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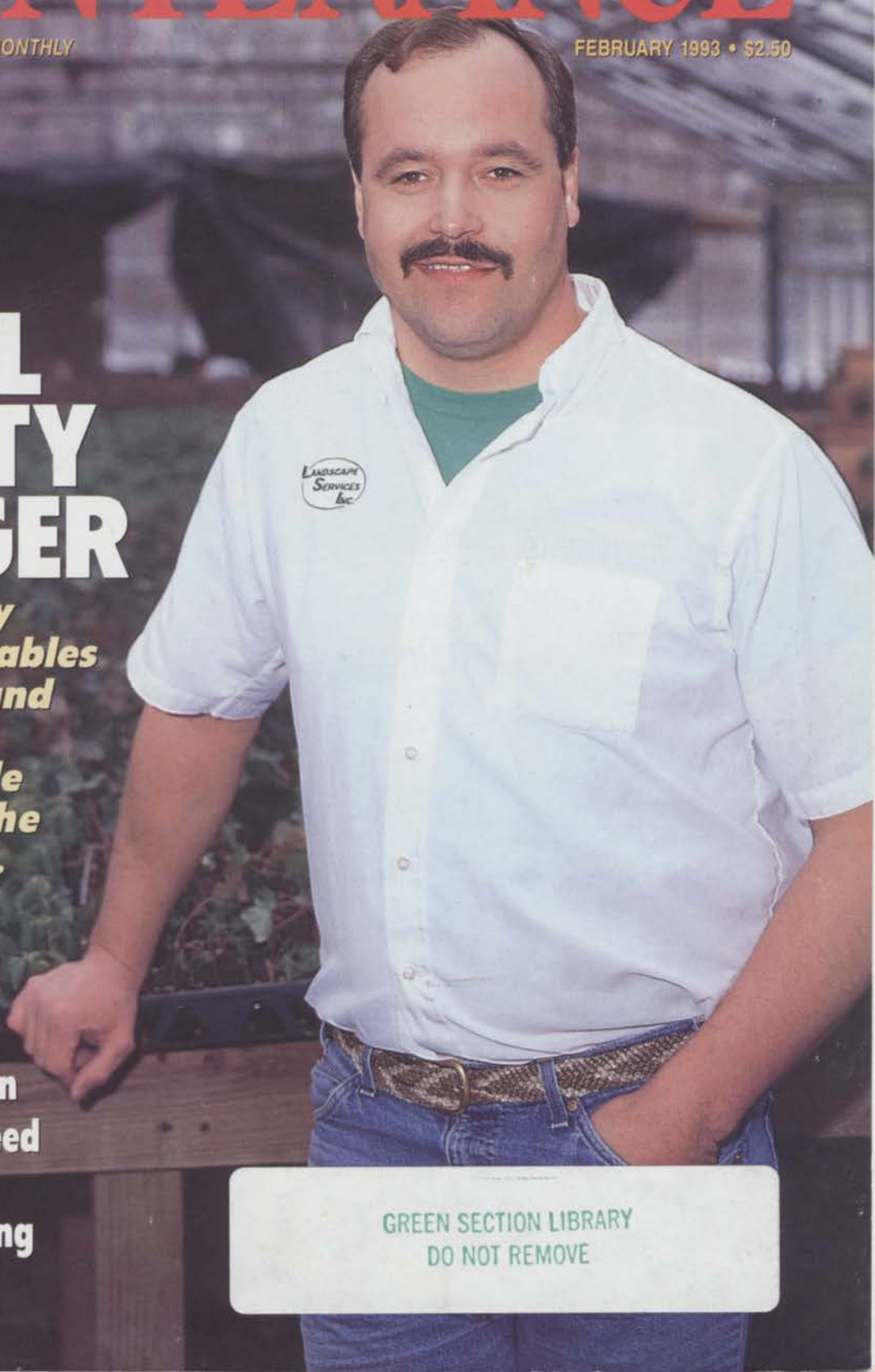
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In this issue:

**Designing for
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RECORD OF MATERIALS USED

Material	Amount	Unit
Gal	30	Gal
Lbs	10	Lbs

RECORD OF PAYMENT

Charge	Amount
CHARGE	\$47.60
PREPAID AMOUNT	\$0.00
SALES TAX	\$2.86
TOTAL	\$50.46

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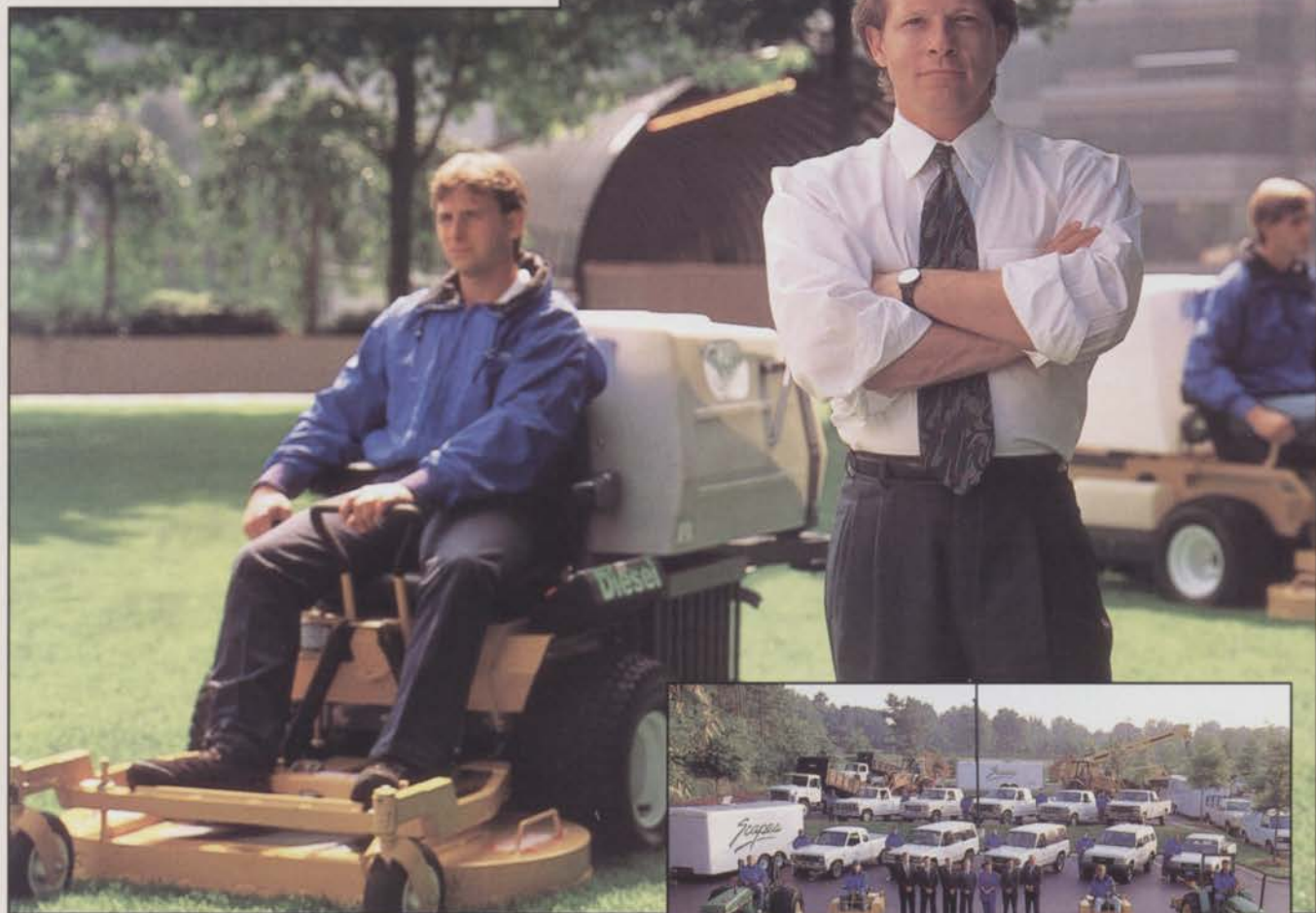
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Lawn & Landscape MAINTENANCE

VOLUME 14, NUMBER 2

FEBRUARY 1993

Cover Photo:
Terry Colter, Fort Wayne, Ind.

FEATURES

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A firm believer in Total Quality Management, Daniel Skinner of Landscape Services Inc. learned to enable his staff to succeed while concentrating on the bottom line.

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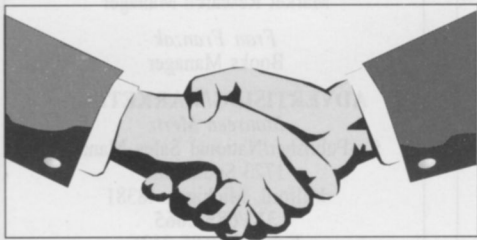
The common bond between landscape designers and lawn and landscape contractors is the desire to create an end product that pleases the client. To achieve that goal, each must strive to meet the other's needs and expectations.

40 Preemergents: Opening The Window Of Opportunity

New chemistries and subsequent products for weed control give lawn/landscape contractors more options and leave less to chance in their turf management battles.



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48 Repairing Damaged Turf

Once it's determined an area of turf is not what it should be, options from dethatching to overseeding to turf variety selection are important steps in reclaiming an acceptable aesthetic appearance.

51 Building Company Teamwork

Enhancing your employees' interaction with co-workers and peers through group events not only boosts confidence, it may heighten job performance.

57 Irrigation's Lifeline: Zoning and Routing

Lesson eight in our irrigation training series discusses the importance of suitable zoning and pipe routing to the success of the entire system.



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Editor's Focus

ASK ANY FIRM what sets it apart from its competitors and the answer you'll most often receive is good service.

Surely, no one will deny that good service is essential to the long-term viability of any organization, but good service is in the eye of the beholder. And today's customers — both internal and external — are more demanding than ever before. They want it faster, better, cheaper and "their way."

Consequently, to provide good customer service it's imperative that owners, managers, foremen and all personnel not only understand what the customer is looking for, but that the customer's expectations are realistic as can only be explained through thorough customer education.

Creating a quality customer service program is more than giving the customer what he wants (the customer is always right syndrome), it means establishing an environment within the work place and among workers that creates accountability, a sense of pride and a feeling of accomplishment when tasks are performed.

Creating and managing a service quality culture was the focus of a recent Executive Forum hosted by the Associated Landscape Contractors of America. The forum, an annual meeting of landscape contractors of varying sizes and geographic locations, created a relaxed setting in which uninhibited participants delved into the huge task of creating a quality service environment.

The theme was an extension of last year's focus on total quality management. The TQM theory embraces careful and extensive training of all company individuals so that they have the knowledge and skills to achieve service standards. Once accomplished, individuals should be empowered to work on behalf of your customers.

Within this context, empowered employees must be prepared to deal with customer requests and complaints. It should be discernable to all employees what accountability is expected of them and when they have the authority to make decisions. For example, should front-line employees have the authority to satisfy a customer's demand or should it wait for a superior?

If your firm chooses this route, be explicit with your decisions. If you are going to empower your people, be prepared to live with the mistakes they can and will make. This is one of the hardest lessons to learn in total quality management.

Customer service strategies, as trying as the responsibility can get, were unveiled at the Executive Forum through general sessions with Ron Zemke, president of Performance Research Associates, Minneapolis, videos and group interaction. Zemke's



words and examples were further dissected and mulled over by intimate groups of non-competitive peers.

Strategies for the 1990s should reflect customer intimacy, operational excellence and professional leadership. After all, the better you are at solving customer problems, the longer you'll keep your customers. "Repeat business is the business you are in today," Zemke said.

Eight keys to superior service in any firm are: finding and retaining quality people; knowing customers intimately; focusing on organizational purpose; making systems easy to do business with; training and supporting employees; involving and empowering employees; recognizing and rewarding good performance and celebrating success; and setting the tone and leading the way through personal example.

In its third year, ALCA's executive forum continues to grow and receive support from the industry's landscape contractors and suppliers. It's an active, invigorating process that challenges and rewards its attendees. Far from a traditional classroom setting, contractors learn through participation and interaction with the best resource — their peers.

ALCA and its Executive Forum participants should be congratulated for their efforts in improving the professionalism and business health of the lawn and landscape industry.

As total quality management and client sensitivity issues continue to pervade the green industry, we'll bring you interviews with companies actively involved in the quality movement, steps they took to get there and tips which will help your firm thrive. — Cindy Code

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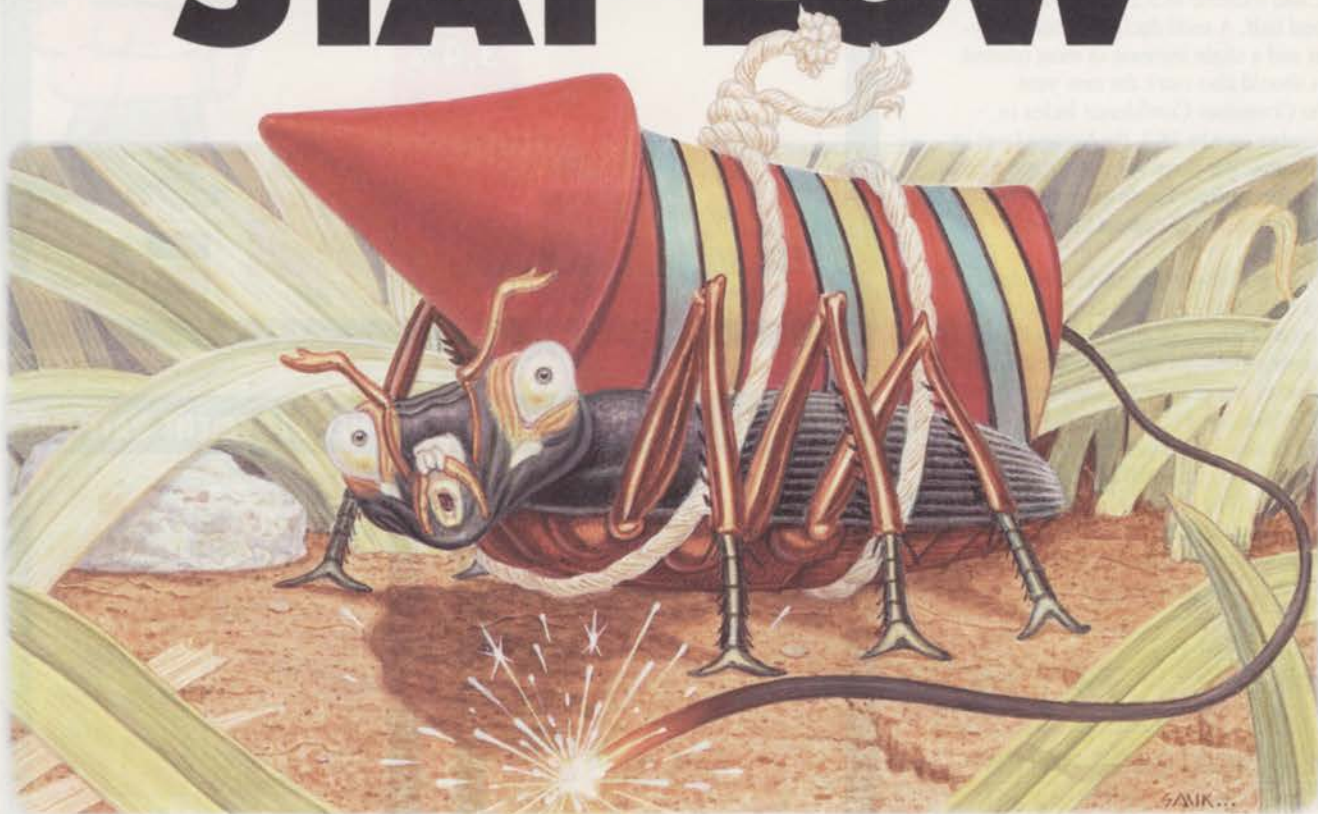
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USE READER SERVICE #22

Business Watch

ECONOMISTS ARE calling for moderate economic growth and lower inflation for 1993. A panel of 44 economists surveyed by *The Wall Street Journal* expects the economy, after being adjusted for inflation, will grow at a 2.8 percent annual rate for the first half, and increase to 3.2 percent in the second half. A mild decline in unemployment and a slight increase in most interest rates should also mark the new year.

The Consumer Confidence Index in December rose to 78.3, the highest level in 18 months. The jump from a revised 65.6 in November reflects future expectations rather than an appraisal of current business conditions.

Growing consumer confidence helped boost the sales of existing single-family homes to the highest monthly level since December 1986. Existing homes sold in November at a seasonally adjusted rate of 3.85 million, up 19.2 percent from November 1991 and 5.8 percent from October 1992, according to the National Association of Realtors. The Association expects 3.44 million existing homes to sell this year.

Mortgage rates reached 8.02 at year's end, then fell to 7.83 in January.

RETAIL SALES

SEPT.	OCT.	NOV.	DEC.
+0.7	+2.1	-0.5	+1.2

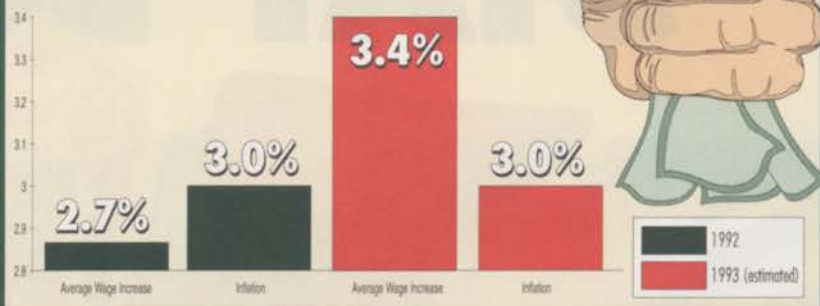
FIXED MORTGAGE RATES*

OCT.	NOV.	DEC.	JAN.
7.91	8.05	8.02	7.83

*Posted yields on 30-year mortgage commitments for delivery within 30 days.

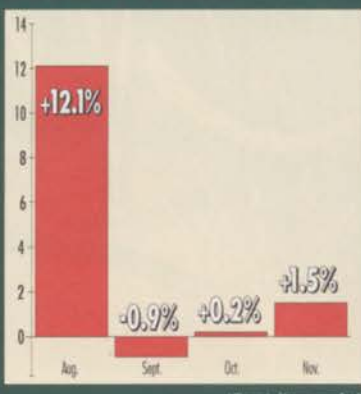
WAGES GAIN ON INFLATION IN '93

Wages couldn't keep up with inflation in 1992, but economists expect salary increases to jump ahead in 1993.



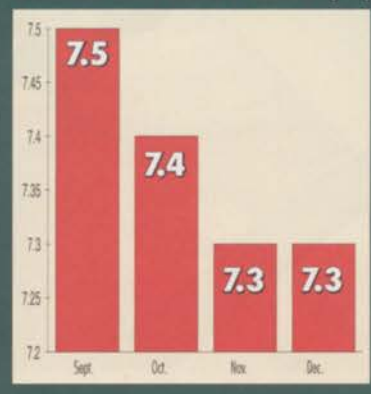
Source: The Wall Street Journal

HOUSING STARTS*



Source: Bureau of the Census

UNEMPLOYMENT RATE (%)



Source: Bureau of Labor Statistics

ECONOMIC REPORT: POST-ELECTION REALITY

PRIOR TO THE presidential election, contractors chose George Bush as the candidate most likely to promote policies benefitting small business. Now that President Bill Clinton has taken office, many foresee tax hikes and other changes crippling small enterprise.

Some readers interviewed agreed the effect of those changes won't be felt immediately, but expected policies down the line to counter the initial optimism that slightly boosted the economy. The first indication they've noticed is Clinton breaking campaign pledges. "He made a lot of promises that he won't be able to keep. I don't think his deficit reduction plans will work and that will come back to haunt him," said Andy Skoog, foreman at Skoog Landscape & Design, Chadwick, Ill.

Contractors pinpointed health care as the first issue to come before the new administration that hurts the lawn and landscape industry. "Health care is a very big issue because the industry is so labor intensive," said Terry Haaf, owner of T.J.'s Lawns and Landscapes in Woodstown, N.J., adding that present employer health care taxes are more than enough burden.

"The tax is a quick fix. They don't think about how it affects small businesses," she said. "These are things I have to do to stay in business that I don't feel I should have to do."

Denny Leipert of Shelagh's Plantscapes in Palos Verdes Estates, Calif., expressed reservations about Clinton but claims a change was necessary. "We couldn't go on with Bush. In areas of health care, business, education — something's got to be done," he said. "Here in California, we've got problems that have to be addressed at the government level. Illegal immigration is sapping big dollars. It's breaking the state."

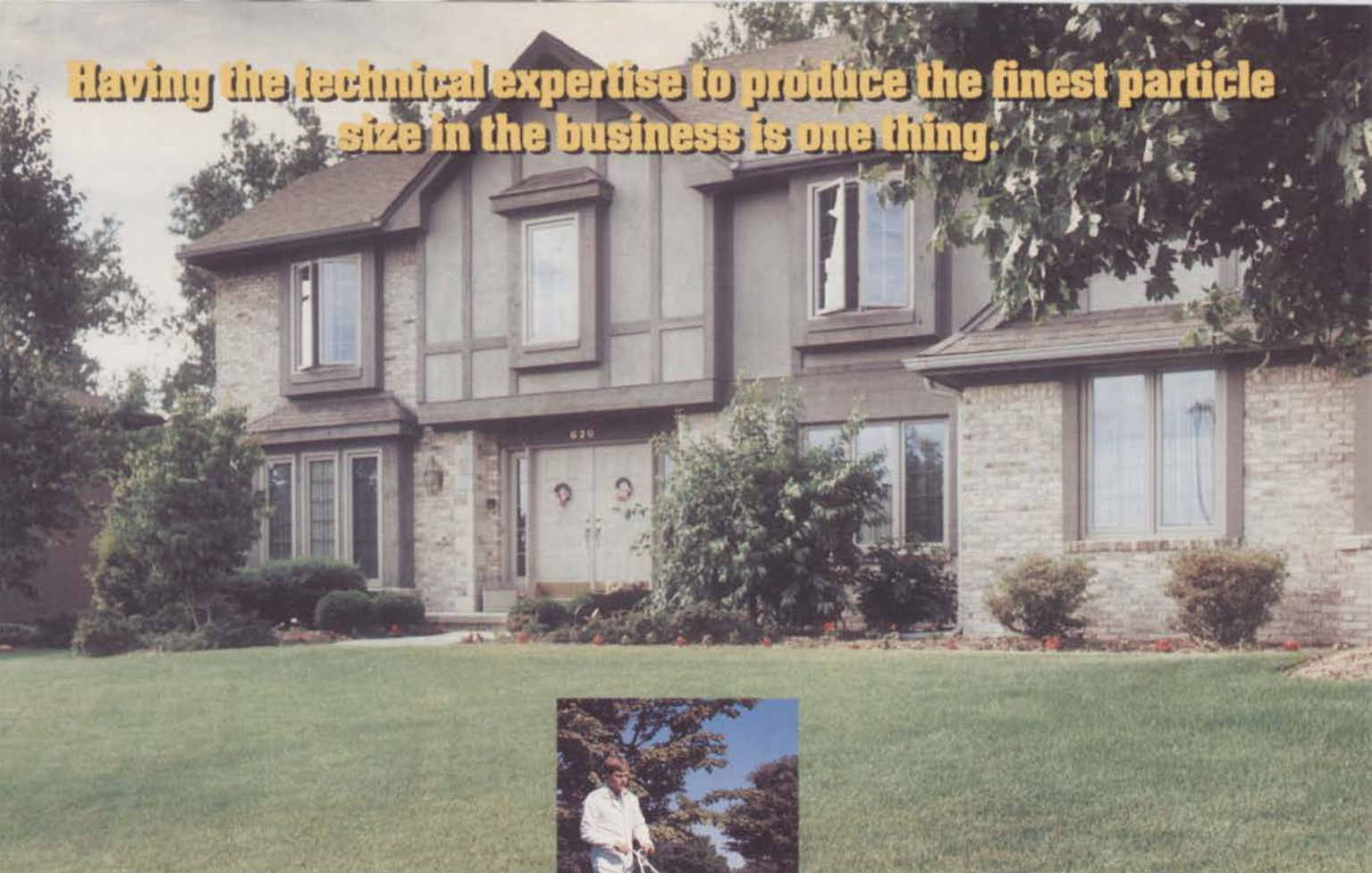
Worker's compensation tops Leipert's list of pressing issues facing the industry. "Our company is a small business. We have five employees and pay \$2,500 a year for worker's compensation that we don't even use."

On environmental issues, contractors expressed uncertainty as to how Clinton will act. "I don't think I've heard enough from Clinton on environmental concerns to form an opinion," said Charlie Price, president of TerraSod Inc. in Maldon, W.V. "There are environmental regulations in place that are heading in the right direction. We need to continue those," he said.

Carl Nagel, Michael/Todd Inc., Naples, Fla., believes Clinton's policies "across the board, will be costly to small business," but that "environmental regulations will be carried to the extreme."

Pesticide use is one area that needs government control, he added. ■

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USE READER SERVICE #93

NEWS DIGEST

Monsanto Buys Ortho's Assets

Monsanto plans to purchase the assets of Chevron Chemical Co.'s Ortho Consumer Products Division for \$400 million, including working capital employed in the business. Monsanto said the companies hope to conclude the transaction by April.

ICI Undergoes Name Change

ICI Professional Products changed its name to ZENECA Professional Products after the company split into two wholly-owned subsidiaries of Imperial Chemical Industries PLC. ZENECA encompasses the agricultural products, seeds, pharmaceuticals and specialty businesses. ICI Americas Inc. includes materials, explosives, paints and industrial chemicals.

Lawn Care Companies Rank As Top Franchises

Success magazine ranked Nitro-Green Professional Lawn and Tree Care 53rd and Lawn Doctor 70th in its listing of the top 100 franchise opportunities in the United States. Nitro-Green, based in Fairfield, Calif., has 41 locations — 38 owned by franchisees and three by the company. Matawan, N.J.-based Lawn Doctor has 293 locations — 292 owned by franchisees and one by the company. Criteria for the rankings included franchisor life cycle, services provided, stability and profit.

Fuqua Denies Newspaper's Claim

Fuqua Industries in late January refuted *The Atlanta Journal and Constitution's* claim that Fuqua planned to sell its Snapper lawn and garden equipment division for \$50 million to \$75 million and use the money for acquisitions. Fuqua officials met with a potential buyer but failed to reach an agreement, said a company spokesman.

Turf Resource Guide Not Yet Available

Information for a turfgrass management resource guide is being sought by the Crop Science Society of America. The guide is not yet completed, as reported in our January issue, but is expected to be published by the fall. If you have information for inclusion in the new guide, contact Dr. Keith Karnok, Agronomy Department, Plant Science Bldg., Univ. of Georgia, Athens, GA 30602; 706/542-0931.

Survey Shows Expo Attracts Buyers

RESULTS OF THE 1992 International Lawn, Garden & Power Expo Visitor Survey show 94 percent of attendees have buying influence for their companies, and that 78.4 percent are owners or presidents of their companies.

The survey, conducted by the University of Louisville School of Business, queried a random sampling of 1,000 dealers, distributors, retailers and other buyers attending the Louisville, Ky. event. About 300 of those surveyed responded.

Landscape and commercial mowing contractors made up 15.5 percent of the buying audience. Dealers and retailers comprised the largest segment of industry attendees at the show — 36 percent, while equipment rental dealers, at 2 percent, represented the smallest segment.

Other survey findings show:

- More than 40 percent of the respondents traveled at least 400 miles to attend the Expo.
- 48 percent planned to order between \$5,001 and \$150,000-plus worth of products as a result of attending the show.
- More than 50 percent show annual sales revenue of more than \$500,000.
- Nearly half attended primarily to see new products.

The top-selling product lines at EXPO 92 were: lawn mowers; chain saws and accessories; power equipment replacement parts and supplies; lawn mower accessories and attachments; commercial equipment; tractors and attachments for lawns, yards and gardens; engines, generators, batteries and supplies; shredders and chippers; shop tools and equipment; and trimmers and blowers.

Listed by *Tradeshows Week* magazine as the second largest tradeshow in the United States in terms of exhibit space, EXPO has tripled in size since its inception, from 300,000 net square feet to 900,000 net square feet, and more than doubled its number of exhibitors, from 220 to last July's 550.

The 1993 show floor plan allows for even greater participation by utilizing the expo center's new South Wing, plus the East and West wings and an outdoor demonstration area. A new model store, sponsored by the North American Equipment Dealers Association, will be located in the East Hall.

EXPO 93, which marks the show's 10th anniversary, is set for July 25-27 at the Kentucky Exposition Center in Louisville.

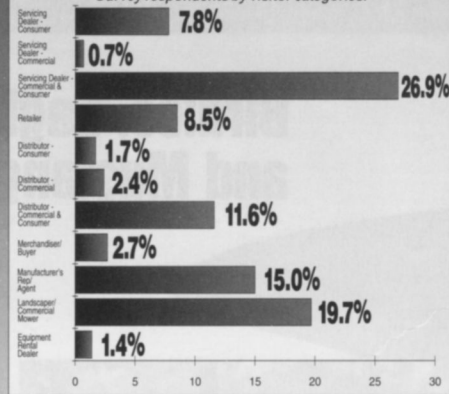
Seminars tentatively scheduled for the show include Marketing Opportunities Using Environmentally Safe Products; EDI Networks - Moving into the '90s; The Servicing Dealer's Niche in the Modern Marketplace; More Mow for Your Money; Success Stories in Tough Times; Demands and Rewards of the Rental market; Pricing for Profits, Bidding for Bucks; and Successful Dealer Open Houses & Field Days.

Special events planned in conjunction with the show include a day of horse racing at the Sports Spectrum, visits to Derby Dinner Playhouse, Kentucky Derby Museum and Farmington and a lunch-cruise on the Star of Louisville.

Reservations for all tours and hotels can be made through the EXPO 93 pre-registration brochure, expected to be mailed in mid-March. For more information, contact Andry Montgomery & Associates, 6100 Dutchmans Lane, 6th floor, Louisville, KY 40205; 502/473-1992.

ATTENDEES AT EXPO '92

Survey respondents by visitor categories:



Sandoz, Scotts Sign Agreement

Sandoz Agro and The OM. Scott & Sons Co. signed a limited time exclusive agreement for the Rizolex fungicide.

Rizolex, which can be used as a stand-

alone product or combined with a fungicide premix, contains a chemistry developed in Sandoz Agro's North American facilities. The mix provides brown patch and snow mold control for cool- and warm-season turf applications.

The companies expect to register Rizolex

in 1994, and to launch Scotts' products formulated with Rizolex possibly in 1995. Scotts estimates it will use Rizolex in up to six products within its current and future fungicide lines.

N.J. And Rutgers Study Compost Use

The New Jersey Department of Protection and Energy and Rutgers University plan to conduct a study to determine if municipal waste makes fertile soil.

The state's solid waste could generate 2.5 million cubic yards of compost annually, providing organics and nutrients for landscape plantings and a substitute for peat moss and similar materials.

The project will help researchers identify market availability for compost products, examine safety in using composted materials and provide a basis for application standards.

DEPE plans to pay for the project using private contributions and \$250,000 from its Recycling Fund.

Calif. Suspends 93 Pesticide Ingredients

The California Department of Pesticide Regulation intends to suspend registration of 93 pesticide active ingredients found in about 400 products sold in the state.

Few of the products are pesticides used for lawn care, and few have widely known brand names, the department said.

Up to 11 studies may be required for each active ingredient, including animal tests to gauge toxicity.

The department sent notices of intent to suspend registration, informing companies they must provide up-to-date toxicology data submitted on potential chronic health effects.

DowElanco Promotes Safety

DowElanco offers a Responsibility Comes First product stewardship program to help businesses provide safe working environments and meet increasing pesticide regulations.

Customers participating in the program earn points with each DowElanco turf and ornamental pesticide product they buy. Accumulated points can be redeemed for safety items.

Nearly 250 safety products were ordered last year, including spill response kits and stations, personal safety and decontamination kits, and *Right-to-Know* books, available with *When a Crisis Strikes* videos.

This year, participants can choose to use their points to make donations to research and trade associations.

Report Tags Horticulture Sales In Billions

Sales of nursery, greenhouse and outdoor floriculture crops in the United States amounted to an estimated \$4.6 billion in 1991, according to a survey by SRI International. The survey also found that nearly 6,100 U.S. firms grow ornamental crops wholesale as their primary business and have annual sales of at least \$25,000.

The survey of 449 wholesale growing firms indicates that 83 percent of U.S. nursery and greenhouse firms have annual sales of less than \$1 million. The largest firms with annual sales ranging from \$1 million to more than \$50 million account for 75 percent of total industry sales, however.

The Pacific and Southeast regions accounted for 57 percent of total industry sales, led by California and Florida.

In pesticide sales, nursery and greenhouse growers spent an estimated \$71.4 million in 1991. Insecticides and miticides accounted for 33 percent of growers' total

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pesticide costs. Fungicides and bactericides constituted about 30 percent and herbicides nearly 26 percent.

SRI conducted the survey as part of a new study titled U.S. Nursery and Greenhouse Ornamentals Markets for Pesticides. The report contains an overview of the U.S. horticulture industry, including costs, pest problems and pest management programs.

Information about the report and survey results can be attained by contacting SRI International, 333 Ravenwood Ave., Menlo Park, CA 94025; 415/859-5815.

Court Overturns Ban on DEET

The New York Supreme Court overturned a state regulation banning sales of insect repellents containing more than 30 percent DEET. The product is considered the most effective measure against ticks that cause Lyme disease.

The New York State Department of Environmental Conservation had proposed a blanket cancellation of the registration of products containing more than 30 percent DEET, based on some anecdotal reports of adverse health effects.

The Chemical Specialties Manufacturers Association, which represents the manufacturers of DEET-containing insect repellents, filed suit against NYDEC opposing implementation of the proposed May 8, 1992 ban.

The Court last spring granted CSMA a temporary restraining order against implementing the regulation, pending a final decision.

"A ban on DEET would have likely contributed to an increased incidence of Lyme disease among New York residents and visitors to the state," said CSMA President Ralph Engel. "The disease has already reached epidemic proportions in some parts of the state."

John Deere Sponsors 'Keep Green' Program

Some John Deere commercial equipment dealers are sponsoring a "Keep Green" program which highlights sale prices on equipment parts. The program runs through March 31.

"This parts sale provides significant savings for grounds maintenance operations of all sizes," said Greg Davis, parts marketing manager in John Deere's Raleigh, N.C. marketing unit.

Davis claims the sale is a good opportunity for grounds maintenance managers to stretch their budgets by stocking up on parts for the 1993 season. Participating dealers have specific information on how to maximize discounts during the program.

TOCA offers \$2,000 In Scholarships

The Turf and Ornamental Communicators Association plans to award two \$1,000 scholarships to college juniors and seniors interested in green industry communications. To qualify, students must hold a 3.0 GPA in their major, 2.5 overall.

Applications can be obtained by writing to Den Dardner, TOCA Executive Director, 8400 Normandale Lake Blvd., Ste. 500, Bloomington, MN 55437.

Sod Stakes Made Biodegradable

Yamashita Commercial Co. in Tokyo is distributing biodegradable sod stakes molded from fully biodegradable polymer.

The starch-based polymer breaks down in soil and water. The biodegradable stakes, unlike traditional bamboo or metal ones, can be left in place after the sod takes root.

The specialty polymers are made by Novon Products Group of Warner-Lambert Co., Morris Plains, N.J. ■



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USE READER SERVICE #81

Association News

THE **ASSOCIATED LANDSCAPE Contractors of America** plans to award eight \$250 scholarships to ALCA Student Chapter members pursuing a degree in the fields of horticulture, ornamental and/or landscape at a two-year or four-year vocational/technical school. Deadline for application is March 1. Winners will be announced at ALCA Student Field Days March 26-28.

ALCA also intends to contribute \$1,000 to the Future Farmers of America Scholarship fund. The scholarship goes to an FFA member pursuing a two- or four-year degree in any field directly related to the landscape industry.

The **Professional Lawn Care Association of America** has developed advertising guidelines to help industry professionals publicize accurate, complete information about their products and services. The guidelines include briefings on Environmental Protection Agency and Federal Trade Commission advertising standards, and describe language that is considered misleading, conflicting or unsubstantiated. Additionally, what can and cannot be said concerning safety claims is explained.

"The advertising practices of our industry

continue to receive a lot of attention from state and federal regulators," said Tom Delaney, PLCAA director of government affairs. "And lawn care professionals need to keep in mind that advertising, by definition, includes all communications with customers and the public, including letters and any statements made over the phone or in person."

The guidelines, prepared in cooperation with the FTC and the EPA, are available from PLCAA at no charge.

The **Florida Turfgrass Association** and Tiffy Turf are educating kids of all ages on the benefits of turfgrass. The FTA produced an activity booklet for children to illustrate the importance of turfgrass to the environment and quality of life. The book includes coloring pages, cartoon characters, word puzzles and drawing games.

In the activity booklet, cartoon character Tiffy Turf, along with pals Suzy Sprinkle and Handy Andy, walk through the amazing abilities of turfgrass: trapping air pollutants,

For more information...



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absorbing carbon dioxide and releasing oxygen, filtering and filling the underground water supply, cooling the planet, preventing erosion and providing playing fields for sports and recreation.

A connect-the-dot mole cricket and menacingly toothy broadleaf weed show that turfgrass has enemies and needs tender loving care to grow and prosper.

The FTGA offers the booklet to schools, government offices and retail outlets.

The Professional Plant Growers Association is sponsoring a tour of England Aug. 24 to Sep. 9 to introduce members to the country's horticultural production and marketing practices.

The tour includes visits to growers and horticultural businesses including: H. Evans Ltd. which has about 7 acres of greenhouses including an irrigation system for pot plant production; Nielsen Plants with 16,000 square meters of greenhouse space for specialty pot crops; Newington Nurseries, the first company in England to install the Visser Automatic Transplant Machine; and M.D. Smith with a 4-acre greenhouse producing 250,000 flats of spring and autumn bedding plants and perennials.

The tour is offered on a first-come first-

served basis. Cost is \$2,849 per person, double occupancy. The price covers 29 meals, sight-seeing and land transportation by deluxe motorcoach. Airfare is not included.

Two seminars on certification for organic lawn care are scheduled for March 30 at the Auburn Elks, Auburn Mass., and April 2 at the University of Massachusetts Cranberry Station, Wareham, Mass.

Hosted by the **University of Massachusetts Cooperative Extension System** and the **Natural Organic Landscape Professionals Association** (NOLPA), the seminars, titled Organic Lawn Care: Practices and Certification Standards, cover organic turf management techniques, cultural, biological and least toxic options for insect and disease management and newly developed certification standards.

Preregistration costs \$60. Credit will be given for Massachusetts pesticide recertification as well.

IN BRIEF... The **Associated Landscape Contractors of America** plans to hold its Member Tour to San Diego April 2-4. The trip includes a visit to the San Diego Zoo's

Behind the Scenes Tour. The two-hour zoo visit includes a Botany at Breakfast lecture, review of the zoo's bio-climatic exhibit and a journey through a replica tropical Asian rainforest...The **Colorado Association of Lawn Care Professionals** is hosting a pesticide training and recertification seminar March 9-10 to help employers meet state regulations. State law requires new employees to have applied pesticides at least one season in the past three years and to take a minimum of four hours classroom training. If inexperienced, turf and tree applicators must take 16 hours of training...The **American Soil Producers Association** targets China and Hong Kong for its next study tour. The 17-day trip includes stops in Shanghai, Beijing, Xian, Guilin and Hong Kong. Price is \$4,000 per person. The trip features a tour of Beijing Agriculture University's sports stadiums...The **Arizona Landscape Contractors' Association** elected Bud Stephenson, owner of Caretaker Landscape Management, Mesa, Ariz., as the association's 1993 president. Stephenson succeeds Kent Miller of Groundskeeper, Tucson. Others elected include Jackie Simonson, Westscape Environmental, Glendale, as president-elect, and Nancy Coxe, Western Innovations, Chandler, as vice president. ■

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USE READER SERVICE #37

USE READER SERVICE #38

Compost Corner

LOOKING FOR QUALITY COMPOST

COMPOST USE IN the United States is on the rise. As compost supplies increase, more segments within the green industry are finding uses for them as soil amendments, top dressings and container media. All compost is not created equal, however, and compost users should ensure they are receiving a top quality material that fits their specific needs. While cost effectiveness remains a factor, the user must consider other qualities as well.

TYPES OF COMPOST. Compost is material that is periodically turned and aerated to promote microbial activity. Compost quality and analysis vary considerably with the material's origin. Compost breaks down into four broad categories: leaf/yard waste, sewage sludge/manure, mixed solid waste (MSW) and mushroom compost.

Leaf and yard waste compost, readily available today in many parts of the country, is made from composted leaves, grass and brush. Properly composted, it yields a

(continued on page 20)

CHARACTERISTICS OF AN IDEAL COMPOST

APPEARANCE

Inerts: No glass, metal or plastic

Particle Size: Screened to 1/2", few sticks or undecomposed material.

Weeds: None

Color: Dark

MATURITY

Age: Well composted, no excessive heat present

Odor: None to slight earthy

CHEMICAL ANALYSIS

% NPK: High as possible, ratio to fit compost use

pH: 6-7.5

% Organic Matter: High as possible, >20%

% Moisture: Low, <40%

Soluble Salts: Low, <3 mS/cm if to be used without blending or for seedlings

Metals: Low, less than regulatory limits for unrestricted use

Pesticides: Non-detectable or below regulatory limits.

OTHER

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USE READER SERVICE #36

USE READER SERVICE #80

N



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For more information, contact your Lebanon sales representative or local Lebanon Turf Products distributor. Or simply call 1-800-233-0628.



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S

Compost Corner

(continued from page 18)

quality, cost-effective material which serves as an ideal soil amendment. Many suppliers blend their composts with loam or sand to produce different grades for sale.

Many municipalities today are providing sewage sludge compost to the green industry. Some private composters are receiving animal manure or food composts from various sources. The chief advantage of these composts over leaf/yard waste is nutrient value. Their disadvantages include potential metal or odor problems if not properly composted and poor public perception about using sewage sludge.

Municipalities are beginning to bring mixed solid waste (MSW) composting facilities online, so that MSW compost will be available in some geographic locations in the near future. MSW compost is made simply by grinding the standard garbage stream as it is received, and allowing the organic fraction to compost. Composters attempt to extract metal, glass and plastic, but remnants of these and other contaminants such as batteries (lead), paints and pesticides continue to cause concern.

Certain areas of the country, especially

eastern Pennsylvania and Delaware, have large quantities of spent mushroom compost available. This material is predominantly horse manure used for mushroom production. After mushroom harvest the manure is discarded, composted and then sold as a relatively high-quality, highly organic material.

QUALITY PARAMETERS FOR COMPOST.

People interested in purchasing compost face numerous quality issues. The level of acceptable quality depends somewhat on the material's end use and perhaps its contact with customers, employees and the general public. These issues are summarized in Table 1.

The compost's appearance and make up are critical. It should be rich-dark in color and free of metal, glass, plastic and other apparent contaminants. Weeds should not be actively growing in or on compost piles.

If buying compost, be sure the material is screened to a fineness appropriate for your use (generally about 1/2 inch), and does not contain any large sticks or rocks. A few undecomposed small sticks may be desirable (especially if the material is used for soil or potting media amendments) as they add structure and improve aeration. In

general, no undecomposed leaves or grass should be left in the material after composting.

Compost maturity is another critical factor to consider. Acceptable compost needs to be well decomposed and mature, meaning the intense biological activity and heat associated with decomposition have dissipated. Active composting piles reach 140 to 160 degrees F; finished compost should remain at ambient or slightly elevated temperatures.

If compost is not fully mature, there develops a risk of foul, unacceptable odors and immobilization of soil nitrogen. Microorganisms in the compost use soil nitrogen to continue the composting process, robbing the plant of needed nitrogen.

A chemical analysis should be available with your compost purchase. Macronutrient (N-P-K) analysis is important, especially if you plan to derive some nutrient value from the material. Generally, sludges and manures have a higher N-P-K analysis than leaf/yard waste or mushroom compost. However, all composts do add some nutrient value especially since they are used in large quantity, and all can be easily supplemented with standard fertilizer materials.

pH of compost also plays a key role, es-

(continued on page 22)

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Brillion's new, improved **Turfmaker Seeder** helps you grow thicker, more uniform stands and save up to 50% in seed costs. Its legendary precision seeding helps you get better seed/soil contact, increased germination, faster emergence and thicker stands all with one pass seeding.

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93-02

USE READER SERVICE #17

Compost Corner

(continued from page 20)

pecially in regions that have very acid or alkaline soils. Compost often can modify pH extremes in the soil. Most composts have a pH in the neutral to slightly acid range, but you should always check the pH of new composts before using them.

All composts contain higher amounts of organic matter than a typical soil, but lower amounts than peat. As a soil amendment, compost significantly raises the organic matter content of soils, especially sands, giving it an advantage over peats which are typically very acidic and more expensive.

Moisture content of composts varies widely, depending on where and how the finished product is stored. The compost should be kept as dry as possible. Wetness caused by improper handling or storage adds weight, thus making the compost more costly to ship and difficult to handle.

Soluble salt content can be high in some composts. Generally, sludge, manure or mushroom compost has higher salt contents than leaf/yard waste compost. If salt content is too high, it can damage seedlings and other sensitive plants. Most composts are blended with other materials at the job site,

however, generally moderating the effect of excessive salts. Be especially careful of salt content if you are going to seed directly into compost.

Chemical contaminants fall into two broad categories: heavy metals and pesticides. Toxic heavy metals are a concern in sewage sludge and MSW compost and must be continuously checked by compost producers. Many states have established guidelines for using compost with metal, and the U.S. Environmental Protection Agency is preparing to issue federal guidelines.

Based on metal levels, sludge and MSW compost are categorized by use: unrestricted use, use with limited public exposure, not for use on food chain crops, or landfill use only. Green industry users should buy unrestricted materials, and always request a metals analysis to ensure the sludge or compost meets regulatory standards.

Questions also arise about the presence and persistence of pesticides in finished compost. Leaf/yard waste compost contains large quantities of grass which may have retained some pesticides. Past and current research indicates that the pesticide content of finished compost should not be a concern. The conditions established within a compost pile provide for rapid decompo-

sition of any pesticides which may be present, and surveys indicate the levels of pesticides getting into the waste stream on grass is low. Pesticide analysis on finished compost generally shows non-detectable levels or levels far below regulatory limits.

Biological activity within an active compost pile should be very high. The heat produced will kill not only weed seeds, but fecal pathogens in sewage sludge composts. After completing the composting process and cooling down, composts still contain an abundance of microorganisms that are beneficial in the end use of the product. These microorganisms are helpful in minimizing thatch development in lawns, as well as helping to keep plant disease causing organisms found in soil in check.

Composts less abundant in microorganisms are not as beneficial. Materials simply stockpiled and aged and not composted will not contain as high a level of beneficial microorganisms and indeed may contain materials such as organic acids produced under anaerobic conditions which can be harmful to plant growth. — Jim Wilkinson ■

The author is vice president, professional sales and research and development for Earthgro Inc., Lebanon, Conn.

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USE READER SERVICE #77

USE READER SERVICE #78

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Senior Vice President of
Post Landscape Services

"We started experimenting with mefluidide to reduce mowing and trimming costs even before they called it *Embark*," says John Hooks, "and I can assure you that these items in my hands, which make up the PBI/Gordon PGR Demo Kit, can teach you in one season what it has taken us many seasons to learn about using PGR's."



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The experience of Post Properties, Inc. is indicative.

Post Properties, Inc., headquartered in Atlanta, is the premier developer and manager of garden apartment communities totaling some 16,000 units throughout the Southeast. Characteristically their landscaped areas are 35% turfgrass; and 65% ornamental plantings, flower beds, jogging trails, recreation facilities and water.

"Cosmetic image is vital to our success," says John Hooks, senior vice president of Post, "but it puts a strain on maintenance costs." Hooks goes on to say that edging turf adjacent to amenity areas with a mechanical edger can take as much time as mowing the rest of the turf.

"This is what got us started experimenting with mefluidide," says Hooks, "and we have found that, by using Embark Lite, our original edging schedule of once every two weeks can be reduced to every four to six weeks with absolutely no discoloration problems."

"Subsequently, we have found countless ways to use Embark Lite," continues Hooks. "Including broadcasting on tall fescue to reduce the cost of mowing. And, interestingly, our expertise with Embark Lite has been very valuable to us in our program of branching out into the maintenance of properties other than those owned by Post."

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USE READER SERVICE #15

FINE TURF REGULATOR

768-12/92

LANDSCAPE SERVICES INC.

HEADQUARTERS: Fort Wayne, Ind.

BRANCHES: None

FOUNDED: 1988 by Daniel Skinner
and Tim Hulbert

SOLE OWNER: Daniel Skinner

PRIMARY SERVICES: Landscape design,
construction and maintenance; wholesale
nursery, greenhouse. Subcontract fertiliza-
tion, weed control, irrigation, tree mainte-
nance and concrete work.

EMPLOYEES: 6 year-round, 35 seasonal
1992 SALES: \$895,000

EXECUTIVE SUMMARY

THE CONCEPT: Provide landscape
services to high-end residential and commer-
cial clientele; maintain wholesale nursery of
large-caliper trees for customers in Fort
Wayne and larger markets like Chicago and
Detroit; operate a greenhouse; import
clay pots from Mexico.

PROJECTIONS: Reaching \$1.1 million in 1993

HURDLES: Knowing costs; dealing with client
bankruptcies.

THE OWNER

DANIEL SKINNER

AGE: 33

FAMILY: Married

EQUITY HELD: 100 percent

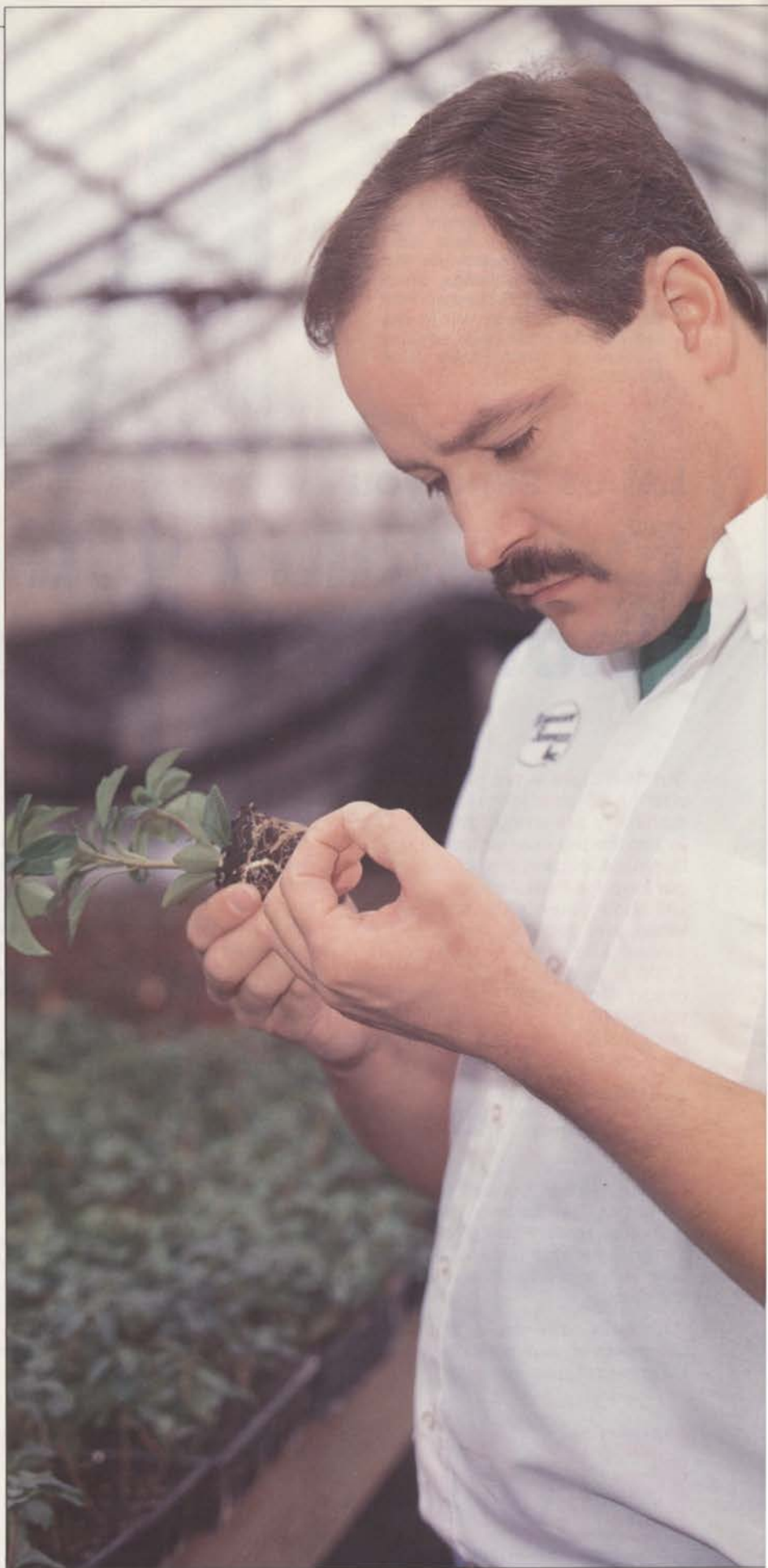
WORK WEEK: More than 70 hours

EDUCATION: Michigan State University,
bachelor's degree in landscape horticulture
with minor in golf course and
turfgrass management.

OTHER COMPANIES STARTED: None

LAST JOB HELD: Plant purchasing for The
Brickman Group in Philadelphia.

Dan Skinner has had an acute interest in gardening and plants since his early teenage years. Today, Skinner has built the nursery portion of his business to \$250,000 in sales. Photos: Terry Colter.



Seizing Opportunities; Embracing Total Quality

A firm believer in Total Quality Management, Daniel Skinner learned how to enable his staff to succeed while concentrating on the bottom line.

By Julie A. Evans

DANIEL SKINNER started his first business when most kids his age were more concerned with playing games than making money.

At age 12, he launched a candle-making company, followed by an organic gardening business and a rototilling service — all before his 16th birthday. He even bought a rusty old dump truck before his first car, using it to tote a rototiller to clients' gardens. "My dad used to say he could hear that truck rust," Skinner recalled.

Today, Skinner, 33, is owner of Landscape Services Inc. in Fort Wayne, a full-service landscape design, maintenance and construction firm with 1992 revenues approaching \$900,000. A large portion of that total comes from the sale of large-caliper shade trees, which the company grows on its 30-acre nursery in Whitley County. The company also provides clients with ground covers and other plantings from its greenhouse, and sells clay pots imported from Mexico.

Skinner is an opportunist in the best sense of the word. He has a knack for finding and filling gaps in the marketplace. When his high-end residential accounts dwindled during the early '90s' recessionary pullback, Skinner hustled for commercial accounts interested in quality landscaping and built up a substantial client list.

He also seizes market trends like composting, wetlands mitigation and large-caliper shade trees, turning those trends into business opportunities.

Since embracing the philosophy of Total Quality Management last year, Skinner has emerged a more confident manager. He predicts 1993 will be a record year for Landscape Services, with projected sales of \$1.1 million. The bulk of that total, about \$650,000, will come from the construction sector, followed by the nursery division, \$250,000; maintenance \$100,000; clay pot sales \$60,000; and greenhouse product sales \$50,000.

EDUCATION. Skinner gained an understanding of the landscape at an early age. He said he was influenced by his father, an independent businessman whose hobby was flower gardening.

"I didn't want to compete with my dad or step on his toes, so I got into vegetable garden-

ing when I was young and built it into a business," he explained. Even at a young age, Skinner displayed a shrewd business sense, opting to cultivate organic vegetables because, "With organics, I knew I could charge more and make greater profit from the same amount of work," he recalled.

An East Coast prep school education provided him with discipline and an excellent education that shaped his business philosophy for years to come, Skinner said. It also helped him conduct business with his wealthy clientele.

"It taught me how to deal with clients who expect the best. I use that in marketing to approach particular clients," he explained.

Skinner graduated from Michigan State University in 1983, with a bachelor's degree in landscape horticulture and a minor in golf course and turfgrass management. From there, he took a job with The Brickman Group, an experience he described as "tremendous."

"I don't know of anyone who has taught me more than Dick Brickman about concentration on the customer and on quality," he said.

Working his way up from crew supervisor to expeditor to plant purchaser, Skinner soon learned how to set budgets and grow a business. As one of six men involved in the start-up of Brickman's Philadelphia office, he helped it expand from \$250,000 its first year to \$11 million in just four years.

But by 1987, Skinner was ready to break away from The Brickman Group and start his own company. He grew frustrated with his inability to climb the corporate ladder. "I ran into people at the middle management level

(continued on page 28)



BEFORE

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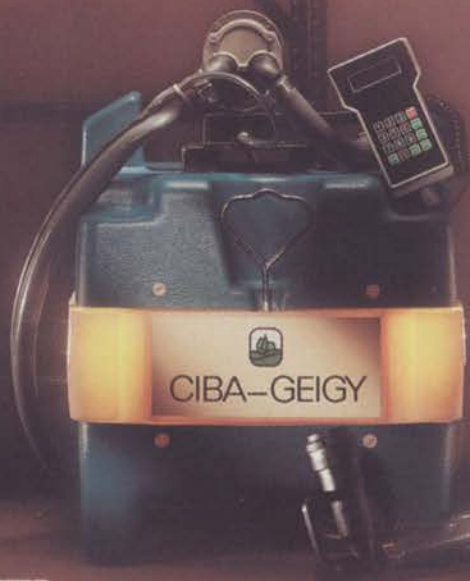
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AFTER



CIBA-GEIGY

Embracing Total Quality

(continued from page 25)

who were not willing to let me grow," he said

GETTING STARTED. Landscape Services was incorporated on Jan. 1, 1988, by Skinner and then-partner Tim Hulbert. The two men settled on Skinner's Fort Wayne hometown after scouring cities on the East Coast and Midwest for landscape opportunities.

"Every time I came home to Fort Wayne, I kept hearing about the need for quality landscaping," he said. "It became pretty obvious that Fort Wayne could support this kind of operation."

Skinner and Hulbert initially sold new accounts with only a portfolio of their past projects from The Brickman Group. They soon landed two high-profile accounts for homes on a Jack Nicklaus golf course. Then they got lucky: A home and garden show called the "Street of Dreams" featured the two clients' homes, and visitors took note of the high quality landscaping.

"We got tremendous exposure

Skinner believes in delegating responsibilities to his employees and watching them grow.

from the show. People walking past the homes saw the difference in landscape quality right away. A lot of people who were thinking about building homes there (in the golf course community) became our clients."

First-year revenues reached \$300,000, yet the company lost \$40,000, which Skinner attributes to poor management. It wasn't until 1990 that Landscape Services was profitable. By then, Skinner and Hulbert's partnership was showing the strains of a bad marriage. The two men didn't share the same vision for the company, Skinner said. He declined to give details of the failed partnership, revealing only that jealous competition between the two men hurt the company's productivity.

TQM. 1992 was the year it all came together for Landscape Services. Revenues reached an all-time high, productivity soared and satisfied clients referred an increasing number of new accounts to the company.

Skinner attributes this success in large part to the implementation of Total Quality Management, the concept of enabling employees to excel through empowerment. He first learned the con-

cept at the Executive Forum, an annual idea-sharing meeting of members of the Associated Landscape Contractors of America.

"Total Quality Management is just a tremendous enabler," Skinner said. "It enables me to promote people from within. The best thing I can do is replace myself with these people by giving them the opportunity to do better and do more."

TQM is easier to implement than most people realize, he added. "Everyone wants to have a good job and to do a good job. My main task is to enable my employees to do a good job, not stand over them and crack the whip."

"One of the most important aspects of TQM is realizing the internal customer," Skinner said. "For example, my assistant has a number of customers — me, the foremen, vendors and clients. She has to look at how she services each, independently."

TQM requires the business owner to relinquish some control and place it in the hands of others — not always an easy task. But Skinner said he has no problem delegating responsibility. "Letting go is a lot easier for me than for a lot of people," he said. "I

know my employees can take me to new levels if I let them."

Since introducing the total quality concept, Skinner now has more time to coordinate operations and concentrate on company growth. He handles all sales, scheduling and collections.

Office Manager Leigh Anderson is Skinner's "right-hand person," he said. "She does just about everything. She orders materials, takes calls from clients, makes sure everything runs smoothly."

Other key personnel include Dave Geller, production supervisor, who is also in charge of the nursery and greenhouse operations; Clay Stark, production supervisor in charge of the maintenance department; Fred Shyman, accounting; and Ben Lopez, who heads the construction department.

Lopez followed Skinner to Fort Wayne from The Brickman Group. Lopez is bilingual in Spanish and English, which helps the company attract Mexican-American workers. About 90 percent of seasonal employees are Mexican-American.

"Most of us are bilingual," Skinner said. "I learned the importance of Spanish while at The Brickman Group. Speaking Spanish helps separate us from the competition locally and attract good workers."

Landscape Services runs five crews: three construction, one maintenance and one nursery. Skinner said the small number of crews is deliberate. "I can only manage about five people effectively," he said.

NURSERY. Landscape Services couldn't have reached its present size without the sales of large-caliper trees from its wholesale nursery. Skinner added the nursery in 1989 along with a wholesale greenhouse, primarily because he couldn't find a consistent, high quality source of plant materials for his accounts.

The nursery is now the company's second largest source of revenues. It produces large-caliper shade trees, a wide-open market, according to Skinner. "Most nurseries sell 2-inch trees, but we're geared to the larger caliper market, starting with 2 1/2-inch caliper trees and going up as large as we can dig them, tie them and get them up the highway —

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USE READER SERVICE #46

Embracing Total Quality

(continued from page 28)

about 12-inch to 14-inch trunk diameters," he said.

In addition to supplying its Fort Wayne client base, Landscape Services markets the trees to larger markets like Chicago and Detroit where larger trees are more scarce. This year, Skinner plans to step up marketing efforts to golf course owners as well.

"It's a great outlet for our product," he explained. "Golf course owners run into all kinds of problems with improperly planted shade trees. If we provide a program that plants a couple hundred shade trees and guarantee them, the client knows he's not going to have replacement costs."

The nursery has a private investor, which Skinner sees as an asset. "He (the investor) supplied the cash to purchase plant materials and irrigation equipment. Landscape Services provides all labor and expertise for maintenance of those trees. It's an excellent situation. I can grow the nursery at five times the rate than if I was trying to do it from the profits of my company."

The company also leases all property including the nursery, a move that frees the company from land payments. "Too many people worry about their investment in property and not on the bottom line," he explained.

COMPETITION. Landscape Services prices its services higher than the competition, but residential clients are willing to pay more for quality landscapes, Skinner said. "It doesn't mean we make more profit, because we have more costs in quality construction. But we have fewer callbacks, more work and happier clients and employees because of it."

As for commercial accounts, Skinner said, he rarely wins a bid. Most commercial clients come to Landscape Services because they are dissatisfied with the quality of landscape services received elsewhere.

The company sets pricing different than the majority of the competition, Skinner added. Instead of a set contract, services are offered on a not-to-exceed basis.

"Typically, we'll end up under budget and charge less (than estimated)," he said. "Based on that

experience, when we go back the next year, we can give a set rate. That way, especially on commercial projects, the client can budget and feel comfortable hiring you because they know they're not going to get the shaft."

Mowing and weed control are billed on occurrence rather than monthly or yearly rates.

RECESSION MANAGEMENT. Diversity, flexibility and commitment to quality helped Landscape Services overcome losses incurred during its first two years and increase profitability during the next two years. When the market for residential landscaping soured, for example, Skinner steered his company toward commercial accounts, which grew an estimated 150 percent during the 1991-92 period.

In the following interview, Skinner describes how Landscape Services set itself apart from the competition and thrived during a business downturn.

Q: How does Landscape Services distinguish itself from the competition?

A: We're trying to take larger market services and provide them

to a smaller market. We reach the affluent community, mostly high-end residential. If we were in Chicago or Indianapolis, we would have a lot of competition, but we don't in Fort Wayne.

Q: How was Fort Wayne affected by the recession?

A: Fort Wayne was impacted less than most places by the recession. My friends on the East Coast tell me there's a bidding war. The banks there aren't very strong.

Fort Wayne is very conservative. The banks are conservative and have built a foundation to weather the storm.

Q: Was the residential market slowed by the recession?

A: Somewhat. We went after commercial work pretty heavily

(when that happened). Now the residential market has come back.

Q: What else did Landscape Services do to weather that residential slowdown?

A: We let our clients pull us into new services. We did a survey of clients and found they wanted things we weren't providing, like putting up and taking down Christmas lights and gutter cleaning.

During those tougher times, people spent more time at home. They didn't have the money to spend \$30,000 on landscape rejuvenation, but they would pick certain areas of the landscape and concentrate on those.

Q: Does Landscape Services bid commercial projects?

A: We bid on a lot of work, but we don't get a lot of jobs that way. I price commercial jobs at the level of quality of my other jobs. I can't teach my crew to do (one level of) work on one job and top quality on another.

Companies come to us because they want more and are frustrated with the service they've gotten in the past. They've seen the work

we've done at other places. Members of the dinner party circuit talk to each other. When someone goes to a party and says Landscape Services did a good job for me, hopefully new business will result.

Q: What other tactics did you use when clients pulled back on spending?

A: We took a closer look at costs. We started getting more volume out of fewer man-hours than ever before. A good portion of that comes from subcontracting and selling the right services.

Also, we concentrated on complete site management, rather than just being a landscaper on the job. We got involved with all aspects of the job, for example tiling underneath down spouts and other things that builders used to do.

Builders don't like to work with soil, so we've jumped on that niche. We will install drainage man holes and slot drains.

The sale of clay pots also helped. We started selling them in 1990. This year, we're going to start filling them with ground covers and patio-type plantings. I think the 'herb garden in a pot' will take off this year.

Q: As a business owner, what kind of image do you project to your clientele?

A: I want people to feel comfortable that I'm a working owner, not someone dictating from a suit and tie.

I've been criticized (by the competition) for my aggressiveness. People think I'm too pushy. Yes, I am aggressive. You can't do this at this rate and not be. I'm aggressive in getting new accounts. I wouldn't want to be competing against me. I always follow up on leads and constantly keep my eyes open for new opportunities.

Q: What areas of the landscape industry do you consider dynamic?

A: The compost issue is earth shattering. Not everyone understands how much money we can save if we turn our landscape waste around instead of throwing it away.

Larger markets already understand this, but there is still tremendous opportunity in midsize markets. Composting is not a new idea, but the pressure of the whole environmental and landfill issue has made it more cost efficient.

Other dynamic markets are color and low maintenance. Those have to be the buzzwords of the '90s. That's where perennials come in: low maintenance color. Also look for a tremendous installation of wildflowers and ornamental grasses.

I think maintenance also is changing. Total maintenance is going to be a premium product. You don't just mow and do weeding and edging. If clients are not at the same level of expectations (for maintenance), go find clients who are. You don't have to fill your schedule with 'mow and go' jobs to beat out a profit.

The author is a contributing editor to LLM based in Lakewood, Ohio.

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Growing A Landscape... By Design

The common bond between landscape designers and lawn and landscape contractors is the desire to create an end product that pleases the client and opens doors to future job opportunities. To achieve that goal, each must strive to meet the other's needs and expectations.

By Cathy Hoehn

NO ONE WANTS to admit it, but a landscape architect's work is only as good as the efforts of those who carry the plans through their final stages. Even the most beautifully designed and installed landscapes can end up looking flatly average if not maintained properly.

Though landscape architects concede this notion, few seem eager to seek out the maintenance contractors to relay their design intent, field questions or offer advice. In turn, many maintenance crews prefer to make-shift a design rather than question its intent or their own lack of knowledge.

A meeting of minds would help prevent problems, both during design and maintenance stages, but first a few mindsets need altering.

PLACING BLAME. Foremost, many maintenance contractors perceive the landscape architect as safely tucked away in offices, far removed from the realities of the job site.

"We never have an occasion, unless we push for it ourselves, to meet with the architect who designed the project and get an overview of his vision for the property in one year, two years, five years and so on," said Rich Angelo, president of Stay-Green Inc. in North Hollywood, Calif.

"I think that would help the owner—he's going to get more value for his money because the maintenance company is going to maintain it with that integrity in mind. And it would be better for the landscape architect because he'll know if



From the design to the installation, a landscape plan should entail careful consideration for the growing medium as well as the future growth and development of the plant materials. Photos: Empire Landscaping (left) and The Brickman Group (top).

his ideas really work or not. And it's good for the landscape maintenance contractor to have an idea what the architect is trying to achieve."

"I honestly feel landscape architects don't get out of their offices enough," concurred Terry Haaf, owner of T.J.'s Lawn and Landscape Inc., Woodstown, N.J. "They don't get out to see the site and see what new plant varieties are available instead of using the same plant materials over and over again."

Some architects do maintain contact with landscape contractors for several years to ensure their designs retain their shapes. "When we walk away from a project the first week, it looks beautiful, but we want to be able to drive by next year and five years from now and see it grow-

ing and getting more beautiful," said Bob Broughton, a landscape architect for Empire Landscaping in Hamilton, Mont.

On their end, landscape architects note that some contractors cut corners to offer the lowest bid without having the budget to maintain the designs effectively.

Others contend that too many small, one-man crews hinder the ability of "professional contractors trying to make a livelihood," said Ed Connelly, chief executive officer of Connelly Landscaping Co. in Avon, Ohio.

"You get a guy that's been laid off from Ford and he takes his Ford truck out there and picks up maintenance work. He's not a professional," Connelly said.

He added that contractors need to convince clients to pay for extra services to eliminate the low bidders who upset the curve. "The key is ongoing education, for lawn care professionals, the public and the media," he said.

Maintenance contractors differ in their views as to how knowledgeable most landscape architects are about plant materials, soil conditions and climate considerations. Most seem to feel the architects "know their stuff" and are very good at providing aesthetic landscapes but sometimes overlook practical problems that can crop up.

"I think the landscape architect sometimes sells out his integrity for the instant gratifica-

tion of the owner. I'm sure it's more a problem with a person's values than a lack of knowledge," Angelo said.

Contractors single out plant type, size and location as areas causing most concerns. Picking the wrong trees or shrubs for certain locations has become a common problem

with sometimes severe consequences. Angelo still shakes his head at a design disaster six years ago involving 100 poplar trees planted along sidewalks that the client ended up paying about \$35,000 to replace.

"The poplar is a real fast-growing tree that sends out roots, and the roots send out stems that start coming out of the ground. Soon you have little trees growing all over the place," he said. "So what started happening within three years of the planting is that these cute little trees started lifting the walks. So we had to remove the 100 trees and plant new ones." Who's to blame for the poplar

Contractors fear losing potential business when they cross a particular architect with whom they often work.

faux pas, the designer or the contractor who installed them without question? Angelo defended the landscape contractor, claiming contractors fear losing potential business when they cross a particular architect with whom they often work.

"You start to question a landscape architect's design, pretty soon the architect who you may be working with on other properties may say, 'I don't think I'm going to use him anymore. He causes me problems.'"

Another factor, said Angelo, is that often times the client only has a short-term interest in the property and dismisses long-term concerns.

"The landscape contractor could say to the owner, 'I think you may have a problem with the design,' and explain his case and probably the owner is going to say, 'Well, the architect designed it and if that's what he wants that's what he's going to get.' In many cases the owner doesn't care. Unless he's going to keep the property it's just an investment and he's looking to make money on it."

Some contractors point to other frequent design flaws, such as overplanting, planning beds too close together so mowing is difficult or impossible and designing beds around trees so that clippings from mowing cover expensive mulch. Other contractors tapped common sense problems as small sticklers, such as designs calling for thorny shrubs around a playground, sweet-smelling trees that attract bees around picnic areas and regent scholars or other flowering trees in pedestrian areas where the flower petals coat sidewalks, making them slippery.

ARCHITECTS' GRIPES. While plenty of problems stem from the design stage, developments in the maintenance stage also prevent landscapes from looking stellar.

Connelly's main gripe is the sheering vs. pruning dilemma. "Dad gets a new electric head sheer and look out. Son Bobby is using it to do his maintenance business," he said. Shrub designs often end up shaped too structurally — "looking a lot like a basketball," he said.

Chris Berryman, landscape ar-

chitect for Ray's Landscaping and Nursery in Walled Lake, Mich., said overwatering remains his pet peeve. "Clients want to keep their grass green so they keep pumping water into it. The problem is, in this area, they want instant grass so they lay sod in-

stead of seeding. Well, you lay sod on top of clay, the clay doesn't absorb the water so the plants dry out and die."

Berryman estimates overwatering precipitates 80 percent of plant replacement requests, and contends that crews ignoring a

design's intent causes 50 percent of maintenance problems. Ray's Landscaping plans to get back into maintenance for that reason, he said.

Mueller boasts that while on average contractors expect to lose 15 to 20 percent of their plants

the first year, his company experiences only 2 to 3 percent loss. "We put a little more time into it when we are planting. It's not like a production line as it is individual attention to each plant," he said.

(continued on page 38)

DESIGNING FOR DROUGHTS

IN PARTS OF the country droughts have forced landscape designers to integrate some innovative plant and irrigation systems in their designs.

Most drought areas, including parts of Florida, California, Washington and desert states, are using more drought-tolerant plants, a move not well-received by some clients, according to Rich Angelo of Stay-Green Inc. in North Hollywood, Calif.

"To me the plant materials are not very pretty. That's been the resistance here. I wouldn't plant these things at my house. How can I tell a client 'Go plant these things that look like sage brush?'"

Teufel Commercial Landscaping in Everett, Wash., found drought-tolerant turfgrass reasonably well accepted by clients, but discovered people tended to overwater. "They have to learn to read the landscape. It will tell you when it's in distress," said Teufel's Ross Fletcher.

Scientists are testing other methods of planting and irrigating, including rating plants by their water usage. Plants needing similar amounts of water could then be placed close together in a landscape. "I think architects will begin designing on that criteria. Then you just

have to gauge your water usage based on that," said Angelo.

The concept of zeroscape, utilizing more drought-tolerant and native plants and less lawn, is changing its focus, due to industry resistance. "People are now getting back to the concept that lawn is not a four-letter word; you can still plant a little piece of lawn without going crazy," Angelo said.

Drip irrigation is being used on a broader basis. The system has improved, but some maintenance aspects still need fine tuning. "It works well, the problem is maintaining it," said Fletcher. "Because it's used underground, you can't tell it isn't working until a shrub is in distress. By then, it's too late."

Another irrigation system being tested in Florida recently won its designer, Roy Rogers of Arvida/JMB Partners in Fort Lauderdale, the 1992 Water and Energy Conservation Award. The system, powered by wind mill, solar energy or computer, eliminates wasted water by controlling its exact placement and time of application.

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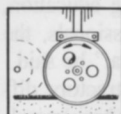
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Like in design work, maintenance errors often are caused by lack of experience or common sense. Broughton remembers one situation in which a job called for various shades of gravel rather than a lawn. "The design was pleasing but then we put down black plastic to keep weeds from growing, but when we walked over it with the machines to spread gravel, we'd tear it."

The crew realized eventually that premergence combined with a woven weed mat

barrier worked best. "The machine could drive over that without tearing it. I'm sure every landscaper in the world knows that but it was something we had never thought of."

He stressed the importance of overlapping weed mat barriers at least one foot so weeds can't push through the seams. He also found when installing edging "you really need to take time to put the stakes in and place them properly. It's not something you can just throw in."

FINDING SOLUTIONS. As quick as contractors are at identifying problems, architects and

other designers offer a slew of suggestions for nipping maintenance nightmares at the design stage.

"In every job we look at the situation, what the maintenance requirements are, what the design's going to be, and also of course budget," Broughton said. "We really fine tune plant selection for our customer. If they want a perennial order in a certain area, or a splash of color, we make sure we're looking at some plants that are proven by time and easy for them to take care of. I personally hate maintenance of my own landscapes. So I really try to make it as simple and clean of a landscape as possible to help out all of my customers."

The most important task, it seems, is going over designs with clients, making sure they understand cost restraints on certain requests and the need to spend more on specific plant materials.

"We show the client photos of job details, opportunities to save time on different types of edges, different types of mulch, etc. We use a lot of weed barriers which can be expensive initially, but potentially save money down the road," Broughton said. "The other thing we stress with customers is that we know our plant materials. We know a certain plant, when put on the drawing board, what its size and shape is going to be. We try to eliminate a lot of aggressive pruning."

Empire's designs usually design mutual tree and bedding areas covered with mulch, thereby distancing mowers and weed trimmers at least 3 feet from the trees.

"One of biggest things I try to do is create soft bedlines that are easy to mow against, that create simple lines that aren't confusing to the eye but are easy to maintain," said Broughton. "If you have beds that undulate in and out and all over the place, it'll never end up looking like that in a few years unless you're actually doing the maintaining."

Budget plays a bigger role than ever before at The Brickman Group, said Mark Hunner of the Long Grove, Ill.-based company. "Cost of maintenance today is more in the minds of consumers than ever before. We as designers and maintenance contractors are always looking for ways to cut maintenance costs," he said. "I find today we're using more native grasses and perennials which require an intense amount of maintenance for the first few years but the level drops off after that."

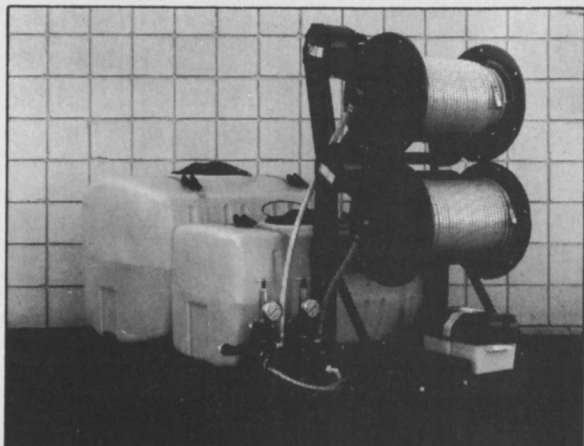
Broughton and Hunner share the distinct advantage of being able to consult with maintenance crews within their companies.

"We have more control over maintenance in-house. On key designs, we'll bring in the landscape foreman and a guy from maintenance and walk the project. A lot of times the landscape foreman will say, 'If we did this, this would be a lot easier for us.' And the maintenance guy has his input, 'Yeah, that's great but this is going to be difficult to maintain.' We try to work that out before it's actually in position."

Of the top three maintenance gripes, Bob

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Cianciolo of Cianciolo Landscape, Cincinnati, Ohio, picks proper plant choice as his number one priority.

"I make sure I'm putting a plant in a location I know it's not going to get out of control or too large," he said. "I say that with the knowledge that there are times we use plants that we know are going to get too big but that we are doing severe pruning on or something."

In the Midwest, abrupt temperature changes limit plant material options. "Landscape architects pick colorful plants that are beautiful, but they won't grow here," said Lee Mueller, owner and manager of Reliable Landscaping in St. Louis. "Usually anything that has a lot of color is not hardy, or it will lose its leaves or needles."

"So if you're planting in areas like St. Louis where you have your true winter and true summer, you want to plant something that will look as good in winter as it did in summer. If you plant with a lot of color, you end up with a beautiful planting in the spring and summer, but it looks like hell in the winter because everything is bare and it looks dead."

Mueller recommends interspersing evergreens with beautiful flowers, so the landscape looks attractive almost year-round.

"Azaleas and rhododendrons are two of the only evergreen plants that do flower in the spring. If you don't have a real heavy winter, they will bloom with some gorgeous colors. So it's almost like having the best of two worlds." But, he cautioned, you can't install either shrub on the south or west sides of buildings because the plants can't survive winter sun.

Positioning plays a vital role with most plant materials. A hefty consideration is "picking plants with suitable mature sizes for the areas in which they are being used," said Matt McCoy of McCoy Landscape in Marion, Ohio. He cited planting snowdrift crabapples too close to buildings as an example.

"Similarly, the designer should use proper plant spacing to prevent an overgrown appearance at maturity and to prevent having to thin them out later. Care should also be taken to avoid plant material with known cultural problems, such as paper birch in central Ohio, that would result in an unnecessary future maintenance expense."

COMBINING FORCES. Combining design/build and maintenance in one company presents huge advantages, according to many contractors and architects.

"That's how our maintenance division got started," Hunner said. "We were somewhat frustrated because we were finding we could come up with this great design and have very proper installation but through improper maintenance the job would decline from the first day forward."

The key is working hand in hand through the design process. "We also, as part of our design training process, have the landscape

architect work in the field to learn both construction as well as maintenance," Hunner said. "The best way to learn various maintenance issues is to literally work in the field and deal with them first-hand."

The architects never squawk at doing field work, he added. "They definitely see the value of it and consider it an important part of their continuing education."

"A designer with some field experience with both installation and maintenance crews will tend to have a common sense approach to design," concurred McCoy. "He will be able to design a landscape so that maintenance time

is spent as efficiently and productively as possible."

Again, communication is essential. "Everyone should understand what's going on with the project from the very beginning — understand in their mind why they're doing a job," said Broughton. "You can hire a laborer and he has the strongest back in the world, and will do whatever you want him to do, but might not take total care with his task if it's not properly explained to him."

The author is Associate Editor of Lawn & Landscape Maintenance magazine.

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USE READER SERVICE #73

Preemergents: Opening the Window of Opportunity

New chemistries and subsequent products for weed control have given lawn/landscape contractors more options, and leaves less to chance in their turf management battles.

By Bob Gitlin

WITH CERTAIN stubborn weeds such as crabgrass, and in situations where a property is severely weakened to begin with, there is no alternative to preemergent weed control.

And weeds today may find themselves facing an uphill battle because of several new classes of chemistry on the market developed to challenge the tried and true dinitroanilines ("DNAs") and provide extra flexibility.

This month, most operators in the United States will begin putting down their first applications of these products, although application schedules vary from region to region.

Keith Kohlmann, communications manager for turf and ornamental products for Indianapolis-based DowElanco, said sales of the company's many preemergent weed control products including two new ones — Snapshot TG (primarily for ornamen-

tals) and Gallery — are brisk.

"The ornamental herbicides seem to have more use over the course of the year than, say, a crabgrass material for lawns only," he said.

Gallery, he said, is the first and only preventive broadleaf weed herbicide, the other options being basically postemergent. "The mindset has been: if you have a broadleaf weed, the only way you can control it is with a postemergent. Finally the end user and customers have a choice from a post to a pre," said Kohlmann. "The mind-set is slowly changing. People now also want to control broadleaf weeds preventively."

"We had a very good year on products," said Andy Seckinger, Chipco product manager at Rhone-Poulenc Ag Co., Research Triangle Park, N.C. "This was surprising in the summer that never was. But then, weeds are like death and taxes. A fungicide treatment, on the other hand, is applied as a preventive and if the conditions do not present themselves, the fungal organisms cannot out-compete the grass and therefore are not a problem. It's not like that with weeds."

In the '60s and early '70s, he said, the trend was toward postemergent treatment of weeds. Then, as products were developed that

were a bit more sophisticated, the trend swung toward preemergent treatments. For the past 15 years, he said, the movement has been toward preventive applications.

"The problem you can run into with a postemergent is that you generally have to hit that weed in a very narrow stage of growth," Seckinger said. "You're betting that you're going to have the time and equipment available when you need to spray, whereas preemergent gives you a little bit more of a safety valve. Plus, if you use a preemergent and you get an escape, you've still got a postemergent to back you up."

Another factor is the wishes of the customer. Many customers question chemical residual.

"Some are concerned about putting something down that sits



Poor weed control is the number one reason for callbacks, but the battle against weeds can be won with proper treatment.



New preemergent weed controls are expanding the window of opportunity for lawn care operators to control bothersome weeds. Photo: Monsanto.

in the soil," Seckinger said, "whereas most postemergents are very short-term materials. The real challenge the green industry has as a whole is not necessarily adapting to new tools, but maintaining what they have and becoming better educated so that they can defend their positions more accurately."

Consistency in a preemergent has everything to do with its ability to stay on top of the turf because it's insoluble in water, said Ron Fister, director of specialty sales for Sandoz Agro, Des Plaines, Ill., whose year-old Barricade enjoys wide usage among lawn/landscape professionals.

"It does not leach into the soil. It stays right in the germinating zone of crabgrass, goosegrass, spurge and oxalis."

Contractors, he added, seek preemergents (as well as other weed controls) that offer water safety benefits through curtailed leaching. And there's a corollary environmental consideration.

"Applicators want products that have a lot less active ingredient than was used in the past," Fister said.

PRE- VS. POST? The distinction between pre- and postemergents is blurring in some product areas, said Dr. Doug Houseworth, a research scientist at Ciba-Geigy, Greensboro, N.C.

"New products are coming on the market which allow the lawn care professional to wait and see what kind of population they have, and then if there's a problem they can come in and clean it up,"

Houseworth said. "Lawn care professionals are beginning to look at the need for overall broadcast applications on 100 percent of their acreage. And now they've got greater flexibility."

Typically, he said, the only products available to the industry have been the DNA herbicides. Now new modes of chemistry — including Ciba-Geigy's Pennant — are available. Pennant, for instance, has a different mode of action from the DNAs in that it is absorbed by the germinating seedling as it comes through the treated zone. DNA herbicides kill the plant by inhibiting root development.

Houseworth has some words to the wise for new folks in the business trying to learn how to best work with preemergent weed control products: "Number one, I

would bone up on the major grassy weeds infesting the area I'm involved in. Crabgrass? Goosegrass? Annual bluegrass? That information can be found through extension agencies or universities. Also, what are the major problem broadleaf weeds that might come through standard treatment? Work with the extension people and the university, and pick the most cost-effective product."

Are there new trends in preemergent weed controls in response to what customers have asked for?

"If anything," said Thomas Perkins, business manager at American Cyanamid, Wayne, N.J., "you tend to get newer generations that may be more specific, less broad spectrum — fewer weeds controlled — but maybe

(continued on page 44)



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Preemergents

(continued from page 41)

lower rates of application than some of the older products on the market."

American Cyanamid is a basic manufacturer of pendimethalin, which is marketed by LESCO and O.M. Scott to the commercial market.

Monsanto's new Dimension has raised a lot of industry eyebrows. It has pioneered the new area of preemergent solutions that also offer postemergent utility. It's a new class of chemistry called pyridines. The active ingredient in this particular "forgiving pre-emergent" is dithiopyr.

Jim Budzynski, product director for dithiopyrs at Monsanto, based in St. Louis, explains the usefulness of the new product:

"Historically, one of the limiting factors, particularly for small lawn care companies, was their ability to get to all their customers in a relatively narrow window of time, and get the preemergent down. In some cases we even

HOW DOES A PREEMERGENT WORK?

DR. BRUCE BRANHAM of Michigan State University explained the workings of most of the standard dinitroaniline preemergent herbicides used for control of annual grasses.

"They work as inhibitors of mitosis (cell division). They tend to hit the root growth. Furthermore, they inhibit function; as the weeds try to grow, the roots of the germinating seedlings can't divide. The cells keep enlarging without dividing. This makes them crush some of the conducting tissues within that small root. Those plants cannot absorb water, and so they die of thirst."

Typically, the commercially available preemergent weed control products provide control that lasts from six weeks to as long as two to three months, he said.

heard of people that, once the crabgrass started to germinate, would stop picking up new accounts. They'd go back to their original customers with second applications rather than face fighting crabgrass that's already emerged all year round."

A product like Dimension allows a lawn care company to make a preemergent application for an additional three to four

weeks, he said. The product offers both preemergent and early postemergent activity.

"Let's say it's a small operator who is operating on a tight budget, and because of that he would like to have some money coming in from his early-early-season accounts. Because the product can be used in a round two application — as opposed to most preemergents, which are really

round one products — it allows the small operator to go out and make an application of straight fertilizer (which is obviously a less expensive treatment) as a first application, and get some accounts paying him, get some cash flow going before making the investments in a grass control product in round two."

Getting out too late is one main problem faced by contractors in their success rate with pre-emergents, said Budzynski.

Another problem is application technique. Because of the seasonal nature of many lawn care companies, the first task assigned to employees may be a first-of-the-season preemergent application.

"I have seen people that have experience using, for example, a liquid handgun," he said, "who do a superb job, getting very uniform coverage — once they've got some experience. But when you first start doing it, your swaths are too wide, or you aren't moving at a uniform speed, and when you slow down a little bit you get a little

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heavier rate; when you go a little faster, you get a little lower rate."

This is corrected by better training. All operators agree that timing is crucial. Too late is no good. But neither is too early.

TIMING IS EVERYTHING. Russ Brown, who manages residential work for Hermes Landscaping, Lenexa, Kan., prefers to get his preemergent weed controls down no earlier than March 1. "There are a lot of companies around here that will get out in February, but I don't agree with that. Maybe they feel they have to do that to get to all their customers, but I just think that's too soon."

Common problem weeds he expects to tangle with are crabgrass, foxtail, dandelions and spurge (which builds up around hardscapes).

In hot Atlanta, applications start as early as Feb. 1, said Ray Wiedman, landscape maintenance division manager for Scapes. "Down here, spring starts kind of erratically. We'll have a week of spring and then it'll go back to winter again. But during that week of spring — it could be in February — we can already get seed germination in the weeds we're trying to fight. Then our preemergent becomes a futile attempt."

Common enemies include goosegrasses, Johnson grasses and the ubiquitous crabgrass. "We're a firm believer in The Weather Channel," he said. "I watch it every morning."

Brown said there may be a trend toward the smarter application of preemergents. People are more aware that a healthy turf will shade out areas that otherwise would produce weeds. There's no substitute for preemergents in very weakened lawns or beds, he stressed.

People are more aware that a healthy turf will shade out areas that otherwise would produce weeds.

Dave Hanson, manager of technical support at Environmental Care Inc., Calabasas, Calif., said his company uses preemergents mostly for ornamentals.

"Usually we do two applications," he said. "In some of the warmer areas, under extreme conditions, such as Florida, there may be a third application as well. We do use some preemergent products for turf, but the timing is different; we're primarily targeting crabgrass, spurge and oxalis weeds that germinate in spring: so-called summer annual weeds. In ground cover (in year-round markets) we target not only the summer annual weeds but also the winter annual weeds. Winter annual weeds aren't as big a problem in most turfgrasses."

Hanson has an answer to those who complain that preemergent applications are too expensive for the landscape.

"Not compared to the cost of hand pulling weeds. The most expensive item that we face as maintenance contractors is labor."

Dr. Bruce Branham, associate professor, Crop and Soil Science Department, Michigan State University, East Lansing, has some advice for contractors who are trying to be both efficacious and environmentally correct:

"If you're managing a new property, the first year you manage it you might want to try a postemergence approach, and evaluate how much weed pressure there is. If you have a lot of weeds, having to do several applications that season, then the next season put a preemergent

down. If you have very light weed pressure, then you don't really need to worry about putting any down."

But beware. Crabgrass seed is not an enemy that goes away easily. It tends to be viable for 20 to 30 years in the soil. "So once you have a site with a history of crabgrass pressure," Branham said, "you're probably going to have the problem for 10 to 15 years."

Which means you'll be using preemergent weed control products year after year. ■

The author is a contributing editor to LLM based in Shaker Heights, Ohio.

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Repairing Damaged Turf

Once it's determined an area of turf is not what it should be, options from de-thatching to overseeding to turf variety selection are important steps in reclaiming an acceptable aesthetic appearance.

By Karl Danneberger, Ph.D

RENOVATION IS commonly defined as the establishment of turf into existing turfgrass stands. In most situations, renovation is generally considered a last resort attempted only after other cultural procedures have failed.

Turfgrass situations that may require renovation are: 1) dead turf areas resulting from biotic factors such as diseases and insects or abiotic factors such as heat and drought; 2) turf sites that are infested by an undesirable weed such as quackgrass which cannot be controlled selectively; and 3) changing the turfgrass community from one type to another such as a predominance of annual bluegrass in a Kentucky bluegrass lawn.

Non-chemical and chemical are two methods for renovating a turf. Non-chemical renovation is commonly used in situations where undesirable grassy weeds are not present. Non-chemical renovation, or simple renovation, is used when uniform thinning and/or dead or dying patches in turf exist.

Again, the one requirement for non-chemical renovation is the presence of a minimal number of grassy weeds. Chemical renovation is used in situations where a

grassy weed is present, and total vegetation control is required before reseeding.

Chemical renovation for most turfgrass situations consists of using a non-selective, short residual herbicide such as glyphosate (Roundup). The effectiveness of these types of chemicals is enhanced by skipping a mowing prior to treatment (taller turf enhances the uptake and movement of the product), and applying the product to actively growing turf (thriving turf more readily absorbs the chemical).

It is important to note that chemical treatment results in total kill of vegetation so the appearance of the turf is brown (Sometimes difficult for the customer to visualize or understand).

In general, seeding can be initiated seven days after treatment with glyphosate. Glyphosate is tightly absorbed by the soil resulting in a short residual. In choosing a non-selective herbicide for renovation, the residual properties are important. A herbicide that has a long residual will inhibit any reseeding that occurs after treatment.

RENOVATION METHODS. Preparing a site for overseeding is

similar in both chemical and non-chemical renovation. The major difference in chemical renovation is that a vegetative killing herbicide is initially applied. (After this point, the steps for chemical and non-chemical renovation are the same).

The first step is to mow the turf short and remove all debris. This helps reduce canopy competition for the germinating seeds. The second step deals with a method of reseeding whether it is coring (aerating), vertical mowing, slit seeding or a combination.

The specific method chosen depends on the amount of thatch present. If the thatch layer is 0.5 inch or less, core cultivation or slit seeding alone can be performed. If the thatch layer is greater than 0.5 inch, vertical mowing to reduce the thatch layer is required.

Vertical mowing is the process by which rotating blades physically extract the thatch from the turf. In overseeding, the vertical mowing can be done alone or in conjunction with coring or slit-seeding. The vertical mowing blades should be set so that they come into contact with the soil (1/8 to 1/4 inch soil depth). The renovation site should be traversed in at least two directions or until 30 percent or more soil has been exposed. The seed is then broadcast or slit-seeded.

Core cultivation is the process where tines (hollow cylinder cones) are mechanically forced down into the turf and soil and the corresponding plug is removed. Tines vary in their spacing, depth and size depending on the equipment. The removal of the cores exposes the soil and provides the means for seed to soil contact. In some instances, the cores can be chopped up (i.e. using a vertical mower) and drug back into the turf. This acts as a topdressing to the turf and can provide a means for seed to soil contact.

Depending on the type of coring machine, spacing and tine size, the number of passes across

the turf is variable. The more holes the better. Using this method the seed is usually broadcast.

Slit-seeding is the process where a slit is made into the soil by a disk like device and the seed is deposited in the slit. This method is the most effective for achieving good seed to soil contact. In this situation, thatch thickness must be reduced for most effective results (true for any method). Additionally, slit-seeding should be done in two directions for good coverage. In high maintenance closely mowed turf such as putting greens a light rolling may have to be done after slit-seeding.

Broadcast seeding, alone, is not very successful. This process is the spreading of seed on an unrenovated turf. Little seed to soil contact is achieved and is basically a waste.

CHOOSING THE PROPER SEED.

Whether a chemical or non-chemical renovation procedure is chosen, the reseeding or overseeding aspect of renovation remains the same. The cardinal rule of overseeding is that good seed to soil contact must occur for success. Thatch often makes this difficult. The thatch layer must be reduced and penetrated to get a successful seeding.

Serious consideration should be given to the grass species selected for seeding, but certain terms need to be defined before a discussion on seed selection begins. (The terms are defined on the following page.)

The theory behind blending is that if one cultivar fails for any given reason, the remaining cultivar(s) will survive and fill in for the least adapted cultivar.

When blending it is always important to remember that a combination is only as good as its "weakest link". Blending should be done with cultivars that respond well to the environmental conditions present for the region; are resistant to



diseases common to the region; and have similar color, density and texture. If certain conditions are present, such as shade, use at least one cultivar that excels under the specific site condition.

It is best to blend at least two or more (preferably three) cultivars. A mixture is the combination of two or more grass species. For example the combination of perennial ryegrass and Kentucky bluegrass is a mixture.

Picking the right turfgrass composition for the situation at hand is often considered an afterthought. Consequently, an inadequate composition often shows up as a failed turfgrass stand. Following are several scenarios and suggested mixes and blends for cool-season turfgrasses under various conditions and diverse traffic patterns. (Note: Depending on climatic regions, species adaptability may vary.)

UNDERSTANDING SEED TERMS

SPECIES -- a subclassification or family used to denote a certain collection of grass plants such as Kentucky bluegrass, creeping bentgrass or bermudagrass.

CULTIVAR -- is a term used to denote an assemblage of cultivated plants that is clearly distinguishable by any characteristics (morphological, physiological, cytological, chemical, etc.), and when reproduced retains its distinguishing characteristics. Examples are "Merion" Kentucky bluegrass, "Pennfine" perennial ryegrass or "Emerald" creeping bentgrass. In the United States cultivar and variety are synonymous.

BLEND -- is the combination of two or more cultivars of the same grass species. For example, the combination of "Adelphi", "Baron" and "Nug-get" Kentucky bluegrass is a blend. Blending is strongly recommended for moderate to high-maintenance turfs especially for grasses such as Kentucky bluegrass.

LOW MAINTENANCE. Low maintenance is defined as turf raised with no supplemental irrigation, two or fewer fertilizations per year and a high mowing cut (greater than 2 inches).

SITUATION:

full sun, light traffic

- 80 to 100 percent common Kentucky bluegrass, 0 to 20 percent perennial ryegrass
- 100 percent tall fescue

SITUATION:

full sun, heavy traffic

- 50 to 80 percent common-improved Kentucky bluegrass, 20 to 50 percent perennial ryegrass
- 50 to 80 percent common Kentucky bluegrass, 20 to 50 percent perennial ryegrass

- 100 percent tall fescue (improved or K-31 cultivars)

SITUATION:

partial shade, light traffic

- 30 to 50 percent common Kentucky bluegrass, 50 to 70 percent fine fescue
- 50 to 80 percent common Kentucky bluegrass, 20 to 50 percent fine fescue
- 100 percent tall fescue

- 100 percent tall fescue

MEDIUM MAINTENANCE. Medium maintenance is defined as a turfgrass site with sporadic supple-

mental irrigation, three or less fertilizations per year and mowed at greater than 1.5 inches.

SITUATION:

full sun, light traffic

- 80 to 100 percent improved Kentucky bluegrass, 0 to 20 percent perennial ryegrass
- 100 percent tall fescue

SITUATION:

full sun, heavy traffic

- 50 to 80 percent improved Kentucky bluegrass, 20 to 50 percent perennial ryegrass
- 100 percent tall fescue

SITUATION:

partial shade, light traffic

- 50 to 70 percent shade tolerant Kentucky bluegrass, 30 to 50 percent fine fescue
- 100 percent tall fescue

- 100 percent tall fescue

HIGH MAINTENANCE. High maintenance is defined as turf with supplemental irrigation, greater than three fertilizations per year and mowed at an inch or higher.

SITUATION:

full sun, light traffic

- 80 to 100 percent improved Kentucky bluegrass, 0 to 20 percent perennial ryegrass

SITUATION:

full sun, heavy traffic

• 50 to 80 percent improved Kentucky bluegrass, 20 to 50 percent perennial ryegrass

SITUATION:

partial shade, light traffic

• 70 to 100 percent shade tolerant Kentucky bluegrass, 0 to 30 percent fine fescues

Seeding practices discussed in the establishment section are applicable to renovation.

SPECIAL SEED TREATMENTS. Pre-germination employs the planting of seeds that are partially germinated prior to sowing. It's most significant attribute is that it is effective in shortening the germination period. The practice is often performed for work conducted on athletic fields where a quick turf cover is desired.

The procedure involves soaking and drying the seed in water over a given period. Research has found that aeration (bubbling oxygen through the water) enhances pregermination.

The disadvantages to pre-ger-

minated seed is the need to immediately plant the seed after treatment, and the increased difficulty in seed spreading because of moisture.

Osmoconditioning is the process of preconditioning seeds in an osmoticum. The idea is to allow the seed to take up enough water for physiological reactions, but not to the point of germination. The seeds are then dried down to their original moisture level (for turf seeds this is around 11 percent) and seeded at a later date. The advantage is upon seeding these seeds will germinate quicker because they have previously completed initial physiological steps in germination.

SODDING. In some renovation situations, stripping the turf and laying sod may be the best turf establishment option. Sodding is the process of cutting and transporting already established turf to an area devoid of turf.

The main advantage to sodding is the immediate establishment of the turf. The timing of

sodding is more flexible than seeding. Sodding can be done anytime during the growing season. During excessively hot periods over the summer, however, soil temperatures may be extreme enough to prevent rooting of the sod into the soil.

Site preparations before sodding are the same as for establishing new turf. The sod should be placed in a staggered pattern. This will allow for better stability and netting characteristics. Once sod is in place, irrigation must be provided to promote growth. A frequent problem with sodded turfs is that inadequate water is provided and the sod dies.

To get started, sodded turfs need to be fertilized more often than established turfs. Sod will often go light yellow (nitrogen deficient) sooner and more frequently than established turfs, especially in new areas such as subdivisions and commercial property.

POST SEEDING PRACTICES. The major components of post seed-

ing practices include the following:

• After seeding, if the site is an athletic field or golf course, dragging the field with a drag mat will enhance seed to soil contact, especially if seeding is done in conjunction with vertical mowing or coring.

• Remove excessive debris to cut down on any shading effect that may occur.

• Apply a starter fertilizer to enhance establishment.

• If summer annual weeds are a concern apply the preemergence herbicide siduron (Tupersan) for weed control.

• Irrigation is required, following the same practice described under establishment.

• If possible, in most situations excluding putting greens, continue to mow short for several weeks to reduce the competition of the existing turf. ■

The author is an associate professor in the Department of Agronomy at The Ohio State University, Columbus.

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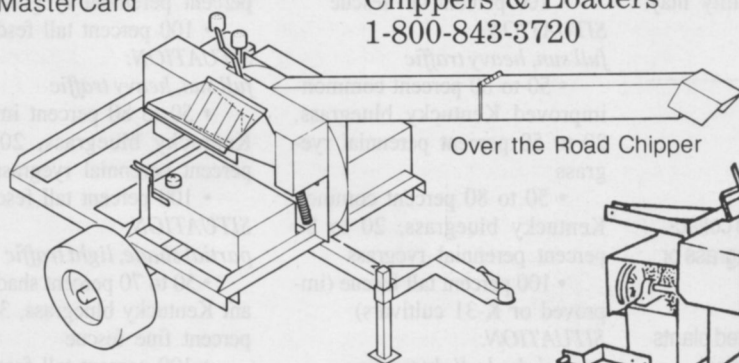
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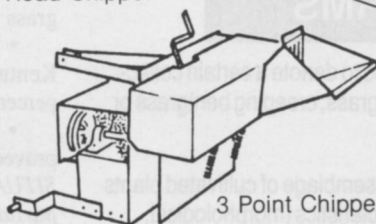
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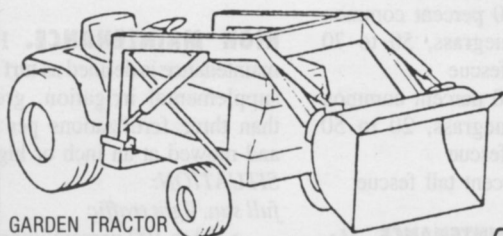
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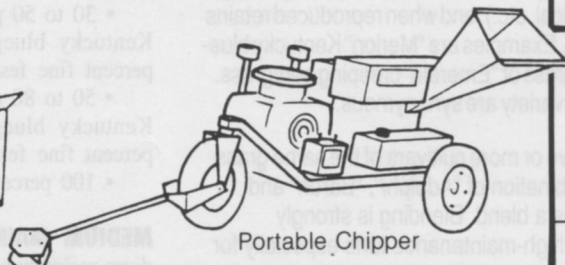


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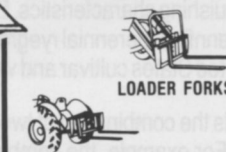


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Building Company Teamwork

IT'S AMAZING how much better the work load can be handled when all members of the company function together as a team. Just as the most expensive piece of equipment operates inefficiently when a belt slips or a bolt works loose, friction and lack of communication within the management/employee chain hampers results.

Companies often concentrate time and effort in selecting top applicants to fill openings. Once hired, problems can occur in finding ways to make best use of the assets each employee brings to the team.

No two people process information exactly the same, function at exactly the same level of expertise on every task or work at exactly the same speed. A company's work force is like a network of computers operating on slightly different programs. Building company teamwork, fashioning a smoothly running operation from a group of individuals, is the most challenging task owners and managers face.

How well do you know your employees or fellow crew members? Observing on the job activities is a method of gathering information on employee performance, and one that is essential to proper management. But continuous scrutiny and overly close supervision can make employees nervous and apprehensive, and may even lower some

employees' achievement levels.

Bringing groups of company personnel together in less stressful situations can provide even more input on how each individual processes information, reacts and performs. Pulling together people from different parts of the company, with different areas of expertise can be especially beneficial.

TEAM ACTIVITIES.

There are many opportunities for lawn and landscape companies to make arrangements for company personnel to interact with other company members from different divisions or job categories. Landscape designers, installation foremen and members of the land-

Enhancing your employees' interaction with co-workers and peers through group events not only boosts confidence, but may heighten job performance.

*By Steve and Suz
Trusty*

scape crew can jointly attend state and regional nursery and landscape association meetings.

Lawn care operators can send groups of managers, crew foremen and crew staff members to turfgrass conferences or turfgrass field days. Sports turf managers and crew members can attend regional or national sports turf managers association meetings. These events often combine on-site facility tours or presentations by facility managers with other educational sessions and trade shows.

If industry related meetings are not on your schedule, use other events such as local basketball,

volleyball or softball leagues to bring people together. Working as a group to help coordinate a charity event is another alternative. Some crews flip pancakes for a school district's fundraiser. Some companies lead the clean-up efforts at neighborhood parks or sportsfields. Other companies help the extension service give community lawn care or plant care sessions.

For golf enthusiasts, events such as the annual John Deere team championship golf tournament can open the door to better work relationships. About 937 four-person teams recently competed at sectional tournaments all across the United States and Canada. Those 33 teams qualifying for the finals joined forces with a representative of their John Deere golf and turf distributor to compete at two premier courses in the Palm Springs area.

With practices, the sectional and final tournaments, the teams had the opportunity to play several rounds of golf together. For many of the teams, this was the first time these individuals had all been together at one time for a complete walk-through of any golf course, including their own.

Though that sounds surprising, think about your company's major accounts. Have all members of your company involved with a customer's landscaping or maintenance walked around that property together to pinpoint problems and clarify details, or have you relied on



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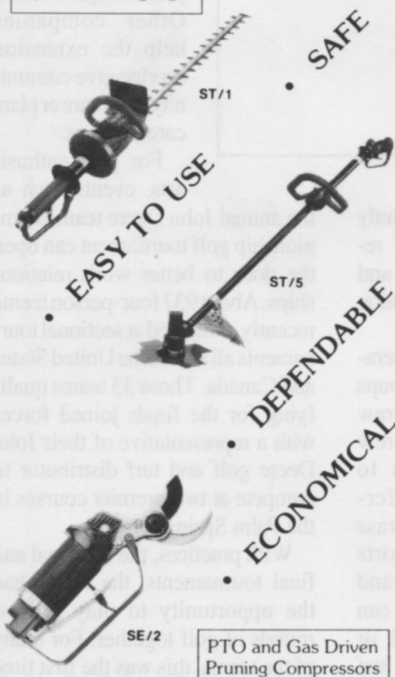
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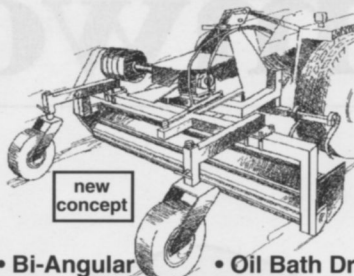


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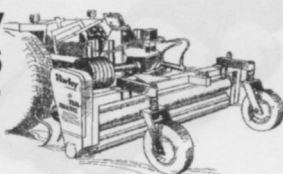
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drawings, notes and inter-office conversations to relay the information?

For that matter, has your company's team made any joint on-site visits to compare observations and reactions to specific features? With everyone so wrapped up in the daily routine and concentrating on their own jobs, such lack of interaction is not uncommon. Yet, each employee looks at a site from their own individual perspective and sharing those views can make everyone's job much easier.

In industry related meetings, the comments and ideas exchanged with those from other companies add to the learning experience. The Iowa Nursery and Landscape Association summer tour of residential landscapes around Lake Okoboji was a prime example.

Attendees included company owners and managers, landscape designers, landscape contractors, retail store staff members, planting and maintenance personnel, plant salespeople and arboretum staff members. Most companies were represented by two or more employees.

IDEAS WERE FLYING. One company's designer made this comment to their landscape

Joint participation in meetings may help discern an individual's best method for receiving information.

foreman. "This drainage problem is exactly what we're encountering at the XYZ estate. Our geotextile diversion system is reacting just like this one."

That was followed by a solution from another firm's landscape foreman: "We had that same problem and used an underground tile bypass in conjunction with the fabric to divert the excess moisture. We started about here, and ran it to there, about this deep."


A maintenance crew member called his foreman's attention to the ground cover on a steep, shady bank. "This is the plant that I've been trying to describe that we could use at the ABC home, but I still don't know what it is."

Immediate help was at hand from the plant salesperson who even knew it was in stock and in what sizes. This is a great planting combination to screen the back entrance of the property from the road and still allow air movement.

What grass varieties did you plant here to get such good cover in this dense shade? What watering and fertilization program do you use to maintain it? Did the builders take special precautions to avoid equipment compaction of the soil around these existing trees?

I see the windburn on the new plantings at the adjacent property. Which antidesiccant did you use to avoid damage here? How often did you treat, and at what rate? Do you think this shade of impatiens would work for the front

(continued on page 54)

 Tree roots break through sidewalks. They can break through into greens and sand traps. They can even break through into hazardous waste sites and contaminate everything around them. In fact, wherever you need to maintain the integrity around an area with trees, you need a root control system that works.

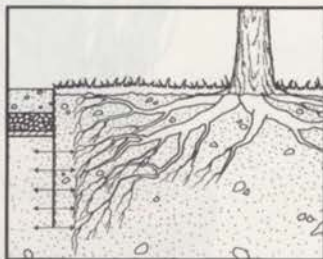
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Social activities such as these can provide co-workers with an opportunity to interact outside the work environment.

maintenance crew supervisor and spend a few minutes each morning laying out the day's plan with another. What matters is that each supervisor has the information needed to achieve the desired results.

This process works both ways. If you really need to have everything written down to perform effectively, and one of those employees who reports to you is best with verbal messages, you are the one who needs to take notes.

Remember, with methods of communication and other individual traits you may observe, there is no right way or wrong way, only different ways.

Team Building

(continued from page 52)

flower beds with the new color the CDE family painted their house?

I'd like to try this technique for the terracing at the FGH place. What would that do to your maintenance load there?

It was quick and easy to point out problems, to see solutions in one site that could be adapted to another and to identify elusive plants and their sources.

Any one of the ideas picked up during the tour could have paid for the trip. And, for observant managers, the advantages of employee interaction don't stop there.

REVELATIONS. Joint participation in such meetings may be the key to discovering an individual's most effective method of receiving information, an excellent tool to help cut communication problems. For some people, the on-site tour, a combination of hands-on observation coupled with verbal reinforcement may be highly effective. Others may seem better able to connect with the more detailed verbal messages of seminar speakers. Still others may react better to written material.

Use this knowledge to convey information to employees and fellow staff members in the form they process best. It doesn't really matter that you leave detailed notes for one

NAME THAT WEED

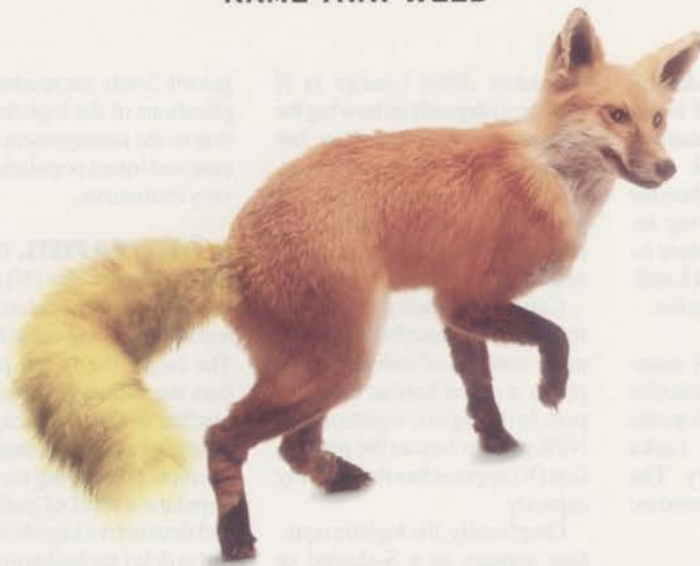


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Observe how quickly company employees pick up on new ideas. Some people will follow an explanation and immediately want to know more about the new concept. Others will understand what is being presented, but be content with the level of information offered. Some will have problems assimilating new ideas and need to have basic issues repeated, or expressed in a different manner, or with different examples. Still others will seem reluctant to embrace a new concept right away.

Watch the ease with which employees adapt to new situations. Some people seem to fit in immediately under any circumstances. Others are uncomfortable with the unknown, preferring to stay close to others they know and to situations in which they understand what is expected of them. Most people fall somewhere in between, a bit ill-at-ease when faced with the unknown, but able to adapt reasonably well.

Keep these traits in mind when assigning new tasks or making adjustments in long-term practices. You may need to supply detailed, step-by-step instructions to one crew member; simply tell another what you want accomplished, hand out the tools, and stay out of the way.

Problem solving techniques may also be exposed during joint activities. Some people quickly apply the first solution that enters their minds. Others prefer to consider all possible alternatives and the end results of each

before acting. Some people quickly seek help; others make sure assistance is definitely required before asking for it.

Certain employees will complete their assigned task and pitch in to help another person complete their assignment. Other employees will complete the job assigned to them and make no effort to assist others unless specifically asked to do so.

Other individual traits are good to know. Who can take a joke well? Who is quick to laugh at himself? Who steps in to save someone else in an embarrassing situation? Who naturally serves as a mentor to new employees? Who acts as a sparkplug, quick to motivate herself and bring the group along with her? Who can maintain a calm outward demeanor, even when upset, angry, frustrated or nervous?

Perhaps the most beneficial information such interaction will provide is the wide range of assets your company's team possesses and the power you can have when all those assets are set to work on the same goal. Your company employees can gain a new respect for each other, a greater spirit of cooperation and increased understanding of the important contribution they make. Building company teamwork has a positive outcome for all those involved. ■

The authors are partners in Trusty & Associates, Council Bluffs, Iowa.

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COMING SOON!!

of disease and insect populations. Look for more excerpts from the book and ordering information in future issues of *Lawn & Landscape Maintenance* magazine.

Population Dynamics

Ed. Note: The following text is a short excerpt from the soon-to-be published book: TURFGRASS ECOLOGY AND MANAGEMENT. In this installment, such things as logistic equations and understanding pathogens can aid significantly in the management

THE MOST COMMON equation used in ecology to describe population growth is the logistic equation developed by Lotka early in the 20th century. The logistic equation is expressed as:

$$\frac{dN}{dt} = rN \left(\frac{K - N}{K} \right)$$

where dN/dt is the growth rate of the population, r is the rate of population increase, N is the population size and K is the carrying capacity of the system.

The equation is built from two concepts. First the increase of the

population dN/dt (change in N over time) depends on how big the population (N) is, plus how fast the individual can reproduce (r). The second concept is that the growth rate must decrease as the population approaches the maximum the system can support.

Carrying capacity (K) is the term used to describe the maximum number of individuals or plants a given habitat can support. In the logistic equation, $(K - N)/K$ goes to zero as the population (N) approaches the carrying capacity.

Graphically, the logistic equation appears as a S-shaped or sigmoid curve. It is characterized by an initial slow increase, then a rapid escalation (similar to an exponential growth) followed by a slowing down at the halfway mark. Finally, a flattening of the curve occurs once the

growth limits are reached. Applications of the logistic equation to the management of disease and insect populations are very instructive.

N: EFFECT ON PESTS. The initial population size (N) affects how quickly a population can reach its carrying capacity (K). The larger the initial population, the sooner the population reaches the carrying capacity. In regard to pest management, attempts at reducing the initial population level of pathogens and destructive insects is an effort to delay the buildup of these pests to plant damaging levels.

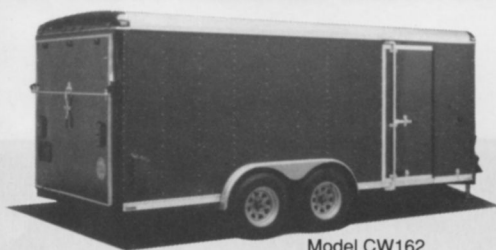
In some cases, reducing initial N is an economic or environmentally sound approach.

Reduction in disease inoculum and insect populations is

(continued on page 78)

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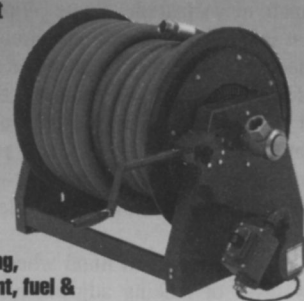


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IRRIGATION
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IRRIGATION'S LIFELINE: ZONING AND ROUTING

*An irrigation system
will fail unless suitable zones
and pipe routing are
designed and installed.*

By Larry Keesen

AFTER COMPLETING sprinkler head layout, the next steps in the design process are to determine the size and area to be served by each zone in the system, the location of the control valve and proper pipe routing. These steps are vital for controlling costs and improving system efficiency.

When developing zones, divide each site into areas of differing water requirements such as turf, planting beds, ground covers and so on. Cultivated planting beds require more water than areas mulched with humus or rock. Additionally, the height and density of the plant materials will provide shade for the soil surface, reducing the evaporation rate from the soil.

Many different watering requirements exist for every site. It's the job of the professional, however, to identify relevant terms to save water and improve the health of the landscape as well as to maintain its aesthetic value.

*Photo: Matt Shooner,
Focal Point Communications, Cincinnati, Ohio*

WATCH OUT FOR slopes or berms in which the slopes are greater than 4:1. When berms or mounds are present the top should be watered with a separate zone even if it consists of only one head. The peak of the berm will dry out much faster than the slopes, and will require additional water.

ZONING FOR CONTROL. Heads on the slope must be zoned separately from those at the peak or base of the slope. The heads at the base are zoned separately because of runoff and soil saturation from above. To meet industry standards, proper irrigation design requires that the operating pressure within a zone never vary more than 15 percent.

Site elevation changes will increase the pressure in the lateral by 0.433 PSI for every foot of elevation drop between the highest and lowest head. This may mean additional zones for the system unless pressure reducing devices (not flow controls) are installed at or inside the heads.

Why worry? If the elevation difference in a zone is 5 feet, the pressure at the lowest head is 2.17 PSI higher than the highest head. An 11 foot elevation change means an additional pressure of 4.76 PSI at the low head. If the heads are pop-up sprays operating at 30 PSI and flowing at 4.0 GPM, then some heads 11 feet below will be operating at a higher flow rate of 4.5 GPM.

This results in an increased flow of approximately 12 percent and a precipitation rate increase from 1.97 inches per hour to 2.17 inches, or 2/10 of an inch per hour of moisture. When coupled with pressure losses in the lateral lines,



this requires a different zone when elevation changes exceed 5 or 6 feet in order to keep the lateral pressure variation within the required 15 percent.

We recently designed a multi-family residential complex with 1:1 and 2:1 turf slopes. In some areas, the elevation difference from the toe of slope to the top was more than 15 feet, and the horizontal distance was 15 to 30 feet. Every 40 or 50 feet, a six-foot-wide stairway intersected the area for access to the street.

Walking, or I should say "climbing," up the slope was almost impossible yet they managed to mow them somehow. It is of primary importance that slope irrigation is designed to control the water application on the slope using separate zones when necessary. Instead of a de-

sign that is driven by costs, the physical limits of the zone (access stairs and walks) and ease of installation must be considered. This will also help turf maintenance crews by eliminating wet spots on the lower half and bottom of the slope.

Identify areas with varying exposures to sunlight. Areas on the north or east sides of a building or steep slope will require less water than the south and west side exposures as well as any other areas of shade or sun. Also identify low places, drainage ways and storm water detention ponds and zone these bottom areas separately from the adjacent areas.

Heads and valves should be installed adjacent to and outside of these low areas, not in the bottom where mud and



To meet industry standards, proper irrigation design requires that the operating pressure within a zone never vary more than 15 percent.

water can affect equipment and ease of maintenance. Parking lot medians and islands, due to the surrounding asphalt and heat, will require more water and a separate zone.

Calculate all the head flows (GPM) for each of the areas you have identified. Remember, all heads within the zone must have matched precipitation rates, i.e., bubblers, rotors, spray heads and so on

must be zoned separately. In addition, the nozzles within the zone should be matched.

Next determine the required system capacity in water flow (GPM) and pressure. (See the November 1992 Irrigation Training article on filtration and system capacity for information on how to do these calculations using the "Keesen" method.) Once the maximum safe flow in GPM is determined, complete system zoning. If 30 GPM is the maximum allowable flow, then an area with a total flow of 101.5 GPM requires four zones at 25.38 GPM. Three zones would be 33.83 GPM which exceeds our maximum flow.

Cheat on the maximum safe flow and it may come back to haunt you. When in doubt add another zone.

The most efficient location for the electric control valve is in the zone's middle, but elevation shifts and other factors make this less cost effective.

ZONE VALVE LOCATION. The most efficient location for the electric control valve (ECV) is in the middle of the zone, but because of elevation shifts, pressure controls and wire, pipe and trenching costs, this is not always cost effective for the entire system.

Cost effective control valve placement allows the valve to be on one side of the zone it serves. If an area is two zones in width, then it would be appropriate to route the main between the two zones. This will save on the cost of pipe and installation, as well as maintain a good balance of pressure throughout the zone.

The same is true at the end of the mainline where it is usually cost effective

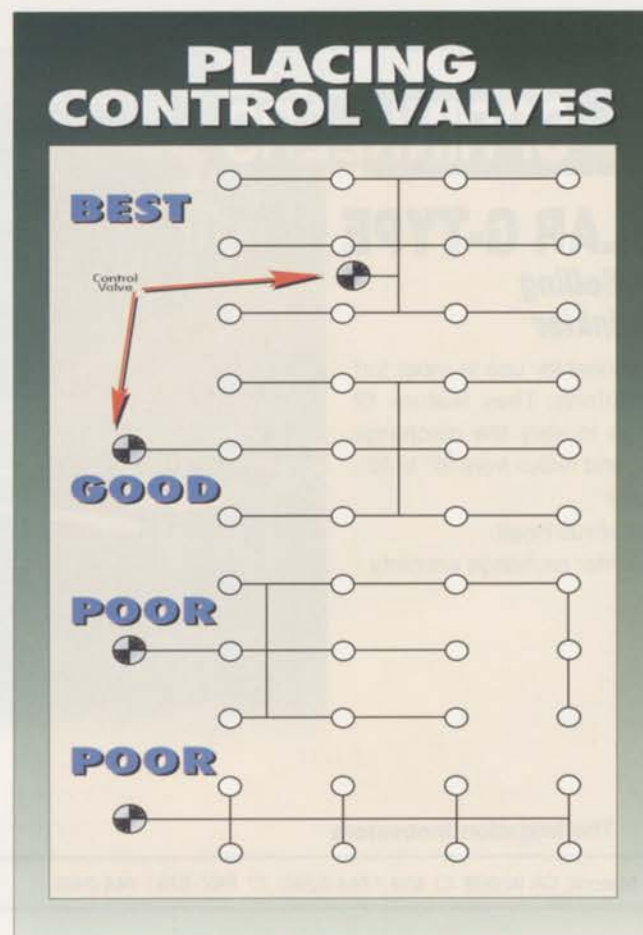
to stop the mainline prior to entering the last zone or two, depending on the distance and elevation change from the control valve and the closest boundary of the zone.

The mainline route, where the area widens and is more than two zones wide on any side, should have the mainline extended toward that area in order to better control the lateral pressure variation and lateral line surge. (Long straight lines have a much greater potential for surge than do shorter ones, and empty lines from low head drainage will increase the surge damage potential.)

End feeding long, single row zones with 30 to 40 pop-up spray heads can

take minutes between the time it takes for the first and last head on the line to pop-up. This can affect the water distribution by placing more water closer to the zone. Center feeding the line will reduce surge potential and reduce the time between the first head and the last head.

Five years ago, I evaluated a parkway irrigation project in which most of the zones were composed as a long single row, several hundred



feet long, with 20 feet of elevation change and the control valve at one end. The maintenance personnel complained of wet and dry spots in the turf area.

The high pressure variation plus the elevation increase, caused the wet and dry areas and poor uniformity of coverage. This was the first time I was able to see this theory in vivid reality.

If there are two or more rows of heads and little slope, shorten the rows and place several rows on the same zone. (If all heads have matched precipitation rates.) Remember, heads that are grouped together will cool the air more resulting in less evaporation



The irrigation system should be nearly invisible to avoid detracting from the landscape.

to avoid damage from vehicles and snow plows, lessen pedestrian liability, reduce visibility and prevent vandalism. The irrigation system should be as invisible as possible so as not to detract from the landscape's design.

and better compensation for wind direction changes during the watering cycle.

Valves and valve boxes should be kept away from walks, streets and driveways

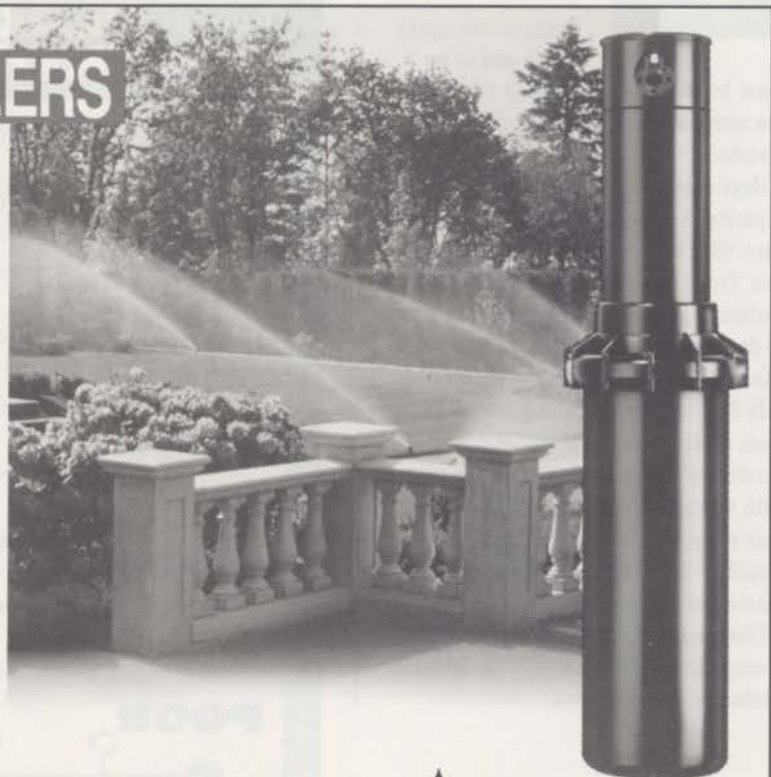
MAINLINE & LATERAL PIPE ROUTING. Determining zones and approximate control valve locations helps route the mainline from the point of connection through the

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G-Type sprinklers are ideal for use in most turf and landscape applications. They feature 12 interchangeable nozzles to vary the discharge rate from .5 to 14.4 GPM, and radius from 22' to 52'.

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The PGP 4" Pop-Up
Gear driven for
quiet operation.

backflow preventer (if required) to the zone control valves, and then the lateral piping to the heads.

The lateral piping is generally laid out in parallel rows, with up to six rows which are connected at the approximate center of the row with a header and then routed to the ECV. The pipe should always be routed away from the control valve unless obstructed.

Why waste pipe and pressure by directing the pipe back toward the valve? If you know that the pipe will be pulled into the ground then the route can be curved to the extent that the pipe and puller will allow. Routing will also be determined by the ease of construction

and how the pipe and fittings are made.

I have seen designs where a wye was used instead of a tee, and most of us know that wyes are used in sewer and drain lines, not irrigation. Some designers try to place as much pipe as possible in the same trench and then branch off to the head locations. Most often, the difference between the distance and the rows of heads and the distance within the heads in the row is insignificant.

Any way its done, the amount of trenching is about the same, but single head branching will always increase the costs because of the additional fittings and repositioning of the trencher.

In cases where trenchers can't get close

enough to a building, branching is the only choice unless you want to dig it by hand. Trenching or pulling the pipe requires equipment that is several feet wide. Space must be allowed for this when routing the main and laterals.

Often, the easiest way to route the pipe is also an effective way to control pressure loss. The type of soil or rock will also have an effect on how the pipe may be routed. Minimize pipe routing through gardens and cultivated planting beds to avoid damage to lines. When routing the pipe, avoid obstructions and stay away from trees and their root systems.

Roots can cause polyethylene pipe to

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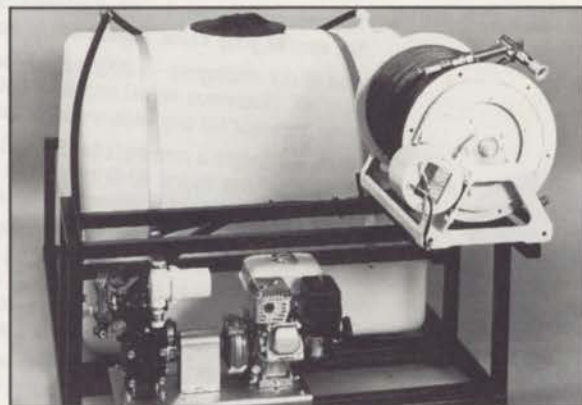
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One Of My Top Performers."**



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Gentlemen:

I'm sure you've heard a lot of interesting stories by now on the uses of your Velke. Let me add to your collection.

One of my employees—a 20-year old—seemed a hopeless goof-off. Numerous verbal requests, notes in his paycheck, even reducing his pay each week got me nowhere.

Well, we bought a new walk-behind and spent a lot of extra money to have hydraulic drive instead of belts and "Oh so what, while we're at it throw in a Velke."

The results were more than I hoped for. My guys now get twice the work done. And my problem kid—he won't get off the thing! He thinks he's lawn skiing. All I know is that he's become one of my top performers. He's producing so much I've not only given him back his lost pay, but a raise.

Now I just smile throughout my day watching his newfound attitude. What more can I say except thanks for making such a great product.

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Steve Wilbraham
Steve Wilbraham
Condominium Grounds Maintenance



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From Lawn-Wright, Inc., makers of the Grass Gobbler.

LESSON EIGHT

be squeezed shut, restricting flows and causing leaks. PVC pipe has greater rigidity and can better withstand damage from roots.

Next month's training article will discuss pipe sizing, cost effectiveness, valve sizing, surge damage and other tidbits that make life interesting.

Please write a note to Cindy Code or myself and let us know if these articles have been helpful. Indicate what other irrigation subjects may be of interest.

Thanks in advance for taking the time to let us know. ■



The author is vice president of Keesen Water Management, 10700 E. Bethany Drive, Suite 103, Aurora, CO 80014.

IRRIGATION QUESTIONS

1. At what slope ratio should the irrigation designer be concerned about control?
2. What is the allowable pressure variation within a lateral zone?
3. One foot of elevation change equals how much PSI?
4. If the pressure within a zone is increased, will the precipitation rate increase too?
5. What is the best location for a zone control valve?
6. Is it a good practice to route the lateral line pipe through cultivated planting beds?

Answers appear on page 81 of February LLM.

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Hands On

Editor's Note: Hands On is a department in Lawn & Landscape Maintenance magazine designed to provide our readers with ideas and resources for running their businesses. We need you to share ideas and the lessons you've learned with your peers. Submit your stories to: Hands On, LLM, 4012 Bridge Ave., Cleveland, OH 44113. Or call us with your tips at 800/456-0707.

Tackling Training

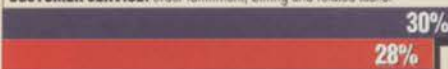
EVERY COMPANY struggles with training. When to train, who to train, where training should be held and so on.

Joe Bilskemper, president of Lawn Care Specialties of LaCrosse, Wis., annually takes his pesticide crews to an area hotel for a five-day training session. (Those on mowing and aerating crews are not involved in this particular training course.)

Senior employees are called upon to become "resident experts" on such topics as white grubs, chinch bugs and so on, and to present their scope of information to both new and returning employees attending the spring meeting. Additionally, county extension reps, golf course superintendents,

WHAT GREATLY IMPROVES SALES?

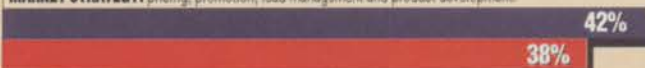
CUSTOMER SERVICE: order fulfillment, billing and related tasks.



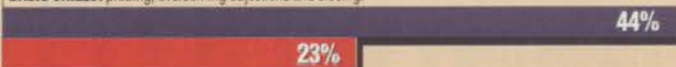
DIRECT SUPPORT: sales coaching, recognition, technical assistance and career development.



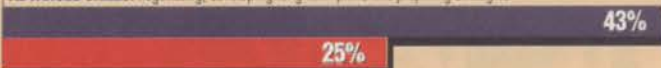
MARKET STRATEGY: pricing, promotion, lead management and product development.



BASIC SKILLS: probing, overcoming objections and closing.



ADVANCED SKILLS: negotiating, developing long-term plans and preparing strategies.



PERCENT WHO EXPECT A GREAT INCREASE IN SALES

Sales managers
Salespeople

Source: Learning International, Stamford, Conn.

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USE READER SERVICE #63



local distributors and others are called in to assist with the training program.

"We get away from the distractions and get a lot out of it. Our guys really take it seriously," said Bilskemper whose firm

maintains 2,000 residential and commercial accounts. "It really makes more sense the second year. The first year they're getting bombarded with so much new information."

In addition to technical information, Bilskemper makes sure his crew is trained in the basics of first aid and certified in CPR. The training program, including daily lunches, represents about a \$2,000 investment for about eight employees. — *Lawn Care Specialties*

Seeing Eye to Eye

SALES MANAGERS and sales people disagree on what it takes to increase sales — a potential barrier to sales gains. While surveyed sales managers say a salesperson's selling skills are most important, sales-

people think market strategies and sales support systems are most critical.

The study by Learning International Inc., a Stamford, Conn.-based sales training firm, asked sales managers and salespeople which of five factors would

greatly improve sales. (See chart on page 64.)

It's interesting to note that sales managers had higher expectations than salespeople for each of the factors studied. — *Business Marketing*

Basic Tips for Back Health

LOWER BACK pain has plagued humans since the beginning of modern time; probably even before. While not as ordinary as the common cold, 80 percent of all Americans may have experienced some form of lower back pain in their lifetime.

Good posture is one of the simplest things everyone can do to help backs stay healthy and pain-free. Good posture, particularly when lifting and carrying heavy loads, can prevent muscle pain, stiffness and tension as well as back aches, pain and injury.

Tips to remember when lifting:

- Always wear shoes or boots with firm, slip-resistant soles.
- Bend at your knees, hug the load close to your body and lift yourself up with the strong muscles in your legs.
- Make sure your path is clear and well-lighted before lifting or moving the load.
- Know where to put the load down before you lift it.
- Never hurry when carrying a load.
- Organize your work area to reduce unnecessary lifting or moving.
- Check the condition of mechanical aids before loading, i.e., are nuts, bolts or moving parts properly adjusted? Are wheels stable and in good condition? — *Valeo Inc.*



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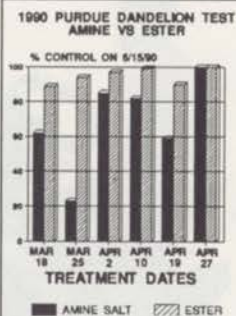


USE READER SERVICE #61

COOL WEATHER WEED CONTROL

University Testing Proves Esters
Outperform Amine Formulations
In Cool Temperatures.

Pennies saved using an Amine formulation in low temperatures could cost dollars in call backs. During cool Spring and Fall conditions, Ester formulations are recommended.



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Tri-Ester™ Tri-Ester II™

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USE READER SERVICE #62

Client Relations

REAPING INCREASED PROFITS THROUGH CUSTOMER SATISFACTION

"THE CUSTOMER NEEDS to feel important." "The customer is king." "The customer is always right." Wish you had a dollar for each time you've heard one of these old saws?

Maybe this advice is heard so often because it works. The customer really is always right — even if he is wrong — because only he decides whether or not to do business with you again.

In a business dealing with so many customers in a week's time it's easy to forget that we aren't just in the outdoors business, but we're in the selling business.

Your company's success depends on your customers' perception of you and your employees. Even if you have good judgment and complete knowledge of lawn care, if an employee is abrupt with a customer or if a customer with a complaint isn't taken seriously, you may lose a client and his referrals as well.

SATISFYING CUSTOMERS. Is there a magical formula to ensure that your employees treat

CUSTOMER SURVEY

At Quality Lawn Care, your satisfaction is our top priority. You can help us continue to improve our service by completing this survey. While the results will be used by our staff, your response will be kept confidential.

	VERY GOOD	GOOD	FAIR	POOR
1. Quality's response to service calls is:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Rate our technician's knowledge and manner:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Our staff's instructions for watering were:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Our explanation of fees is:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sample customer survey.

customers so that they will keep coming back? First you have to attract the best employees. Then you have to work with them to create an atmosphere of customer satisfaction. Begin with your own attitude.

Always act as if you believe each customer should be treated like royalty and treat them that way.

Training your people in customer relations takes many forms. You might start a company

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Slips on and off like a regular endgate, no drilling required! Takes less than 30 seconds to install! Weighs less than 110 lbs. yet loads any object up to 2,000 lbs. without needing extra personnel. It mounts on the same latching system currently used on all full size 1/2 – 1 ton pickup trucks and folds out into a ramp that allows any item to be loaded without backing into a ditch or using planks that can slip. Easily load: Riding lawn mowers, snowmobiles, ATV's, motorcycles, core aerators, etc...

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library covering topics from turfgrass management to selling and marketing. Or buy your employees subscriptions to trade magazines so they'll understand you expect them to be up to the minute on techniques and products.

In employee meetings, or in individual conversations, explain to employees the concept of the customer's buying cycle. The cycle states that as soon as you have done business with a customer, the customer begins evaluating you and your services right away. If the work was not satisfactory, the customer returns to the beginning of the cycle and starts over.

Two important factors to remember about the customer's buying cycle are: First you must observe it entirely from the customer's viewpoint since that's the only way he can view it. Secondly, every time you contact or work for your customer, the customer automatically makes that evaluation at the bottom of the buying cycle.

For example, if you fertilize a new customer's lawn correctly twice, then over-fertilize a corner once, he won't figure the odds. He'll wonder whether his need for lawn care is being met.

EVALUATING SATISFACTION. How satisfied are your customers with your service and the

treatment from your employees? An easy way to poll your clients is to mail out surveys with postage-paid envelopes allowing customers to rate your employees and their work. (See the sample customer survey.)

Although the management information survey is vital to keeping customer relations on track, it is seldom used in the lawn and landscape industry. Often the owner of a small company is closely involved in both the field work and with the customers. As the business grows, however, the owner's jobs as dispatcher, purchasing agent, personnel manager and accountant leaves less time for on-the-job troubleshooting. In these cases, a survey of clients is even more important.

Don't think a client survey will mean having to re-do your business from top to bottom. These surveys bring to light little problems that can be solved with small changes — like better control of scheduling or tighter equipment maintenance procedures. Little changes in your company's policies and procedures make big changes in customer satisfaction, especially if you leave a small flyer to let your customers know you're implementing their suggestions.

CUSTOMER-ORIENTED SELLING. Here's an employee-training method that is easy to implement and reaps big benefits in customer relations. Train your employees to ask questions so they'll be able to:

- Understand the customer's current problems and needs.
- Find out the implications of those problems and needs.
- Agree with the customer on the best solutions.

Your employees are selling every day. If they think they're selling services and products, you're in for trouble with clients. They must understand that they're selling solutions. Good sales people never introduce a product or service without fully understanding the customer's needs and desires.

Developing the want is a good way to sell additional services or products. Whether it's an additional product or service, or a more elaborate and expensive one, remember that customers who want, rather than just need, are willing to pay more to have their needs satisfied. — Robin Pedrotti

The author is based in San Diego, Calif. He is also the owner of a lawn aeration business and the author of a book on selling aeration services.



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Now available with optional blower and leaf vacuum attachments that make loading of processed material a breeze.

Two models to choose from, CS1000 PTO and a CS5000 Self-Powered unit driven with a 13 h.p. Honda engine.

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People

BLUEBIRD INTERNATIONAL appointed **Scott Murdock** as national sales manager. Formerly a sales representative for 3M Co., Murdock handles sales to all BlueBird manufacturers and distributors in the United States and Canada.

Briggs & Stratton announced the following appointments: **Charles Brown** as vice president of engineering and **Curt Larson** as general manager and vice president of the company's industrial sales division. Already serving as vice president of quality assurance, Brown now manages corporate engineering and research as well. Larson, who served as vice president of sales and marketing since 1988, directs sales and marketing for the industrial division's domestic and Canadian customers.

Jacobsen Textron promoted **James Cutler** to vice president of manufacturing and **Steven Ramig** to director of materials. Cutler, responsible for managing multiplant manufacturing activities, replaced **Earl Klepel** who retired in December. Ramig previously served as manager of distribution and marketing services, and now handles purchasing, production control, production

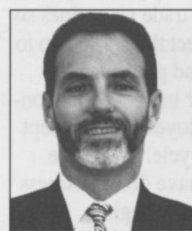
stores, master scheduling and material control departments. Jacobsen also appointed **Richard Mowry** as manager of distribution and marketing services. Mowry formerly managed several industrial distribution businesses.

Alex Arrache joined ISK Biotech as formulations chemist in the coatings division. Arrache served as R&D chemist for Akzo Coatings. Additionally, ISK named **John McLaughlin** manager of human resources development. McLaughlin is responsible for training, organization development and career development.

Turf Diagnostics and Design named **Jennifer Sutch** manager of its technical operations laboratory. Sutch was formerly research agronomist for Okeelanta Sugar Corp.

Donald Newhart joined Idea Factory as vice president of sales for HELP for All Plant Growth, an organic biological growth stimulant. Newhart was sales director for Safer Inc.

Aquatrols named **Dr. Stanley Kostka** director of research. Kostka previously served as research manager for a major



Shampeny



Williams

agriculture biotechnology company.

The Bunton Co. named **Gary Shampeny** vice president of sales and marketing. Shampeny was formerly golf operations manager for Toro.

Irrrometer Co. promoted **Mark Williams** to national sales manager. Williams, who served for three years as sales representative for Irrrometer's Southern California landscape market, is former director of communications of the Irrigation Association.

Ransomes named **Steven Yolitiz** director of marketing. His responsibilities include supervising advertising, training, market research, dealer development and order planning. ■



MULCH MONSTER

The crisis in the waste management industry and the restrictions that apply specifically to "green waste" make the AmeriQuip 250 Chip N Mulch the right product at the right time.

The 250 is built tough for commercial use. A suspended trailer, big capacity mulcher, large shaft and bearings, dual purpose design and a 16 HP OHV engine are all standard equipment. For more information, call:

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Products

Seymour Manufacturing Co. added a concrete mover and two mortar hoes to its line of heavy-duty contractor tools.

The concrete mover features an 18-inch steel head with a welded wire lifter. The lacquered hardwood handle, contoured for easy handling, is double-bolted to the head for extra rigidity.



The hoes are available in two sizes — 10 by 6 inches and 7 by 4 1/4 inches. The steel heads contain holes for mortar mixing and also feature contoured hardwood handles.

Circle 126 on reader service card

Product Spotlight

Brown Manufacturing introduced the Bedmaster digging rotor for use on the small model F-702 Trenchmaster.

The Bedmaster digs check-shaped trenches used by landscapers for defining beds and installing plastic or steel edging. The rotor, available in two sizes, digs either 3 or 4 inches deep and tapers about 8 inches back into the bed. The trencher's light weight permits fancy bed shapes and tree rings as small as 6 feet in diameter.

In hard clay areas, the Trenchmaster can perform a six-hour manual labor job in 15 to 20 minutes.

Circle 125 on reader service card



Gallery 75 Dry Flowable preemergence herbicide from **DowElanco** is now available with a cap that also serves as a measuring device. The cap measures 1/2 ounce of Gallery, enough herbicide to treat 1,000 square feet and prevent broadleaf weeds for six to eight months.

The cap remains attached to the package, encouraging users to dispose of it when the container is empty rather than using it to measure other pesticide products.

Gallery 75 DF contains isoxaben, a new chemical compound which helps prevent the growth of 46 different broadleaf weeds. It can

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Triamine II™ combines MCPA, Mecoprop and Dichlorprop to satisfy 2,4-D Free, Dicamba Free needs. It's your choice.

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USE READER SERVICE #55

be used on most established cool- and warm-season turfgrasses and in more than 400 field-grown and 236 container-grown ornamentals.

Circle 127 on reader service card

The **Exmark** Viking 5-speed and hydro walk-behinds feature a driving system that prevents downhill runaway. The mowers offer five forward speeds, true reverse and positive traction even in wet conditions.

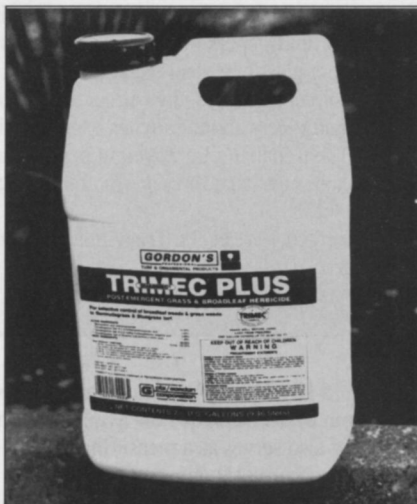
The Viking Hydro boasts zero-turn maneuverability, instant forward-to-reverse and infinite speed control. In addition, Vikings



mulch, bag or discharge using the Exmark Micro-Mulch accessory.

Circle 128 on reader service card

PBI/Gordon Corp. recently received EPA approval to expand the label for Trimec Plus grassy weed and broadleaf herbicide. The product is labeled for use on zoysia-

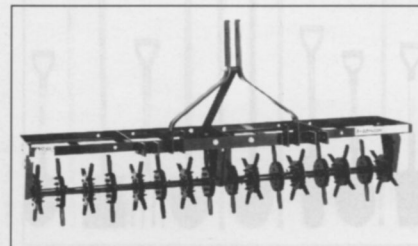


grass and tall fescue. Previously approved species include Kentucky bluegrass and bermudagrass.

Trimec Plus provides postemergent control of yellow nutsedge, crabgrass and other coarse grasses, plus almost all of the broad-leaf species controlled with regular Trimec herbicide. Trimec Plus' use rate is the same for tall fescue and Kentucky bluegrass.

Circle 129 on reader service card

Feldmann Engineering & Manufacturing Co. introduced a 64-inch swath model to its line of pull-behind core plug aerators. The model includes a three-point hitch that easily connects to the commonly used '0'/1' tractor hitches.



The 64-inch aerator is similar to Feldmann's 32-inch and 48-inch models, but also provides user time efficiency through greater turf coverage per hour of use.

Circle 130 on reader service card

Billing Software

The Billing Clerk™

is ever-so-easy to install and use!

Installation takes 2 minutes or less! To install just type

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That's right! **The Billing Clerk** self installs and is so easy to use! It's all menu driven and walks you from screen to screen.

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The overhead valve construction allows the engine to run cleaner and more efficiently. It also permits less carbon build up, longer valve life and better fuel economy.

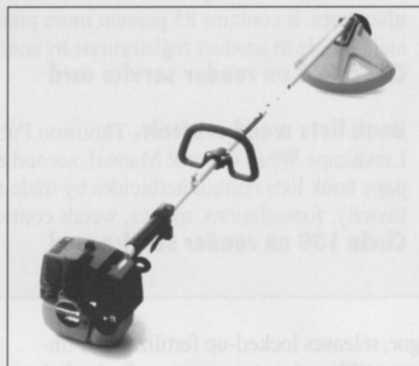
Full pressure lubrication provides a controlled flow of oil to all moving parts for less wear. A spin-on automotive-like oil filter keeps oil clean.

Circle 131 on reader service card

Parkway Research introduces Seduction Insect Feeding Stimulant for turfgrass. Seduction is a blend of flavorings and attractants designed to improve the performance of water-based or emulsifiable insecticides. Seduction forms a flexible, tacky film on plant foliage to improve adherence, while attracting target insects.

Circle 132 on reader service card

The model 120L commercial trimmer from **Husqvarna Forest & Garden Co.** features a muffler molded of an aluminum



alloy to reduce noise level to 91 dBA. The trimmer weighs 10.1 pounds and generates low vibration.

Other features include a one-button injection starting system, a loop handle design that wraps around the shaft for easy turning and side trimming, and a 35-degree angle between the driving shaft and trimmer head which allows the operator to trim without excessive strain.

Circle 133 on reader service card

Barenbrug USA added Alice Ladino White Clover to its line of forage legumes and grasses.

The white clover is a large-leaf, vigorous variety showing excellent spring growth capabilities. It has an increased stolon density, providing better persistence under continuous grazing. It also exhibits resistance to sclerotinia and other clover diseases, good winter hardiness and heat and drought tolerance, and produces a high-protein, highly palatable forage while exhibiting high dry matter yields.

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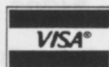
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Idea Factory offers a one-gallon economy refill bottle for HELP, All Plant Growth, an organic biological growth stimulant.

HELP is a 100 percent natural complex containing more than 60 plant-growth factors to stimulate beneficial microorganisms occurring naturally in the soil. Its catalytic action through roots or foliage of gardens, lawns and trees fosters plant growth and

FYI...

Monitoring plant health. Eubank Consulting offers ColorBank, a pocket-size diagnostic guide that lists more than 250 common landscape plants with individual healthy color ratings and appropriate green color bars for quick comparison with specific plants.

Circle 137 on reader service card

T&O chemicals reference available. The second edition Turf & Ornamental Chemicals Reference from John Wiley & Sons helps lawn care professionals meet new environmental regulations.

The book includes product labels and MSDSs for 315 chemical products from 23 manufacturers. It contains 85 percent more products, an expanded explanation of regulations and a guide to product registrations by state.

Circle 138 on reader service card

Book lists weed controls. Thomson Publications introduces the Nursery and Landscape Weed Control Manual, second edition, written by Dr. R.P. Rice Jr. The 300-page book lists current herbicides by trade name, chemical formula, manufacturer, toxicity, formulations, usages, weeds controlled, application and precautions.

Circle 139 on reader service card

vigor, releases locked-up fertilizer and improves tilth and water retention. It also helps resist disease and reduces the need for chemicals.

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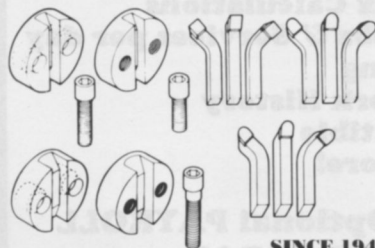
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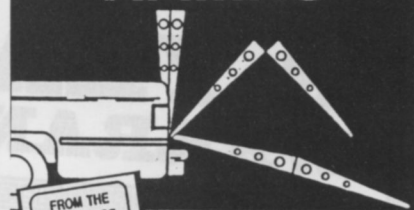
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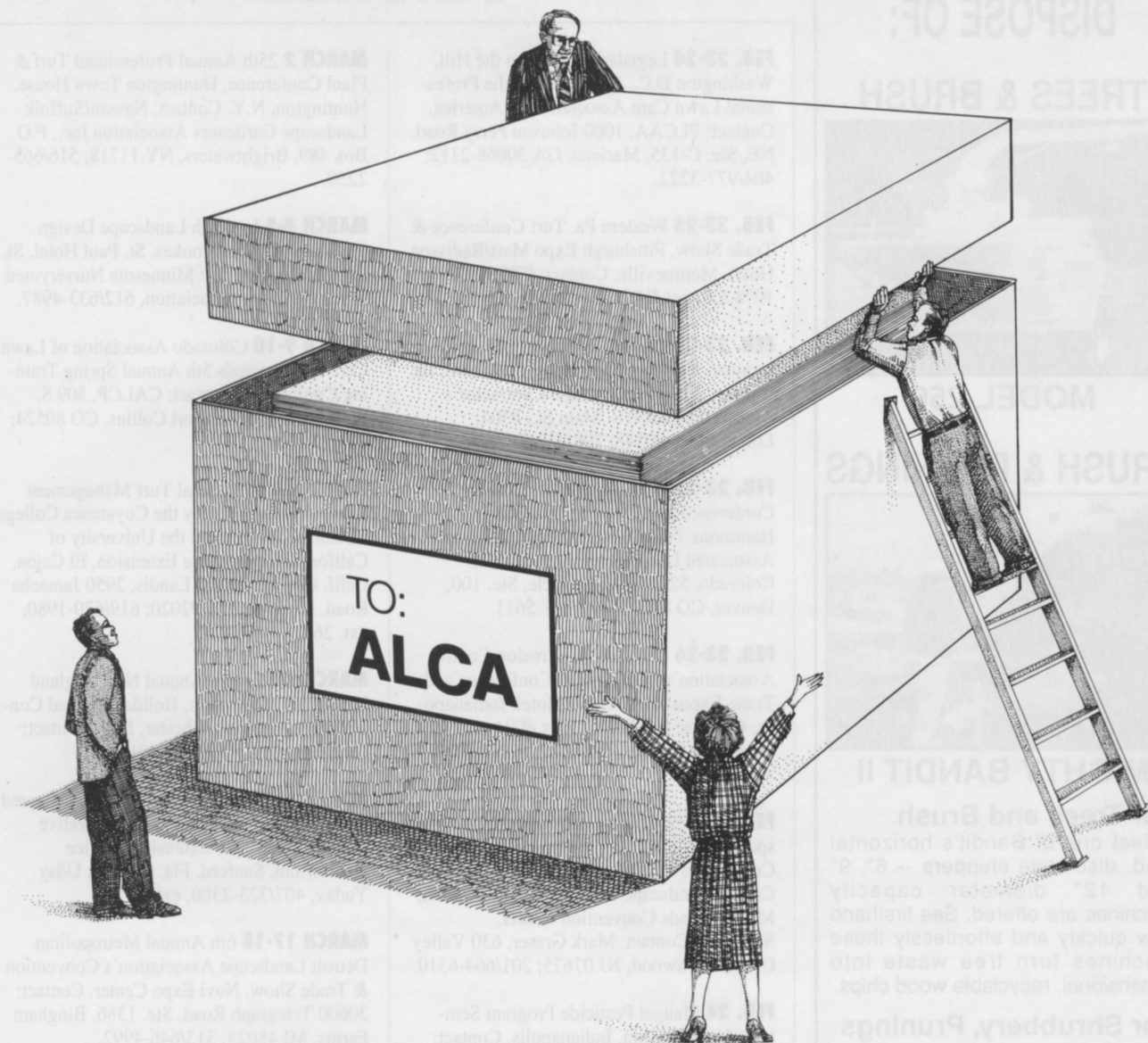
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Calendar

FEB. 23-24 Legislative Days on the Hill, Washington D.C., sponsored by the Professional Lawn Care Association of America. Contact: PLCAA, 1000 Johnson Ferry Road, NE, Ste. C-135, Marietta, GA 30068-2112; 404/977-5222.

FEB. 23-25 Western Pa. Turf Conference & Trade Show, Pittsburgh Expo Mart/Radisson Hotel, Monroeville. Contact: PTC, P.O. Box 1078, Lemont, PA 16851-1078; 814/863-3475.

FEB. 23-25 Creating a Winning Season seminar, Holiday Inn O'Hare, Rosemont, Ill. Contact: Illinois Landscape Contractor's Association, 2200 S. Main St., #304, Lombard, IL 60148; 708/932-8443.

FEB. 23-26 1993 Landscape Industry Conference and Trade Show, John Q. Hammons Trade Center, Denver. Contact: Associated Landscape Contractors of Colorado, 5290 E. Yale Circle, Ste. 100, Denver, CO 80222; 303/757-5611.

FEB. 23-26 International Erosion Control Association's 24th Annual Conference and Trade Exposition, Westin Hotel, Indianapolis. Contact: IECA, P.O. Box 4904, Steamboat Springs, CO 80477-4904; 303/879-3010.

FEB. 24 New Jersey Landscape '93, co-sponsored by the Associated Landscape Contractors of New Jersey and the Bergen County Landscape Contractors Association, Meadowlands Convention Center, Secaucus. Contact: Mark Graser, 630 Valley Court, Westwood, NJ 07675; 201/664-6310.

FEB. 24 Maugé Pesticide Program Seminar, Signature Inn, Indianapolis. Contact: Releaf Tree Consultants, R.R. 1, Box 205A, Nineveh, IN 46164; 317/933-9351.

FEB. 24-25 The Landscape Industry Show (formerly GreenTech), Long Beach Convention Center, Long Beach, Calif. Contact: 916/448-2522.

FEB. 24-26 Landscape Contractors Association Winter Workshop, Holiday Inn Crowne Plaza, Rockville, Md. Contact: LCA, 9053 Shady Grove Court, Gaithersburg, MD 20877; 301/948-0810.

FEB. 27 Long Island Arboricultural Association's 22nd Annual Tree Conference, State University of New York -- Farmingdale Campus, Long Island, N.Y. Contact: LIAA, 516/783-1001.

MARCH 1-3 62nd Massachusetts Turfgrass Conference and 17th Industrial Show, Springfield Civic Center, Springfield. Contact: Dr. Joseph Troll, P.O. Box 489, Hadley, MA 01035; 413/549-5295.

MARCH 2 25th Annual Professional Turf & Plant Conference, Huntington Town House, Huntington, N.Y. Contact: Nassau/Suffolk Landscape Gardeners Association Inc., P.O. Box 489, Brightwaters, NY 11718; 516/665-2250.

MARCH 4-5 In-depth Landscape Design Seminar, by John Brookes, St. Paul Hotel, St. Paul, Minn. Contact: Minnesota Nurserymen & Landscapers Association, 612/633-4987.

MARCH 9-10 Colorado Association of Lawn Care Professionals 5th Annual Spring Training Conference, Contact: CALCP, 309 S. Summitview Drive, Fort Collins, CO 80524; 303/224-2293.

MARCH 12 4th Annual Turf Management Seminar, sponsored by the Cuyamaca College Botanical Society and the University of California Cooperative Extension, El Cajon, Calif. Contact: Diana Landis, 2950 Jamacha Road, El Cajon, CA 92020; 619/670-1980, ext. 262.

MARCH 15-17 3rd Annual New England Landscape Exposition, Holiday Inn and Convention Center, Manchester, N.H. Contact: Guy Hodgdon, 800/639-5601.

MARCH 16 Environmental Issues, sponsored by the University of Florida Cooperative Extension Service, Extension Service Auditorium, Sanford, Fla. Contact: Uday Yadav, 407/323-2500, ext. 5559.

MARCH 17-18 6th Annual Metropolitan Detroit Landscape Association's Convention & Trade Show, Novi Expo Center. Contact: 30600 Telegraph Road, Ste. 1386, Bingham Farms, MI 48025; 313/646-4992.

MARCH 22 Tree Appraisal Workshop, by Dr. Richard Harris, Portland Ore. Workshop will be repeated March 24 in Spokane, Wash., and March 26 in Seattle, Wash. Contact: Dave Stockdale, Center for Urban Horticulture, University of Washington, GF-15, Seattle WA 98195; 206/685-8033.

MARCH 25-27 The Carolinas Irrigation Association's Trade Show & Seminar, Myrtle Beach Hilton, Arcadian Shores, Myrtle Beach, S.C. Contact: P.O. Box 1642, Lexington, NC 27293; 800/682-7774.

MARCH 26-28 Student Field Days, State University of New York -- Cobleskill, N.Y., sponsored by the Associated Landscape Contractor's of America. Contact: Jack Ingels, 518/234-5646.

APRIL 2-4 Associated Landscape Contractors of America Member Tour, San Diego. Contact: ALCA, 12200 Sunrise Valley Dr., Ste. 150, Reston, VA 22090; 703/620-6363. ■

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USE READER SERVICE #29

Book Excerpt

(continued from page 56)

accomplished through gene-tic resistance, destroying plant debris that harbor the pests and pesticide applications. A few examples of reducing inoculum in-clude (1) reducing rust through frequent mowing of leaves, thus eliminating spores (ureidiospores) before they mature; (2) reducing the spread of St. Augustine decline virus by cleaning mowing equipment; (3) using powdery mildew resistant cultivars of Kentucky bluegrass in shaded conditions; and (4) diminishing the presence of adult Kentucky bluegrass billbugs or the black turfgrass atenius in the spring with an insecticide application. The latter will reduce damaging grub populations in summer.

In practice, assessing the population levels of pests is difficult; however, insect populations are generally easier to assess than pathogen populations due to the relative small size of the fungi involved. With most insect pests of turfgrass, population levels are determined by actually counting the individuals or using insect traps.

Pathogens on the other hand are microscopic making quantification difficult. Recently, disease test kits have been developed to provide a qualitative assessment of pathogen levels. (Miller et al., 1990)

In devising management strategies targeted at population levels, consideration of the population's growth rate is important. If the relative growth rate of a pathogen is high, reduction of initial inoculum has minimal effect. For example, *Pythium* propagules in soil and thatch are the source for blight epidemics. (Hall, et al., 1980) Although reduction of thatch may be a logical means of reducing the *Pythium* blight incidence, this is probably not efficient given *Pythium* can develop explosively from even a very tiny population. However, if the rate of pest increase is slow, reducing inoculum or pest levels will be more effective.

r: RATE OF GROWTH. Rate of reproduction greatly influences population levels. If reproduction or "births" is equal to mortality, no population growth occurs. If reproduction is greater than mortality then the population will increase. Rate with regard to pest problems is governed by the reproductive potential (generation time), the availability and susceptibility of the host and the environmental effects on the interaction.

Cultural practices to minimize pest problems are ways of reducing the growth rate. Any cultural practice that creates environmental conditions unfavorable for reproduction and growth will reduce *r*. Examples of cultural practices that reduce *r* include: (1) increasing air movement through removal of brush around a green, or improving drainage to reduce the conditions favorable for *Pythium* blight; (2) irrigating a turf to pro-

mote *Beauveria* spp. which is a natural fungal disease of chinchbugs; and; (3) through adequate nitrogen applications the growth rate of *Colletotrichum graminicola*, the causal agent of anthracnose can be reduced. (Danneberger et al., 1983)

K: CARRYING CAPACITY. The carrying capacity is the maximum population size that can be supported by a given habitat. Turfgrass managers have the capability of raising or lowering the carrying capacity of the system through managed inputs. For example, well-fertilized and watered turf can support more plants and potentially more pests such as white grubs or bluegrass billbugs than a turf receiving minimal fertilization. Under natural conditions, limits to growth such as temperature, competition for limited resources and predators frequently restrict a population's ability to reach the carrying capacity.

In turf, however, management practices allow for growth to be maintained close to the carrying capacity or raise it through nutritional programs and pest control.

DISRUPTIONS IN STABLE GROWTH — OSCILLATIONS.

In any system a limit to growth is imposed by factors such as space, nutrients and energy availability. The increased competition between individuals for these factors may result in mortality. Changes in climate, genetic makeup, predators and human intervention all promote fluctuations in populations.

In low maintenance situations, plant growth is relatively stable with little population fluctuation. The potential for severe population oscillations is greatest in monoculture systems with high energy inputs. If these oscillations become severe, chaos can occur which can lead to the plant community "crashing".

In a recent study, high nitrogen soil levels led to chaotic behavior in a perennial grass system which the researchers attributed to increased plant litter due to the higher nitrogen. The result was reduced plant growth. (Tillman and Wedlin 1991). In turf, combining nitrogen rate and carrier may also cause wide oscillations in plant growth.

Quick-release nitrogen sources have the potential to cause rapid plant growth in a very short period of time with a subsequent decrease in plant growth after the nitrogen is used up. Cyclic fluctuations in plant growth with repeated high application rates of quick-release nitrogen may eventually lead to detrimental turfgrass effects.

Slow release sources provide a more moderate growth rate which would result in less growth fluctuation, thus a lesser chance of the system crashing.

In turf, "plant litter" often takes the form of thatch which is detrimental to plant growth, and its control or management is critical to maintaining a healthy turf.

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Answers to questions on page 62

1. 4:1
2. 15 percent
3. 0.433 PSI
4. Yes
5. The center of the zone
6. No

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B. GC-1350M	IN-LINE FUEL FILTER	1.35
C. AF-2021M	125HP KAWASAKI PREMIUM FILTER	5.95
D. JT-101M	SPINDLE BEARING	4.80
E. H-9M	KAWASAKI OIL FILTER	4.25
F. TL-130M	.130 MIM, 150° TRIMMER LINE	7.50
G. JT-100M	VARIABLE SPEED PULLEY	73.99

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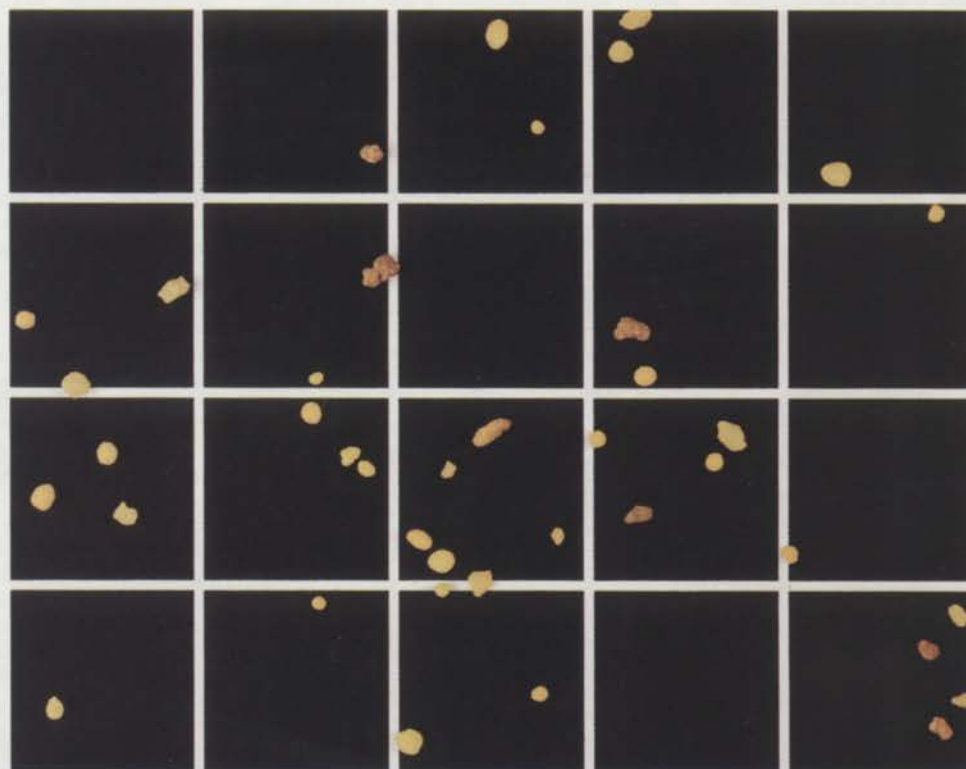
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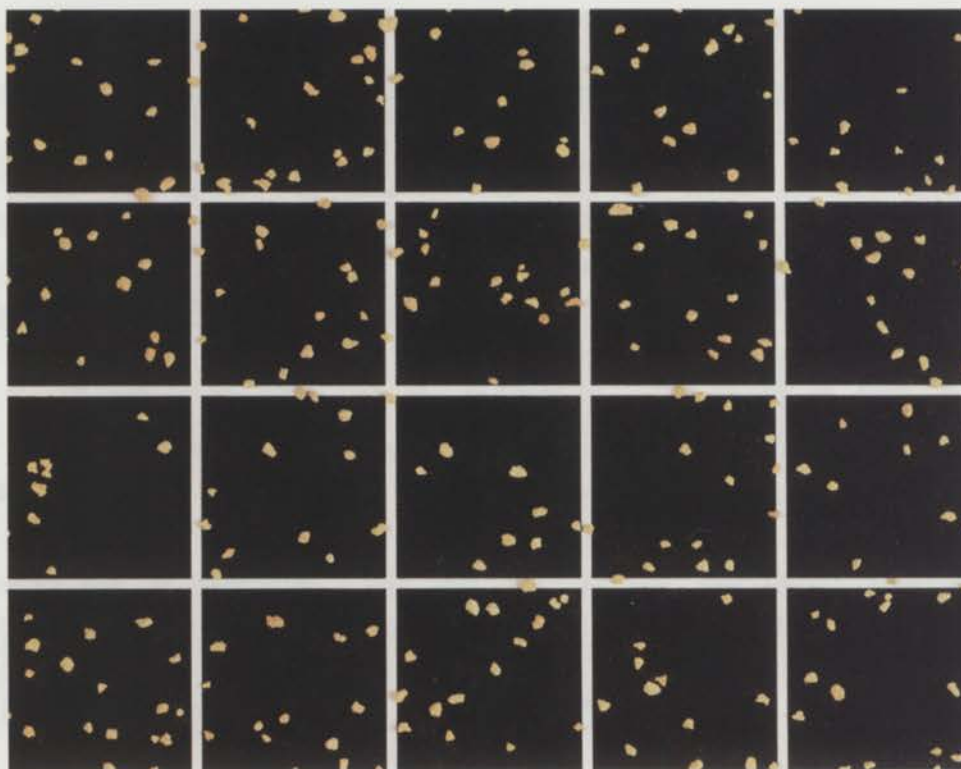
● No other preemergent herbicide can match pendimethalin's combination of broad spectrum weed control, control effectiveness and season-long performance.

Preemergent Control Comparison

	Crabgrass	Goosegrass	Foxtail	Poa Annua	Oxalis	Spurge	Henbit	Chickweed
pendimethalin	H	H	H	M	H	M	H	H
prodiamine (Barricade)*	H	M	H	M	NR	M	M	M
dithiopyr (Dimension)*	H	M	H	M	H	M	M	M

H - High M - Medium NR - Not registered (Based on Scotts/university data)

* Barricade and Dimension are trademarks of Sandoz Limited and Monsanto Company respectively.



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