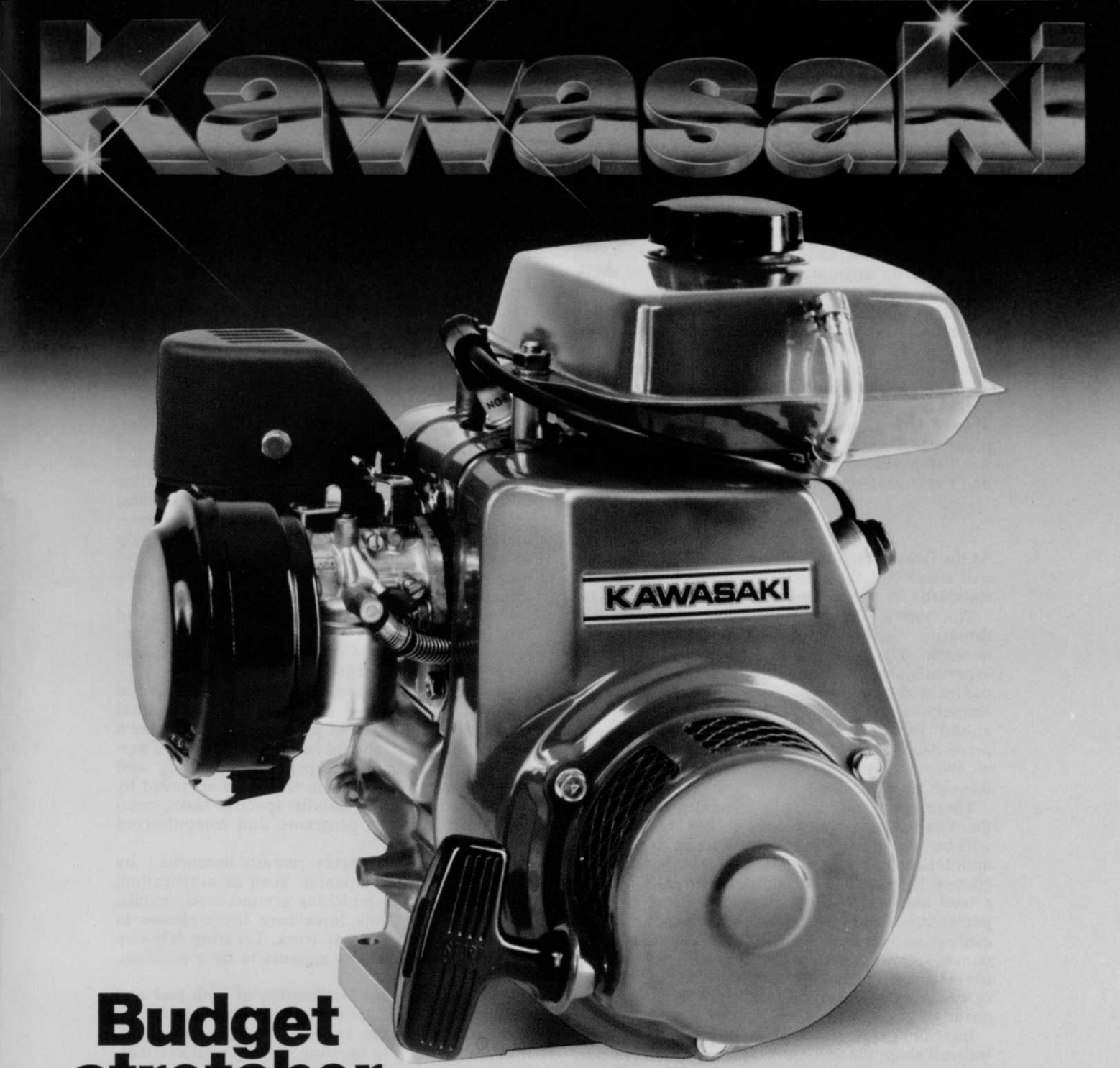
Kawasaki



Budget stretcher.

New equipment is great. But today, tight budgets call for getting the longest life from all your equipment. That's where heavy duty Kawasaki engines can help you stretch your budget.

Specify Kawasaki engines on new equipment—or to replace worn out power plants on equipment you own. You get easy starting engines that run smooth. They've got the torque and horsepower to give new life to old equipment. They've got solid value features such as cast iron cylinder walls, stellite exhaust valve faces, heavy duty shafts and ball bearings on both ends of crankshaft and camshaft, just to name a few. And they run on regular or unleaded fuel.

Look into stretching your budget with reliable, durable replacement engines from Kawasaki. 4 cycle from 2.3 to 20 hp. 2 cycle available. Parts and service available through the Kawasaki distributor-dealer network. Get all the facts for yourself. Send for details today.

The Power to turn People on.

Kawasaki

650 Valley Park Drive, Shakopee, MN 55379
Phone: (612) 445-6060

Circle **112** on free information card

LABOR, PACE OF TECHNOLOGY TO CHANGE STANDARDS IN THE 80's

By Bruce F. Shank, Editor

This article is a stab at the future of the Green Industry in the next ten years. I don't suggest this projection to do anymore than to help us all think about the next decade in order to grow and prosper. It is an exercise in planning by imagination combined with current events. You will have your own version, no doubt. But just to have taken the time to think about more than today is beneficial and even inspirational.

1980 will be a tight year probably. We can't stop at 1980. If you are a good businessman in the first place you have a handle on debt. Be careful, but don't stop planning, don't stop looking ahead, and don't stop growing.

As the Green Industry enters the 1980's two factors will stand out, the pace will be much faster and standards for design and maintenance will change.

The 1980's will be the decade of the quick-thinking, well-trained, and progressive businessman. The small businessman will have to be especially sharp to keep abreast of the larger companies with greater resources for new technology. Economies of scale will keep the big company ahead technologically and even or cheaper pricewise. Rising labor costs will stunt the growth of those companies unable to cut labor costs through technology.

There will continue to be special niches where the small business can make it, but these niches will be changed by new standards in design and maintenance of landscapes. These standards will change in response to population trends, higher priced and less willing labor, and rising costs of petroleum-based products. Three standards will evolve: native vegetation with minimal maintenance, intense use areas, and display landscapes for brightening population centers. The residential or commercial lawn will fall under the third standard.

Interior plant displays will abound as centralized shopping and entertainment centers begin to dominate and centralize human behavior. Population centers will be nearly continuous as they are in parts of Europe and Japan. Commuting to work from remote areas around cities will be less common.

The 1980's will bring smaller and better residential lawns, smaller but intensely used parks, increased apartment and condominium living, technologically advanced golf courses, and highway rights-of-way requiring little or no maintenance.

There will be a clear delineation between low and high maintenance landscapes. Architects will be encouraged to specify lower maintenance plants in their industrial landscapes, but more exotic and high maintenance plants in malls and other activity centers. Parks, commons, schools and athletic grounds will require additional maintenance as use increases. Athletic fields especially will have to withstand extreme wear and be constructed to bounce back quickly. Versions of the Professional Athletic Turf (PAT) system originated by Daniels and Robey of Purdue will be necessary. Technological advances to enable turf to withstand extreme use will be developed in the next few years. Overall, parks and athletic areas will require more attention than they currently receive.

Numerous small parks could become an administrative problem for municipalities unless much of the maintenance is contracted out. Simplifying maintenance for the municipality and making the contractor more attractive an option would entail a broad service package including building maintenance, debris collection, initial reconstruction to make the park easier to maintain, and complete plant maintenance service. A weekly or even daily schedule for each park may be required to handle the demand placed upon the park grounds.

Similar conditions would exist for exterior and interior maintenance of malls and shopping centers. Offering a single service to the mall management lowers competitive advantage.

Lawn care will become the dominant method of care for non-irrigated industrial and residential property as the value of property rises. The lawn service, however, should be more inclusive of services such as mowing, pruning, planting, and design. Economies of scale would be achieved by specialized crews to handle specific tasks, combined turf and tree programs, and computerized routing.

Some residential tasks remain untouched by large lawn care companies, such as aerification, weed control and mulching around ornamentals, and thatching. Some lawn care firms choose to subcontract this type of work. Locating labor to perform such functions appears to be a problem, however.

Weed control and fertilization of both turf and ornamentals could be carried out by chemical injection into irrigation systems. Maintenance would thus be reduced to mowing, edging, and verticutting and aerification where needed.

In other words, many maintenance considerations will be solved at construction time rather than by continuous care. For example, although an irrigation system may seem a luxury, it could lower maintenance costs over the life of the system by reducing labor costs for fertilization, weed control, and irrigation. Small-scale irrigation systems which include injection devices will be offered soon, as well as a line of chemicals for injection systems. Growth regulators will be one of the chemicals to be applied by irrigation systems. Closer attention to soil pH and microbial conditions of the turf will control thatch accumulation. Correction of pH will be accomplished through irrigation injection.

Installation and maintenance of small-scale irrigation systems will create a new niche for Green Industry businessmen.

In the 80's, there will be higher standards for plant materials and maintenance in population centers and reduced emphasis or native standard for remote areas.

Golf courses, especially public courses, will be forced to adapt to intense use as the number of courses in relationship to the population decreases. New courses built as new population centers evolve will be designed and constructed with intense use in mind. Greens and tees will be much larger. Maintenance standards will change, especially for roughs. Native, low maintenance plants will dominate the rough to concentrate maintenance efforts on tees, fairways, hazards and greens.

Larger, more efficient equipment will be utilized to mow, aerify, and spray. Injection irrigation will take over much of the fertilization and weed control, especially on new courses. To gain better control of turf conditions, specifications for new courses will include improved drainage, thorough irrigation, better turfgrass cultivars, and careful composition of the rootzone. These specifications will increase construction costs but control maintenance costs in the future. Older courses will gradually renovate to gain more control of turf conditions.

Unrestricted use of golf carts will cease. Ways to keep carts in the cart paths will emerge. Ball location will also require some solution. If roughs go native, locating balls will be more difficult and more time consuming. Golfers aren't going to leave many $1.25 golf balls in the rough. Some provision will have to be made to make ball searching less desirable to the golfer. Changing rules to penalize slow play could have some effect, but poor golfers care more about the relatively expensive golf ball than they do their score.

It is imperative that government agencies stop subsidizing municipal courses so that the greens fee can rise to a level determined through competition by daily fee courses. If subsidies don't stop, many daily fee courses will be unable to cover rising maintenance costs and return a profit to shareholders too. Perhaps the pressure for zero-base budgeting will stop such frivolous and unfair subsidizing.

Use of secondary treated effluent water for golf courses and sod farms will increase. Management will have to provide monitoring devices, to hire someone who can understand water organisms and content, and to work closely with water management districts. The technology of irrigation with effluent will be developed under Federal support and private research.

Effluent water will play a significant role in reclamation in the 1980's. Although native plant species will be used, irrigation will be needed to speed up natural establishment. Coal development will happen in a big way with reclamation right behind. The scale of the projects may limit contracting to large, equipped companies. The key that will prevent any local farmer with a seed drill to underbid will be understanding of native plant species and their proper establishment. Only well-trained horticulturists with knowledge of native plant material should direct large-scale reclamation efforts. The Department of Interior must stand firm on specifications for reclamation under the guidance of experts in native plant material. Coal companies won't like picky specs on native plants and they will resist them until the Department of Interior shows its insistence and determination to reject anything less. Once the point is made, however, they will make the necessary commitment to secure the coal and restore the land as quickly as possible.

As farms turn into housing developments, man will bring with him his tree, ornamental, and lawn standards. These standards will be higher as well in the new decade. Occupations involving the care of man's green world will grow. But higher standards will mean a need for increased knowledge and sophistication by Green Industry professionals.

With or without Federal support through Urban Forestry programs, greater attention will be paid to the urban environment. The arborist, the landscape contractor, the lawn care specialist, the nurseryman, and the extension agent will be dealing with a broader variety of plant materials. Factors such as irrigation and soil pH will be considered by property owners. Plant and forget will be reserved for remote, unpopulated areas. The population centers will become urban plant showcases, each with a special natural feeling to ease man's anxiety under more crowded conditions. Man has learned from his concrete jungle mistakes and will strive to avoid their recurrence. The Green Industry businessman will show him how .

WTT

PRUNING PROGRAMS REQUIRE ACCURATE SCHEDULE, MANAGEMENT

By Harleigh Kemmerer, Superintendent of Grounds, University of Houston at Clear Lake City, TX

Most facilities have living plants and anytime there are plants there is also a need for pruning. It is the responsibility of the grounds supervisor to develop a program which will provide proper pruning and at the right time for each of the different types of plants growing at his facility.

Instructions on how and when to prune are given in numerous publications. Scheduling work crews to perform pruning when it needs to be done and without interfering with other necessary chores must be done by the supervisor after a thorough analysis of the plant population. Type, number, age, general condition and locations of the plants are used as aids for the development of a pruning program.

A well-managed pruning program involves scheduling personnel, equipment, tools and handling of brush. It is also imperative the manager and crew know the names and identities of the various plants on the grounds. It is impossible to know when or how to prune if no one knows what is being pruned.

Postponing pruning until there is a slacking of other grounds work or until the foreman is looking for something for the crew to do to keep busy causes problems. The delay can turn a potentially hazardous situation into a real danger. It may be responsible for damage to property or injury to people or animals.

Allowing plants to grow completely out of bounds means that extensive cutting must be done to get the plant back to an acceptable size. The need for excessive pruning will often ruin the appearance of the plant until new growth covers bare spots. Sometimes, the plant's attractiveness is permanently ruined and it must be removed.

The best approach for pruning is to schedule it on a frequent basis. This prevents the need to remove a lot of wood and also allows the pruning crew to see the plants on a regular basis. Potential problems can be corrected before a hazard develops.

Scheduling on a calendar basis using the dates when pruning was done the preceding year is not completely valid because weather conditions modify blooming dates and when the flush of growth occurs. However, the dates when pruning is done should be recorded. They can serve as a reminder of when pruning needs to be done. Exact dates can be scheduled according to the growth pattern of the current year.

Winter months are a favorite time for pruning. The timing is fine for some plants, but winter pruning will remove buds from spring flowering shrubs. Also, it is difficult to find dead wood on plants in the winter.

The type of pruning to be done also influences the timing and scheduling. Pruning is normally done for the following reasons:

1. At the time of transplanting. Removing some of the top compensates for roots lost in transplanting. It helps the plant survive.
2. To remove dead, broken and diseased branches.
3. To keep the plant in bounds. Keep trees out of wires and shrubs from growing over sidewalks or windows.
4. For safety, to prevent plants from interfering with the view of stop signs and other regulatory and guidance signs. Also to prevent obstruction of the view at intersections and other hazardous areas.
5. To develop or maintain an espalier, topiary or other particular shape.
6. For rejuvenation. Old woody canes on shrubs often don't produce much flowering wood. Pruning some of the canes to the ground initiates new vigorous growth and doesn't harm the shape of the plants.

Pruning that involves the use of power equipment must be scheduled to avoid interference with classes, conferences and other activities being conducted at the facility. Schedules of some events are known well in advance. Problems with event scheduling may require doing the work on an overtime basis to avoid conflict. Emergency work must be done on an immediate basis regardless of the conflict. Noise and disturbance can be kept to a minimum if only the pruning to eliminate the danger is done with the final clearing and brush pickup deferred until the conflicting event is over.

A good time to inspect for pruning needs is after a rain.

Pruning to clear areas for painters, electricians, and other crafts is often on an emergency basis. However, when routine work is involved the building maintenance supervisor should inform the grounds supervisor of his requirements when his yearly work schedule is developed. This will enable the grounds supervisor to schedule the special pruning with his regular pruning activity.

If practical, all pruning needs within an area should be scheduled at the same time to avoid return trips and to simplify clean up.

The overall pruning schedule has to include all of the special considerations plus the regular pruning.

Inspections will reveal pruning needs also. A good time to inspect is immediately after a rain. Tree branches are at their lowest and thus any need for pruning along roads, parking lots, and other traffic ways is readily apparent. Shrubs also are spread by the weight of water. Checking them while they are wet will indicate where pruning is needed to clear walks, background plantings and other features.

Continues on page 36

Pruning *from page 35*

Assigning personnel to do the job of pruning isn't necessary if the work is done by outside forces. Usually, much of the pruning can and should be done by the grounds crew. All of it can be done if the organization includes a tree crew.

You should not assign just anyone to prune. It is best to select a person with an interest in plants and who has shown he respects pruning techniques. Handing each member of the crew a pruner and telling him to start pruning creates confusion and makes it impossible for supervisors to direct their efforts to those that have the best likelihood of learning. In all situations, including the use of a commercial pruning firm, it is best for the supervisor to prune one plant as a model and to set the standard.

In-house pruning requires the purchase of chain saws and other pruning tools. Normally the cost is justified even if the tools are only used on an occasional basis. The greatest problem is inventory control. Pruning tools and small hand shears seem to disappear. Having a pruning crew reduces the need for many tools and gives control. The crew member should be responsible for his tools. The crew leader can make sure the crew members don't misplace or abuse the tools by using them for other tasks such as cutting wire and string. Tools should be stored in a way to protect cutting edges and to prevent theft.

Brush disposal is the last aspect of managing pruning activities. Chipping is the best procedure because it reduces volume, permits recycling of debris, and eliminates the need for a large brush pile. However, chippers are expensive and a truck with a high enclosed body is needed to transport the chipper and to hold the chips. Institutions with a pruning crew usually have a truck assigned to the crew. Facilities that don't generate enough brush should devise a portable solid side arrangement for a truck body. The sides can be removed when the truck is used for other purposes.

Good management with a chipper involves chipping brush where it is produced. Although noisy, the operation on location eliminates double handling, avoids untangling brush piles for chipping, and gets the brush chipped before it gets dry (dry wood dulls chipper blades).

If a brush pile is used, it should be located in an area that is relatively safe from fire hazards or unlikely to become a community dumping ground.

The storage area for chips also needs to be secure because chips have become a valuable commodity. Any excess chips can be made available to members of the institution. Chip service will make them more conscious of the grounds activities. Participating in the benefits derived from the grounds program will help increase the respect that people have for the program and will also be beneficial in getting approval of budget requests. **WTT**

Small In Stature BIG IN FEATURES

At Ditch Witch, "smallest" does not mean "least capable." The Model 2200 is our smallest horsepower, rider-type machine. But, it's loaded with features that are traditionally found only on bigger equipment.

Packed with Features...

This little 18-HP class trencher has a lot to offer: a big 57-inch wide, fully hydraulic backfill blade; hefty premium cord drive belts, reinforced with aramid fiber; rugged, rigid-frame construction; and three-speed, 4-wheel drive; just to mention a few.

Designed for Convenience...

The 2200 requires very little operator training time: steering and operating controls respond to your "natural instinct," just like a pick-up; trenching visibility is line-of-site, right over your shoulder; maintenance and inspections are simplified by quick access covers; and...the list does go on.

A Lot for the Money...

Yes, the 2200 is small. It's less than 6 feet wide and 7 feet high and weighs less than 3,000 pounds. But by the pound, by the feature, or by the dollar, we think you will find it to be the most economical to own or the most practical to rent of any riding trencher in its class.

Contact your Ditch Witch dealer for a free demonstration. Call Toll Free (800) 654-6481 or write for more information on the 2200: Charles Machine Works, Inc.; P.O. Box 66, Perry, Oklahoma 73077.

DITCH WITCH® IS THE ANSWER.

VEGETATION MANAGEMENT

By **Roger Funk, Ph. D.,** Vice President Research and Development,
The Davey Tree Expert Company

The following discussion on fertilizer absorption and burn is in response to the many requests for fundamental information in these areas.

How are fertilizers absorbed?

All fertilizers, whether organic or inorganic, will eventually form soluble salts that separate in water to release the nutrient ions. Ions are atoms or groups of atoms that carry either positive or negative charges and *are the only form of nutrients that can be absorbed by plant roots.*

The process of nutrient absorption is not clearly understood, but it is believed that the positively or negatively charged ions are attracted to an opposite charge within the root membrane. Through this attraction the nutrient ion is passed across the membrane into the root cells. As long as the fertilizer remains in an uncharged state, it cannot be absorbed.

How are nutrient ions formed?

Inorganic fertilizers are composed of positive and negative ions that separate when the fertilizers dissolve in water. For example, when ammonium nitrate (NH_4NO_3) dissolves in water it releases the positively charged ammonium ion (NH_4^+) and the negatively charged nitrate ion (NO_3^-).

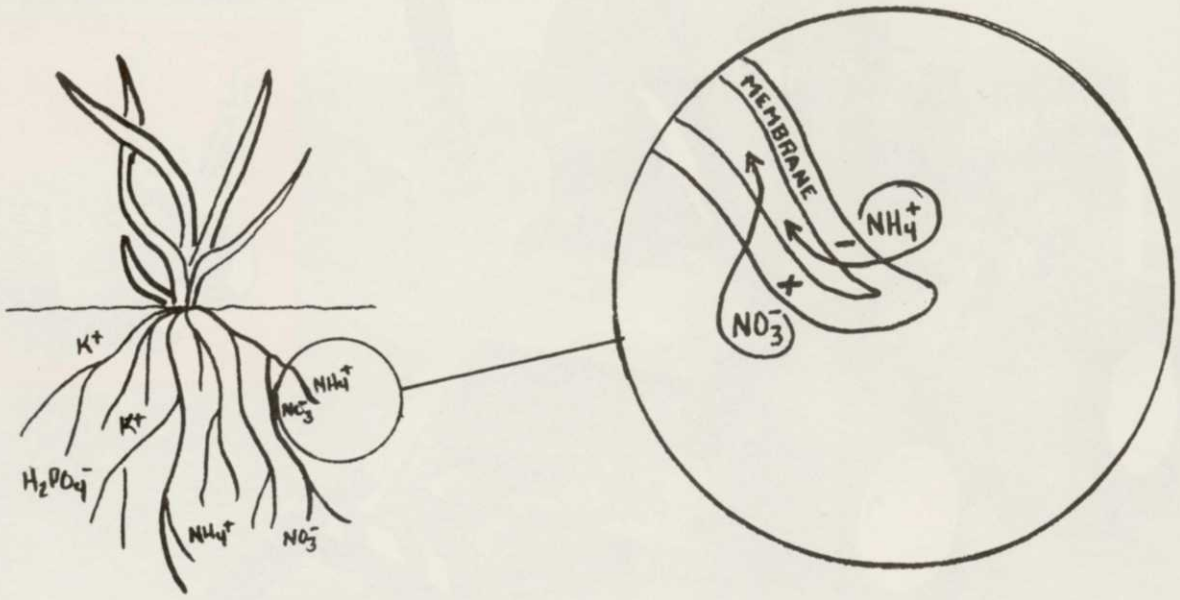
Fertilizer	Formula		Available Forms
ammonium nitrate	NH_4NO_3	*water*	$NH_4^+ + NO_3^-$
superphosphate	$Ca(H_2PO_4)_2$	*water*	$Ca^{++} + 2\,H_2PO_4^-$
potassium sulfate	K_2SO_4	*water*	$2\,K^+ + SO_4^=$

Organic fertilizers release the same nutrient ions found in inorganic fertilizers but the process is generally slower. Most organic fertilizers must be decomposed by soil microorganisms before the nutrients become available.

Fertilizer	Formula		Available Forms
organic nitrogen (segment)	-C-N-C-NH_2	*water microbial decomposition*	NH_4^+ NO_3^-

In general, inorganic fertilizers are considered quick-release and organic fertilizers slow-release because of the release rate of the nutrient ions. Inorganic fertilizers that are coated with an insoluble or slowly soluble material can also be considered slow-release since the coating slows down the release of the ions by inhibiting the penetration of water. The concept of slow-release is usually applied only to nitrogen fertilizers since, of the primary fertilizers, only nitrogen in the form of nitrate is rapidly leached from the root zone.

Continues on page 40



Ions of the dissolved fertilizer are absorbed through the root membrane when attracted to an opposite charge inside the root. A high concentration of salts in the soil around the roots can reverse the flow of elements, depriving the plant of nutrients and water.

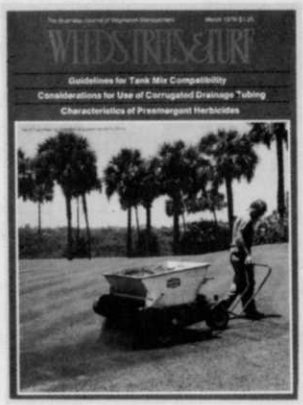
Consider Harvest business publications as media for developing new markets for your company in 1980.

Many advertisers take advantage of more than one of our markets. Advertising schedules, inter-mixed between magazines, earn better frequency rates.

NURSERY PRODUCT NEWS Serving 45.000 growers, garden centers, and other lawn and garden product retailers. Focusing on product news of importance in today's fast paced marketplace. Publishing August, October, and November 1979...monthly beginning in January 1980. Market research available on request.

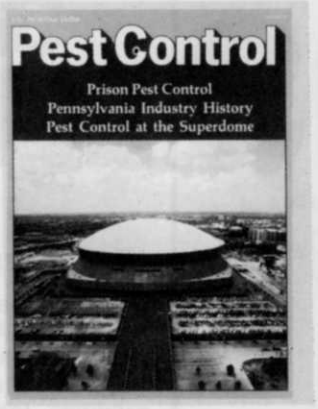
Circle **190** on free information card

LAWN CARE INDUSTRY Read by over 12.000 lawn care and maintenance companies, who in 1978, serviced over 6 million residential-commercial lawns, producing over $2 billion in sales and grew by more than 30%. **LAWN CARE INDUSTRY** has become the voice of one of the fastest growing service industries in the economy.



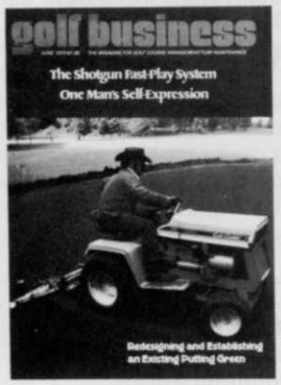
WEEDS TREES & TURF first published in 1964, is today the leading scientific/technical publication serving the multi-billion dollar green industries. 44.681 BPA controlled circulation. Readership and market studies available on request.

Circle **192** on free information card



PEST CONTROL magazine is rated number one in its field by domestic and international pest control specialists...readers who control the multi-billion dollar world market of non-crop pest control. 14.877 ABC paid circulation. Readership and market research studies available.

Circle **193** on free information card



GOLF BUSINESS is the only trade magazine reaching every golf course facility in North America. **GOLF BUSINESS** is devoted to management and maintenance of vegetation in the elite turf market. The only Golf Turf market publication audited by BPA, with a total circulation of 17.875. Market research available.

Circle **194** on free information card

THE LAND RECLAMATION REPORT is a bi-weekly newsletter covering revegetation and erosion control. The only independent publication serving the huge and expanding market. Paid subscription $95.00 per year. Market research available.

Circle **195** on free information card

HARVEST

Harvest Business Publications
A Subsidiary of Harcourt Brace Jovanovich, Inc.
9800 Detroit Avenue, Cleveland, Ohio 44102

How does a fertilizer burn?

The same soluble salts or nutrient ions that are absorbed by plant roots can also cause a type of physiological drought called "burn." Water is absorbed by plants through a process known as osmosis. As long as the root cells maintain a higher concentration of soluble salts than does the water in the surrounding soil, the root cells will absorb water. If, however, too much fertilizer is applied at one time and the salts in the soil water become too concentrated, the absorption of water is reduced. When the level of soluble salts in the soil is very high, water may actually be pulled out of the root tissue into the surrounding soil solution.

The degree to which a fertilizer increases the salt concentration of soil solution is measured by the Salt Index — the higher the salt index, the more rapidly the fertilizer releases soluble salts and the higher the "burn potential."

Fertilizer	Formula	Salt Index
potassium chloride	KC1	116.3
ammonium nitrate	NH_4NO_3	104.7
sodium nitrate	$NaNO_3$	100
urea	H_2NCONH_2	75.4
ammonium sulfate	$(NH_4)_2SO_4$	69
potassium sulfate	K_2SO_4	46
diammonium phosphate	$(NH_4)_2HPO_4$	34.2
natural organic		3.5

How does soil pH affect nutrient absorption?

The term pH expresses the relative concentration of hydrogen (H^+) and hydroxyl (OH^-) ions in solution. A pH of 7 means the hydrogen and hydroxyl ions are equal and the solution is said to be neutral. A pH below 7 means the solution contains more hydrogen ions than hydroxyl ions, and is said to be acid. Similarly, a pH above 7 means the solution contains more hydroxyl ions and is alkaline.

The presence of an element in the soil is no guarantee that it is in a *soluble* form available for absorption. The concentration of hydrogen and associated ions affects soil reaction and the formation of soluble and insoluble compounds. *All nutrients must be soluble to be available for root absorption.* Each nutrient has a pH range of maximum availability simply because within this range it forms a large proportion of soluble compounds.

Plant species differ in their response to the soil acidity because of differences in nutrient requirements. For most plants, the conditions of nutrient availability, without toxic amounts, are best near pH 6.5. **WTT**