLOSE/ FREQUENT
Bull thistle	Annual bluegrass
Burdock	Chickweeds
Chicory	Moss
Smooth bedstraw	Pearlwort
Sweet clover	Thymeleaf speedwell
Teasel	
Wild carrot	

- Introducing weed seed or other propagules (on equipment, in top soil, etc.),

- Aerating or dethatching during peak weed germination and low turfgrass vigor, and

- Any management input not matched to soil tests, the turfgrass species and management of the site.

Good cultural procedures for preventing and minimizing weed invasions include:

- Proper species and variety selection for the site and use,
- Optimum fertility, pH and irrigation management for the turfgrass

Correcting site and management problems contributing to weed encroachment is the first step in establishing an effective program.

and soil properties.

- Correct mowing height, equipment and regime,
- Traffic, thatch, compaction control and management and
- Effective management of other turfgrass pests.

Scouting can greatly assist in identifying the underlying reasons for weed infestations. Correcting the site or management problems contributing to weed encroachment should be the first priority in a weed management program. While correcting the problem and increasing turfgrass vigor and competitiveness will generally not eliminate the weed, failure to do so will almost ensure that the weed will return after herbicide applications. Therefore, control procedures will need to be coupled with site or manage-

ment medication for effective long-term weed management.

DO I NEED A HERBICIDE? If the scouting report contains both the identification and some estimates of distribution, relative abundance and patterns, the decision-making procedure should be simple. Based on the priority status of the pest management unit and the relative abundance of the weeds, ask yourself, "Do I need to treat for weeds." If the answer is yes, the distribution estimates should indicate whether broadcast, limited areas or spot applications are warranted.

If spot or limited treatments are needed, the scouting map should help estimate the area to be treated and the amount of product needed, as well as guide the applicator to the infestations.

Currently, there are two options to controlling weeds: physical removal and herbicides. As strange as it may sound, there are situations where hand weeding is still practical. If only a few weeds are present in a high priority area, hand weeding can be the fastest and most economical alternative.

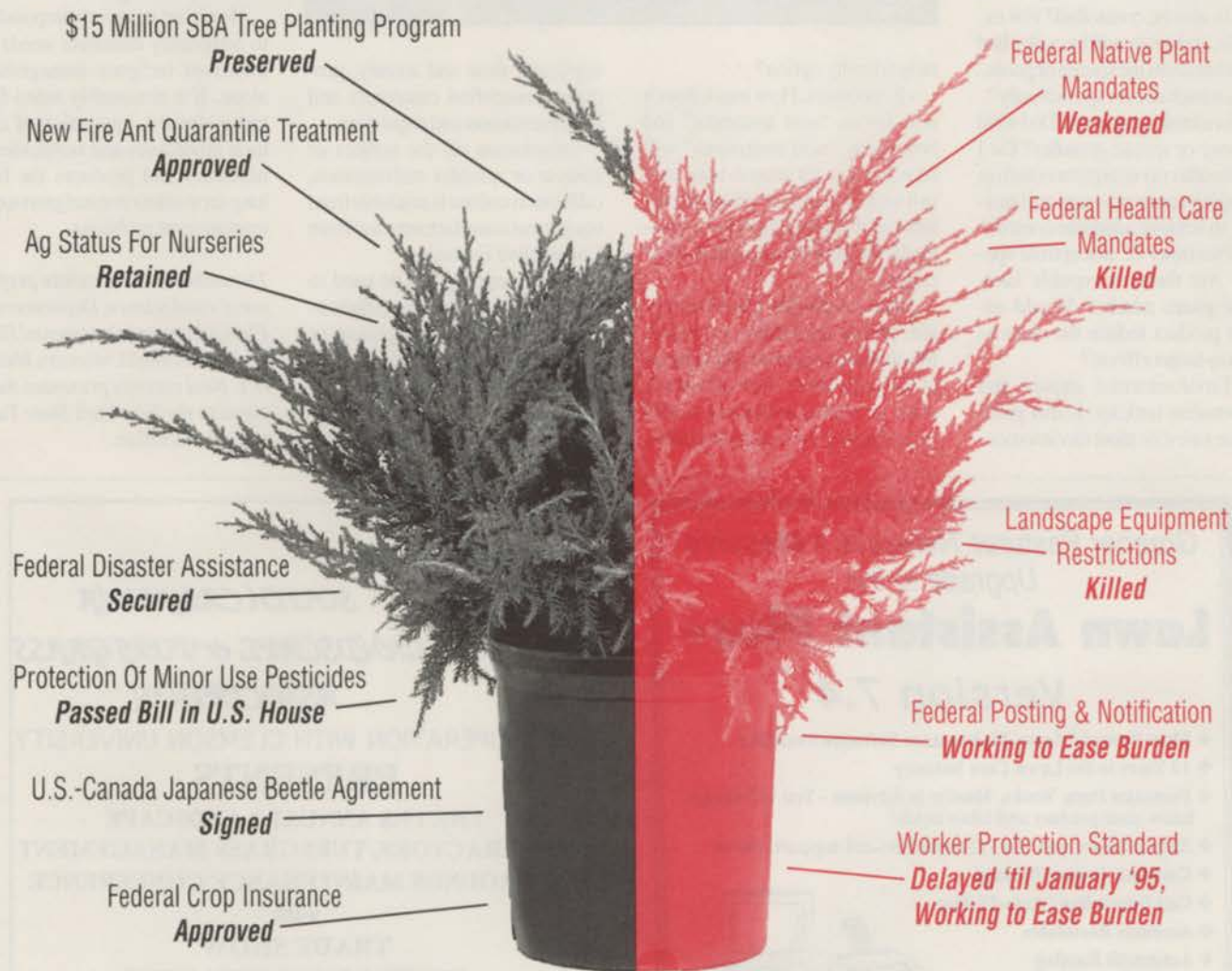
For example: a few goosegrass plants on a golf green or a half dozen dandelions in a home lawn can be hand weeded faster than getting the sprayer ready. If this isn't practical, proper selection and use of appropriate herbicides is essential.

Selecting the most appropriate herbicide can be a challenge. The following are some suggested guidelines for choosing the best product for the job.

- Efficacy on the target weed species: Will it control the target weed?
- Longevity of residual control (if preemergent): How long will the control last? Will multiple treatments be necessary? Will the residual interfere with my overseeding program?

(continued on page 64)

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Weed Control

(continued from page 86)

- Turfgrass species and management: Will it injure the turfgrass species on my site?

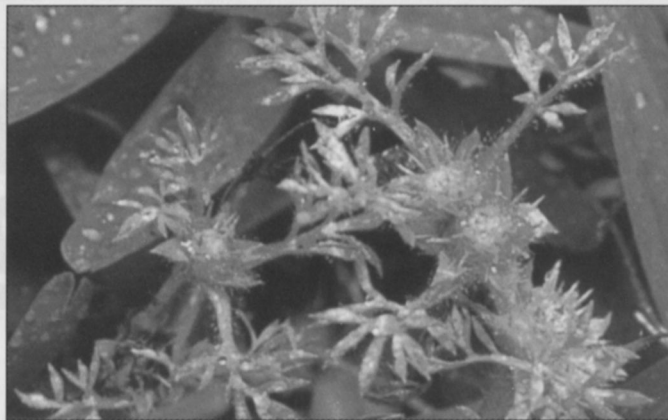
- Weed status or growth stage: Do I need a preemergent or postemergent product? For a postemergent treatment, does weed age or size (tiller number) affect product or rate selection?

- Weed control spectrum: Will other (incidental but important) weeds also be controlled? For example, crabgrass will be controlled but what about the spurge or goosegrass which occurs sporadically?

- Available equipment: Do I want to spray or spread granules? Do I need to alter my equipment (such as changing spray pressure and nozzles) to achieve adequate control?

- Proximity of susceptible species: Are there susceptible landscape plants nearby? Would another product reduce the chances for non-target effects?

- Environmental impact and mammalian toxicity: Is this product the safest or most environmen-



tally friendly option?

- Economics: How much does it cost for an "acre treatment" and how many "acre treatments" will be necessary for season-long control with each option? What are the labor and equipment costs associated with repeat or sequential applications?

Once a herbicide has been chosen, proper application is crucial. Misapplication increases the chances of turfgrass injury, lack of control, skips in control and injury to off-target species. It wastes herbicides,

applicator time and money, produces unsatisfied customers and invites criticism and regulation.

Information on the subject of sprayer or spreader maintenance, calibration and use is available from equipment manufacturers and from Cooperative Extension.

Weed mapping can be used to identify not only weed populations but also turfgrass management or site conditions which may be contributing to the weeds' success. In other words, the weeds may be trying to indicate something about the

Spurweed should be treated in early spring or during active growth. Photo: DowElanco

site, soil or management which allows weeds to be successful.

By listening to weeds, heeding soil tests and following the best management recommendations for turfgrasses in specific regions, the number and severity of weed infestations can be minimized. After all, a dense and healthy turf is the first line of defense against weeds.

However, it is nearly impossible to completely eliminate weeds by improved turfgrass management alone. If a reasonably weed-free turf is desired, integration of cultural procedures and herbicides is necessary and produces the best long-term solution to turfgrass weed management problems. ■

The author is an associate professor of weed science, Department of Floriculture and Ornamental Horticulture, Cornell University, Ithaca, N.Y. Neal recently presented these views to the New York State Turfgrass Association.

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Mower Productivity Rates: Finding the Right Formula

Figures derived by following strict formulas serve as a valuable gauge, but often fail to factor in real-world conditions.

By Bob Gitlin

AS WITH MOST rules, formulas used to calculate mower productivity frequently go out the window as contractors labor to meet the cutthroat demands of the marketplace. Attempts to precisely calculate, by mower size and field

size, how long the job will take must be taken in context. And attempts to bill or to bid on the basis of these numbers, to many contractors, can be futile.

One good mowing time formula, devised by The Deere Co., Raleigh,

N.C., goes like this: 108.9 divided by [mph x 0.9 (mower width in inches)] equals hours to mow an acre x 60 minutes, which equals minutes to mow an acre.

The factor 108.9 includes the acres-per-hour dimensions and a

10 percent time factor for turning at the end of swaths. Mowing speed is the miles-per-hour rating at the recommended mowing gear or usual ground speed. Deere uses nine-tenths of the mower deck width to factor in overlapping swaths for a uniform mowing job.

"Here's an example," said Bob Tracinski, a Deere spokesperson. "If the normal, safe mowing speed of a lawn tractor is 3.5 mph and the mower deck width is 38 inches, then we multiply 3.5 times 34.2 inches (nine-tenths of 38); the product is 119.7. We divide 108.9 by 119.7 and get the answer of 0.909, or 0.9 hours. Multiply that by 60 minutes to get the answer of 54 minutes. To mow an acre of lawn (assumed flat, no landscaping touches) with a 38-inch mower deck at 3.5 mph will take about 54 minutes."

Needless to say, you have to work backward from here to work in all the trees, shrubs, landscaped touches, gates, etc.

LIKES THE FORMALITY. Some lawn and landscape maintenance professionals find it useful to follow fairly stringent schemes for calculating mower productivity rates.

Dan Ferrise, manager of landscape management for Stano Landscaping, a Milwaukee company that handles about a 60/40 commercial/residential mix, has production figured out like this:

With a 21-inch mower, an easy job takes 6,000 square feet an hour; a medium-difficulty job, 5,000 square feet; a difficult job, 4,000 square feet. The corresponding numbers for a 36-inch are 12,000, 10,000 and 8,000; a 48-inch, 34,000, 24,000 and 15,000; a 60-inch, 40,000, 30,000 and 20,000; and a 72-inch, 60,000, 40,000 and 30,000.

Ferrise admitted that the mowing time formulas — and they're available from all the major mower manufacturers — are ideals from which the fudge factors must be deducted. "You buy a 60-inch riding mower and they say it can do so many square

Many professional contractors develop formulas to determine the cost of mowing commercial and residential properties including manhours, equipment selection and downtime between jobs. Photo: Teufel Nursery-Landscape.



feet an hour, maybe 40,000. But that means it's got to be flat, wide open, not a single tree in the way."

A site-by-site assessment is needed, he said. That's how he came up with ballpark difficulty figures for all his mowers. Only now does the mowing formula he uses really work for him.

Has new mower technology changed the way these assessments are done over the years? "Sort of," Ferrise said. "Some mowers have a little better maneuverability, so that reduces the numbers."

Like most big lawn maintenance contractors, Stano Landscaping has different kinds of crew configurations depending on the situation.

"I have four different types," Ferrise said. "Each has its own set of mowers." One crew has two riders and a walk-behind; another, one rider and two walk-behinds; a third, also one rider and two walk-behinds, only different sizes; and the fourth (mostly a residential crew that usually does smaller jobs), two 36s. "Of course that doesn't count the 21s. They all go out with those, for trim work and tight spaces."

Ferrise said mowing productivity formulas help him assign the right crews.

Is there a difference in mower productivity rates between commercial and residential cutting? Ferrise said yes. "Residential jobs tend to be more meticulous. People want a little better cut and they're willing to pay a little more. And, if it's a large property, it takes even longer."

The crew to send out on a large open area would be the one with the 72, the 60 and the 36. With easy access, 60,000 square feet an hour will predictably be reached by the big mower. "But then you look at the more average work, with more obstacles, and you won't even do 30,000 on that," Ferrise said. "You simply have to figure out how much work each of those mowers can accomplish."

Pat Enstrom, landscape maintenance supervisor at Teufel Nursery-Landscape, Portland, Ore., manages an all-commercial mowing operation whose accounts range from 1 to 60 acres. "We base our productivity rates not upon manufacturers' specifications, because they're almost always overly optimistic. Mowing involves more than cutting a flat grass area," he said.

Mower size types provide useful overall time averages. "For instance, a 21-inch mower almost always

MOWING PRODUCTIVITY CHART

(in acres per hour)

Width of Cut	Travel Speed				
	2mph	3mph	4mph	5mph	6mph
21 inch	.42	.63	.84	1.05	1.26
30 inch	.61	.91	1.21	1.52	1.82
38 inch	.77	1.15	1.54	1.92	2.30
48 inch	.97	1.46	1.94	2.43	2.91
54 inch	1.09	1.64	2.18	2.73	3.27
60 inch	1.21	1.82	2.42	3.03	3.64
72 inch	1.45	2.18	2.91	3.64	4.36
76 inch	1.54	2.30	3.07	3.84	4.61
144 inch	2.92	4.38	5.84	7.30	8.76

These production rates assume 100 percent constant cutting. Estimate a percentage of time lost due to maneuvering around the landscape, buildings, hills and odd-shaped areas, refueling the mower, as well as 5 percent to 10 percent for overlapping cuts on each pass of the mower. Collection of clippings also reduces mowing production.

realizes 5,000 hourly square feet," Enstrom said. "We have a different production rate for what we call difficult, which is 3,500 square feet an hour, but that really only applies to small jobs. If you're mowing for more than a couple hours on a large enough project, 5,000 is a very realistic number. We could go higher but there's no incentive to reduce prices."

Enstrom's standard cut with a 36 is 10,000 square feet an hour, 7,500 on difficult or tight mowing jobs.

He uses the same figures for the 48s. "Don't ask me why. We do two-thirds of our mowing with the 36s," he said. Maybe that's why another measurement category was never necessary; the figures were close enough.

For his 70-inch triplex reel mowers (necessitated by the quality- and ecology-conscious Northwest market), the production rate being used is 15,000, he said.

A 72-inch outfront Toro rotary used for rougher cuts uses two production rates: an acre an hour, or 30,000 square feet an hour. These

same rates apply to a jumbo Ransomes five-gang reel.

These data are fully computerized at the Portland shop.

"We purchased a software program called Timberline, which is primarily developed for construction and general contractors," Enstrom said. "We bought it because it can do all our job costing, payroll and office management functions. Everything's on it. We had to do a lot of work to tailor it toward landscape maintenance, but it made sense to do so."

Formulating electronically hasn't made his life any easier than if he scribbled on a legal pad, but as long as everything else was on line, it made sense to computerize this function too.

DO THE NUMBERS ADD UP?

You talk to most lawn maintenance contractors about mowing-time formulas and they're going to start talking to you about bidding for jobs.

Terry Stout, president of R.B. Stout Inc., Akron, Ohio, has, among other entities in his business, a grounds maintenance department

that does about 80 percent commercial work.

When asked if he uses a formal process for calculating mower productivity by deck size and expected job difficulty, he responded, "We're pretty much quoting based on site logistics, location and difficulty. Everybody knows how much a mower can mow in an hour. You can basically just say an acre per hour on a 48. But that's not really what's going on. It's getting to the site. It's what's the next closest site, how many fences, what's the rest of the crew going to do if it's just mowing? Somebody's got to pay for them."

In view of all this, his attention has focused on locking customers, as much as possible, into three-year contracts. "It's a complete package deal, with mowing, spraying and fertilization. They pay a set monthly fee for eight months. We don't have extras, in and outs, anything like that."

He used to get involved in the kinds of numbers Ferrise uses, but found it got to where it was no longer useful for him.

"We set up a computerized bidding process that did that, but we found that cumbersome. The difficulty factor used by one person putting the quotes together isn't the same as those used by someone else. We base our quotes on the particular crew, crew size and location. We match location to crew size. 'OK, this crew can drive here in 45 minutes and mow in 3 hours,' we might decide. We found if we customize to the site, we lose."

This method allows Stout greater flexibility in collecting business, he said. "Say you're out in the boonies or just at a big factory. Someone saw what you did, liked it, and wants you to do their small office down the street from the factory. If you've got four guys and it's 1 acre, it's still going to take them the hour. And you have to charge for it. The travel time would kill me to send a two-man crew to do that little job and come back. But I want the business."

These are the types of exceptions (which help cement so many successful lawn maintenance contracts) that get lost in the equation if you're tied to billing systems that trace themselves to an orthodox use of mowing productivity formulas.

Similarly skeptical (though respectful) of mowing productivity

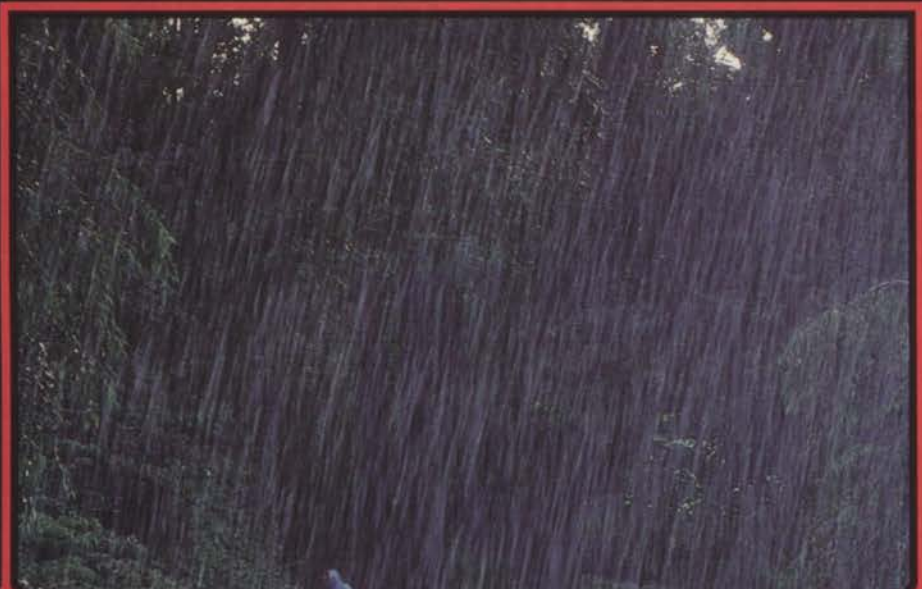
(continued on page 92)

Mowing-time formulas provide a good basis for contractors to do their initial figuring on how to assess their own costs by time, money and man hours.

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Mower Productivity

(continued from page 90)

formulas is Sam Russo, president of Sam Russo Landscape, a Bayville, N.J., company that mows 14,000 lawns a week, mostly retirement communities and some individual houses.

"We probably cut about an average of 750 square feet a minute," Russo said. A lot of what's useful from hourly-rate formulas he has internalized after 12 years in the business.

Sometimes, he said, the time formulas don't even translate into real-world terms. "In reality, so many times you know what the bid price is, the price you have to beat, and you don't always have the luxury of sitting back with a formula."

He's primarily concerned with equipment selection as a way to make his mowing as productive for his bottom line as possible.

Inclines and other obstacles on the property need to be accounted for in a quote. Photo: John Deere.

"Our common-area machines — 60-inch Dixie Choppers — work well on big open fields; we can get about 3 acres an hour. My main concern has been finding the most

efficient machine to cut those common areas, and to not have secondary equipment that does it slower (if it does it slower they don't even want it). I know that a certain 42-

inch walk-behind with a grass-handling system will do about an acre or acre-and-a-half in an hour, and no other machine out there works that well in tight places."



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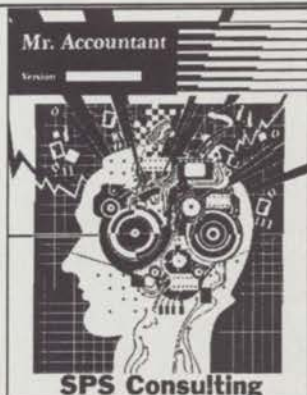
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These are the kinds of things Russo concerns himself with to make money mowing and continually enhance his reputation.

Productive mowing depends primarily on knowing the best possible equipment is being used, and the ability to determine a break-even point and desired profit margin, he said.

"We try to work multi-year contracts with percentage increases for mowing. Throughout the contract, the more years they sign the less percentage per year we charge. This way we get some longevity out of the contract, the customer saves over the long haul, and we get them out of the market from shopping with 25 bidders with 25 different prices," he said.

The reality of the contracting world often dictates against clean-cut mathematics. "Mowing-formula numbers are good stuff," Russo said. "If I had the right contract, it would be nice to work it out that way."

He has made a career of using gut instinct, which sometimes flies in the face of standard wisdom



buttressed with charts and graphs.

"I've sat with these 'experts' that say, 'You're crazy doing that,' but I can tell you that sometimes what would appear to be my worst contract becomes my most profitable. Maybe I know going in they don't want to pay anything for grass cutting, but they are going to throw me \$60,000 a year in extra tree work."

REAL-WORLD APPLICATIONS. Mowing-time formulas provide a

good basis for lawn maintenance contractors to do their initial figuring on how to assess their own costs, by time, money and man hours. Obviously, to reach realistic figures, the smart contractor will time four or five standard mowing job types, at least every other year or so including a big open-field commercial job, a small residential job, etc. The formulas provided by the mower manufacturers are a gauge to work back from to reach your

Contractors use gut instinct, repetition and internal formulas to determine mowing numbers.

true numbers.

Once these are realized, a lot of the veterans don't even bother with the numbers anymore. The figures become part of the instinctual knowledge that enables the contractors to spit out a price, or bid a job, by doing a little scribbling or clattering around on the office PC.

Sometimes the bidding marketplace even forces you to "give away" one aspect of landscaping in hope of either gaining a foothold in another segment or delving into a whole other service area that could prove more lucrative for you. Mowing productivity formulas are a sound, elementary business practice. They teach you your own costs, however, more than they teach you a way to charge for them. Unfortunately, these are often two different things.

The author is a Contributing Editor to Lawn & Landscape Maintenance magazine.

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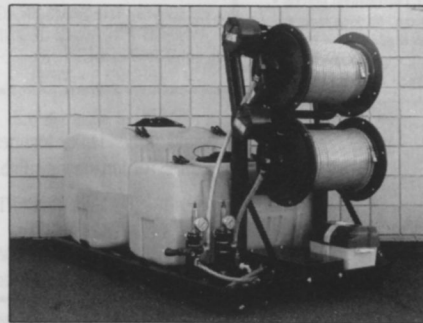
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Calendar

JAN. 19-21 Mid-America Horticultural Trade Show, Hyatt Regency, Chicago. Contact: Donn W. Sanford, 1000 N. Rand Road, Wauconda, Ill. 60084; 708/526-2010.

JAN. 22-25 ALCA Executive Forum, The Grand Floridian Hotel, Orlando, Fla. Contact: ALCA, 12200 Sunrise Valley Drive, Suite 150, Reston, VA 22091; 703/620-6363.

JAN. 23-25 The Central Environmental Nursery Trade Show, Greater Columbus Convention Center, Columbus, Ohio. Contact: Julie Feasel, 614/899-1195.

FEB. 2-5 American Association of Nurserymen Management Clinic and the Association of Professional Landscape Designers Winter Meeting and Conference, Galt House East, Louisville, Ky. Contact: AAN, 202/789-2900.

FEB. 8-9 Landscape Industry Show, Long Beach Convention Center, Long Beach, Calif. Contact: California Landscape Contractors Association, 916/448-CLCA.

FEB. 20-27 International Golf Course Show, Moscone Center, San Francisco. Contact:

Golf Course Superintendents Association of America, 913/841-2240.

FEB. 27-28 PLCAA Day on the Hill, Washington, D.C. Contact: PLCAA, 1000 Johnson Ferry Road, NE, Suite C-135, Marietta, GA 30068; 404/977-5222.

MAR. 24-26 ALCA Student Field Days, North Metro Technical Institute, Acworth, Ga. Contact: ALCA, 12200 Sunrise Valley Drive, Suite 150, Reston, VA 22091; 703/620-6363.

JULY 26-29 American Association of Nurserymen Conference, Minneapolis Convention Center. Contact: AAN, 1250 I St. NW, Suite 500, Washington, DC 20005; 202/789-2900.

JULY 30 - AUG. 1 International Lawn, Garden & Power Equipment Expo, Kentucky Exposition Center, Louisville. Contact: EXPO 95, 800/502/473-1992.

AUG 18-20 TAN-MISSLARK Nursery & Garden Supply Show, Dallas Convention Center. Contact: Texas Association of

Nurserymen, 7730 South IH-35, Austin, TX 78745; 512/280-5182.

SEP. 7-10 Responsible Industry for a Sound Environment Conference, Ritz-Carlton Pentagon City, Arlington, Va. Contact: RISE, 1156 15th St. NW, Suite 400, Washington, DC 20005; 202/872-3860.

SEP. 29 - OCT. 2 ALCA Interior Plantscape Conference & Trade Show, Fairmont Hotel, New Orleans. Contact: Associated Landscape Contractors of America, 703/620-6363.

NOV. 12-15 International Irrigation Exposition, Phoenix. Contact: Irrigation Association, 703/573-3661.

NOV. 12-16 Green Industry Expo, Fort Worth, Texas. Co-sponsored by ALCA, PGMS and PLCAA. Contact GIE, 1000 Johnson Ferry Road, NE, Suite C-135, Marietta, GA 30068; 404/973-2019.

DEC. 5-8 Ohio Turfgrass Foundation Conference & Trade Show, Columbus. Contact: Phyllis Selby, OTF, 2021 Coffey Road, Columbus, OH 43210; 614/292-2601. ■

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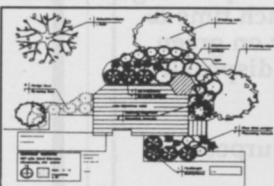
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1994

FEATURE ARTICLE INDEX

The holiday season is upon us and we present to you, our readers, the following holiday gift: Our 1994 Article Index. In the pages that follow you'll find a categorized list of all the feature articles, columns and important news stories that have appeared on our pages in the last 12 months, along with the issue in which the story appeared. We hope you'll refer to this index frequently to assist you in finding the articles you need to help train your employees and build your business. Enjoy. And happy holidays.



BUSINESS

- Setting the Right Price for Contracted Services (Jan.)
- The Dynamics of Lawn Care Sales (Pests. in Urban Environ., Jan.)
- GIE Show Gains Ground (Jan.)
- Contractors Expect Interior Rebound (Feb.)
- Market Report: Trouble in the Twin Cities (Feb.)
- Estimating Strategies that Work (Mar.)
- Playing David in a Goliath Market (Apr.)
- Snow Removal: A Specialty Service or Necessary Evil? (Sept.)
- Economic Revival Stirs Market Growth (Cover, Oct.)
- Contractors Aiming for "Smart" Growth (Oct.)

- All the Right Moves (Professionalism)..... (Cover, Nov.)
- 1995 New Product Showcase (Nov.)

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- Full-Service Future, Byrne Brothers Landscaping,
Essex, Mass. (Cover, Jan.)
- Joint Landscape Endeavor, Conoco Worldwide Headquarters,
Houston (Cover, Feb.)
- The Quality Difference, Northern Lawns, Omaha, Neb. . (Cover, Mar.)
- Leadership By Design, Lied's Nursery Co. Inc.,
Sussex, Wis. (Cover, Apr.)

1994

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ACQUISITIONS, EXPANSIONS, MERGERS

- Richton Acquires Century Rain Aid (Jan.)
- Lawn-Wright Becomes Wright Manufacturing (Jan.)
- Loveland Buys Rights to Valent Spreader (Jan.)
- Roots Acquires RGB Laboratories (Jan.)
- TMI Purchases German Forage Program (Feb.)
- Vermeer Expands Parts Distribution (Feb.)
- Scotts Acquires Grace-Sierra (Feb.)
- Norand, JAS Concepts Sign OEM Agreement (Feb.)
- Scotts, Shemin Nurseries Form Alliance (Feb.)
- Trees Plus Forms Two Sister Companies (Feb.)
- Monsanto, Rohm and Haas Strike Deal for Dimension (Mar.)
- Kawasaki Motors Acquires Kawasaki Loaders (Mar.)
- Terra Purchases Androc Products (Mar.)
- DowElanco, SePRO Sign Sales Agreement (Mar.)
- Norand Forms Mobile Systems Division (Mar.)
- Arteka Opens Des Moines Office (Apr.)
- Bunton, Kubota Canada Plan Joint Venture (Apr.)

- ISK Combines, Renames Agrochemical Business (May)
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- Ewing Plans Eastward Expansion (June)
- DowElanco Dedicates Global Headquarters (June)
- Massey Ferguson, Simplicity Form Supply Agreement (July)
- Pursell Expands Production Facilities (July)
- Snapper Snags Dane Scag as Strategist (July)
- Monsanto Completes Sale to Rohm & Haas (Aug.)
- Scotts Realigns European Sales (Aug.)
- Stens Adds Mower Parts to Its Commercial Line (Aug.)
- Deere Acquires Textron's Homelite (Aug.)
- Vigoro Finalizes Koos Acquisition (Aug.)
- Woods Equipment Acquires Gannon (Sept.)
- New Rep Group Forms In Southwest (Sept.)
- PBI Gordon Opens Stock to Employees (Sept.)
- Cyanamid Accepts \$9.7-Billion Megadeal (Sept.)
- L.R. Nelson Builds \$8-Million Complex (Oct.)
- Natural Earth, Easy Gardener Combine (Oct.)
- Soil Technologies Plans Stock Offer (Nov.)
- LandCADD Signs Distribution Deals (Nov.)

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- NESDA Closes Doors; NAEDA Fills the Void (Jan.)
- TOCA Offers Two College Scholarships (Jan.)

Vision of Success, The Davey Tree Expert Co., Kent, Ohio . (Cover, May)
 Driven To Succeed,
 Dennis' 7 Dees Landscaping, Portland, Ore. (Cover, June)
 Franchising: A Formula For Success,
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 Carving a Specialty Niche,
 Chapel Valley Landscape Co., Woodbine, Md. (Cover, Sept.)

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 Controlling Compost Odor (Apr.)
 Growing Wildflowers In Compost (Aug.)
 Promoting Quality Compost (Sept.)

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 Purchasing the Right Printer (Feb.)
 Should I Upgrade or Start Over? (Mar.)
 Making the Most of Technical Support (Apr.)

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 Subsurface Injection Gives Tree Roots a Boost (May)
 There's More to Fertilizing Than NPK (July)

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 LESSON 21: Evaluating Existing Systems (Mar.)
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 LESSON 22: Appraising Irrigation Systems (Apr.)
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 Make Irrigation Repair a Profit Center (Irrigation News, Nov.)

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IANJ Retains Management Group (Mar.)
 PLCAA's Day on the Hill — Water Becomes Lead Issue (Mar.)
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 ALCA Releases Crystal Ball Report XV (Assoc. News, Apr.)
 Putnam Resigns from IA (May)
 Kimmel New IA Executive Director (June)
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 PLCAA forms two state chapters (Assoc News, Aug.)
 ASPA Changes Name; Takes on New Logo (Sept.)
 AAN, ALCA Contemplate Merge (Sept.)
 If Survey Says Yay, Garden Council's Promotion Order is a Go.... (Oct.)
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 IA and ASLA Combine On-Line Resources (Oct.)
 OPEI Reaffirms Anti Mower Racing Stand (Nov.)

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PLCAA Offers Certified Turfgrass Professional (Jan.)
 PGMS Implements Pesticide Certification Program (Assoc News, Mar.)
 National Course Offers Credits in 10 States (June)
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Butterfly Gardens Promote Composting, Benefit Wildlife (Jan.)
 Scotts Wins Shreveport Contract (Jan.)
 Ohio Delays its Landfill Ban (Jan.)

Contractors Anticipate Construction Upswing (Mar.)

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Innovative Designs Transform Ordinary Landscapes (Feb.)
 Landscape Lighting: If Looks Could Sell (May)
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 Contractors Clean Up With Combination Products (July)
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 AAN Survey Taps Landscapers as Leading Horticultural Buyers.. (Feb.)
 Sandoz Polls L&L Professionals on Their Pesticide Use (Apr.)
 Family Businesses Fail to Plan for the Future (May)
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 Gallup Surveys Home Dwellers for Industry..... (Envir. Forum, Aug.)
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 Study Affirms Resale Value of Landscaping (Oct.)
 NAFTA Boosts Mexican Sales by 58 Percent..... (Oct.)
 Outdoor Equipment Sales Growth Forecast for 1995..... (Oct.)
 California Green Sales Rebound (Nov.)

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U.S. EPA Aims to Reduce Pesticide Risk (Feb.)
 EPA Expands Toxic Report List (Mar.)

Maximizing Pesticide Performance(Mar.)
 Reformulations Prevail in Competitive Market(Mar.)
 SPECIALTY PESTICIDES: The Calibration Rehearsal(Mar.)
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 Price, Performance, Still Top Pesticide Trends(June)
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 Residential Mowing: Painful or Gainful?(Apr.)
 Turf Prep: The Key to Successful Overseeding(May)
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 Quick Analysis (Disease Diagnostic Kits)(Aug.)
 Landscape Fabric:
 More Than Just a Weed Barrier(Aug.)
 Exploring New Weed Control Options(Sept.)
 Newly Shredded Leaves Protect
 Turf from the Elements(Maintenance Matters, Oct.)
 Mowing in the 21st Century(Nov.)
 Today's Sprayers Excel at Supplemental Treatments(Nov.)

EPA Meeting Breaks in New Era(July)
 EPA May Relax Worker Protection Standards(Oct.)

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 Kimmell Sets His Sights on Industry Education(Irrig. News, Oct.)
 Reclamation Head to Give Keynote Speech(Oct.)
 Buzzard Elected President of IA(Oct.)
 Colorado Xeriscape Newspaper Debuts(Oct.)

English/Spanish Sprinkler Video(Oct.)

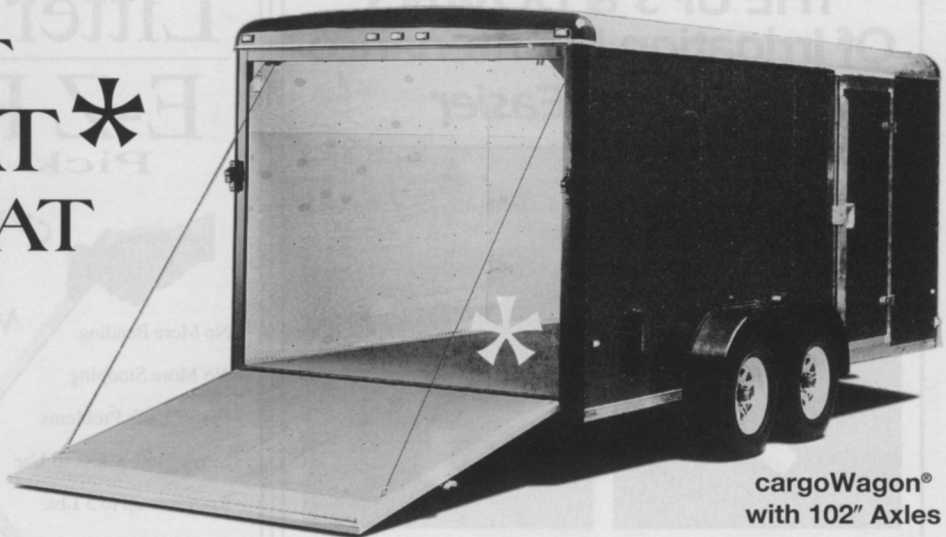
LANDSCAPE NEWS

Employers Go Back To School for Their Recruitment Needs(Feb.)
 The Ins and Outs of Landscape Mulching(Mar.)
 Ruppert Opens New Facilities(May)
 Davey Tree Strikers Fail to Avoid Pay Cuts(May)
 Have Graffiti? Landscape(June)
 Promoting Year-Round Color Ranks as Top Add-On(July)

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NCSU Offers On-Line Resource (Sept.)

LAWSUITS

Toro, Outboard Marine Settle Lawsuit (Feb.)
NYDEC Appeals DEET Ruling (Feb.)
Toro Claims Patent Infringement (Nov.)

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Miles' Allowance Plan Aids Distributors (Jan.)
Ames, NGA Sponsor Youth Garden Grants (Jan.)
Encore Announces Rental Distribution (Mar.)
First Robo-Cop; Now Robo-Mower (Apr.)
Primo Receives New York Label (Apr.)
Stihl Recalls Some Blowers, Sprayers (May)
Hako Minuteman Changes Firm Name (June)
DowElanco Supports 'Responsibility First' (July)
Encore Reaches Nearly 80 Percent Growth (Sept.)
Longhorn Donates Toro Mowers (Sept.)
DuPont Charged with Adulterating Benlate (Oct.)
Howell to Develop UHS Micronutrient Fertilizer (Oct.)
Husqvarna Honored for Environmental Efforts (Oct.)
Toro Gives Debris Management a Facelift (Oct.)
LESCO Founder, Former Chairman Dies (Nov.)
Harris Laboratories Gets AALA Accreditation (Nov.)
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Nursery Industry is \$3.67 Billion Business (June)
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EcoScience Seeks Insecticide Registration (Mar.)
GCSAA Pesticide Study Raises Questions (Mar.)
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Maryland Defeats Pesticide Ban at Schools (May)
Wisconsin Debates Homeowner Posting (May)
Pesticides May Improve Turf Rooting (June)
RISE, Users Face Growing Product-Related Challenges (Nov.)

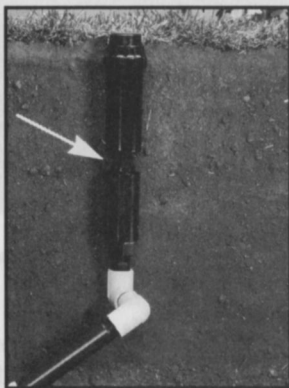
REGULATIONS

California Registers Data on Pesticide (Feb.)
Rhode Island Proposes VOC Regulations (Feb.)
Council Drops Proposed Equipment Restrictions (Mar.)
Five States Consider Preemption (Apr.)
Leaf Blower Bans Continue to Spread (Apr.)
Congress Delays WPS Changes Until '95 (May)
EPA Considers OPE Standards (June)
Minors Prohibited; Did You Know? (July)
"Practice" Laws Limit Landscape Designers (Nov.)

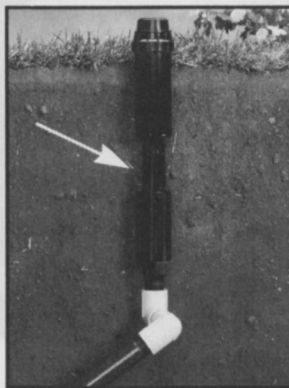
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GIE Attendees Comprise Diverse Group (Mar.)
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PLCAA Continues as GIE Manager (Apr.)
OPE Dealers Call for Greater Customer Value (May)
EXPO: Increased Space Benefits Attendees (June)
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Survey: GIE Attendees Mainly Managers (Aug.)
EXPO '94 Shifts to Commercial Focus, Draws Attendees (Sept.)
Mid-Am Show to Dock at Navy Pier (Nov.)

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