Now, a clog-resistant valve that handles any flow rate.

Another way J-M Buckner® Waterscaping helps you keep things green.

The J-M Buckner 930 Series Electric Valves. A new three-way solenoid eliminates continuous internal flow through tiny orifices and greatly reduces the chance of clogging. And there is no minimum flow rate requirement. This valve will operate efficiently and open fully under all flow conditions. More sprinklers can be installed on each valve to reduce system costs. And clog-resistant performance means fewer callbacks.

Waterscaping: Total Irrigation Capability.
With increasingly elaborate landscape designs and constant changes in the weather, irrigation is no longer a mechanical function. Johns-Manville takes the next step...Waterscaping. It's more than controllers, valves and sprinklers that simply move water. It's the total scope of uniform irrigation as it's needed...from research to product design to field performance. Waterscaping is everything you need.

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At our computerized testing facility in Fresno, we research, test and refine all the parts of Buckner systems to develop components that will provide uniform water application and perform according to our published performance data. The components we test come directly off the assembly line.

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Working with our nationwide network of trained distributors, J-M Buckner has a broad range of products and services to meet virtually any irrigation need. To learn more about Waterscaping (technical information, planning assistance or quality irrigation system components), contact your J-M Buckner Distributor or Vince Nolletti, P.O. Box 232, Fresno, CA 93708, (209) 442-8511.

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On the other hand you have people. Out-of-doors people. Living. Working. Playing. Camping.

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Versatile, broadly registered SEVIN controls as many as 44 insects that attack trees, shrubs, flowers, turf...and people. And it has a long record of effective control of target pests.

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SEVIN controls these 15 major pests. Plus 29 more!

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Look at the big-tractor features! The efficiency and stamina of a liquid-cooled diesel engine . . . an all-gear power train with 10 to 12 forward speeds to let you choose the right speed for most any job . . . Built-in hydraulics and three-point hitch to lift and lower implements at a finger's touch . . . 540 rpm PTO . . . and diff-lock. Optional front-wheel drive gives you four-wheel traction.

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FORD TRACTORS

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Landscape Contractor News

Spec guide, maintenance report published

The second edition of the *ALCA Guide to Specifications for Interior Landscaping* has been released by the Associated Landscape Contractors of America (ALCA). The new 57-page manual represents a major expansion of the material contained in the original document. The manual contains four sections: an expanded introduction with a full explanation of the interior landscaping industry; a complete set of recommended bid preparation instructions; a complete recommended standard form of agreement; and a complete set of specifications of interior plants, including installation requirements and photographs.

The *ALCA Landscape Maintenance Report* is a 62-page report based in part on the proceedings of the Association's Maintenance Symposium held this past December in San Jose, Calif. It contains six papers originally presented at the meeting, including: "Tricks of the Maintenance Trade" by Herman Carruth; "Management Planning and Organization Development" by Rod Bailey; "Choosing the Right Herbicide for the Job" by David Hanson; "Marketing and Promoting Maintenance Services" by Roger Harris; "Cost Control and Financial Management" by E. Gray Payne; and "Problems to Avoid" by Douglas Hamilton.

Copies of either are available at $12.00 each ($5.00 to ALCA members) from: ALCA Publications, 1750 Old Meadow Rd., McLean, VA 22102.

Reward offered for theft information

The California Landscape & Irrigation Council, Inc., is offering a thousand dollar reward for information leading to the arrest and conviction of persons who steal, burglarize, or vandalize equipment and supplies belonging to contractors who are signatory to the Council's labor agreements.

The reward is jointly underwritten by CLIC and the Irrigation & Lawn Sprinkler Fitters Union, Local 345, and went into effect on Feb. 1. Large two-color posters and water-proof decals are being printed, and will be distributed to all landscape and irrigation contractors throughout Southern California who are signatory to the Council's labor agreements. Contractors will be encouraged to post the signs on their job sites and at their places of business, and to affix the decals on tools, equipment, and other items of value.

"Persons who become aware of theft, burglary, or vandalism should notify the company concerned, the local police, or the CLIC office," sais Ahlers. "Once a suspect is apprehended, arrested, and convicted, the reward will be paid in full to the informant with monies placed in a special fund for this purpose."

Container trees used in reclamation

Tree seedlings grown in small containers in a greenhouse can be used to revegetate land strip-mined for coal, according to Russell J. Hutnik and Edgar H. Palpant of the Agricultural Experiment Station at Pennsylvania State University.

One of the major advantages of this system, they claim, is that the container keeps the root system intact and protected in a fertile growing medium. In contrast, conventional nursery-grown tree seedlings are planted in a bare root condition and are subject to injury during processing for shipment.

For many years relatively large container-grown seedling trees were used in the high plains country of the West, to establish windbreaks where moisture was limited. These container-grown seedlings proved to be more vigorous than bare-root nursery stock and survival improved greatly.

According to recent studies at Penn State, however, the container-

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erals such as geothite and hematite are widespread and abundant in many of our warm climate soils.

Iron oxides have a strong capacity to absorb anionic (negatively charged ions) plant nutrients such as phosphorus, nitrogen, sulfur, molybdenum, and boron. Such oxides also improve soil structure by binding clay particles into aggregates.

Seedbed quality, erodibility, and water infiltration are examples of soil properties likely to be influenced by this effect. Station scientists, studying the effects of iron oxide-clay bonding on soil properties, find there is an intimate physical association between silicate clays and iron oxides.

The ability of the mixture to buffer changes in soil acidity, often associated with high nitrogen fertilization, is influenced by reaction of iron compounds with surfaces of other soil particles. Future experiments on soil properties involving the reactivity of iron oxides will be designed to prevent essential soil management practices, such as liming or heavy fertilization, from damaging soil quality.

SEED

New bluegrass variety introduced by NAPB

North American Plant Breeders (NAPB) have introduced Enmundi Kentucky bluegrass, which it claims is the most disease resistant variety on the market. The variety is said to show good winter color, and with respect to adaptation, NAPB says Enmundi's cold hardiness extends its range throughout the American north, well into Canada. In the transition zone, southward, it has exhibited excellent heat and drought tolerance.

In Missouri turf trials, Enmundi performed within the top third at Columbia and in the state's southeast and southwest trials. The variety has done well in tests conducted by the University of California at a location half way between Los Angeles and San Diego. There, Enmundi's performance has ranked fourth or fifth among some 30 commercially-available bluegrass varieties tested during 1976 to 1978.

Enmundi showed the best resistance to Fusarium blight out of 89 Kentucky bluegrass varieties and blends evaluated in 1978 at Rutgers University in New Jersey, says NAPB. It suffered only 0.2% damage, while Fusarium levels of 15-25%

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MANAGING TURFGRASS TRANSITION IN BOTH SPRING AND FALL

By George M. Kozelnicky, Assistant Professor of Turf Diseases and Genetics, Department of Plant Pathology & Plant Genetics, University of Georgia, Athens, Ga.

The term "transition" in turf parlance refers to the periods of time in which turfgrasses pass from one season to another and is usually reserved to describe warm-season grass management in those seasons south of the Mason-Dixon line.

Bermudagrasses, and other warm-season grasses, become dormant in the cold season. Dormancy implies life, not death. Dormancy is initiated by cool fall temperatures and is accelerated by frost. The degree of dormancy is dependent on the latitude of the region and the severity of the cold season. Such grasses growing in the latitude covering Virginia, Kentucky and westward become completely dormant in the winter. Those growing in southern Florida may not go dormant at all.

In between these extremes, the degree of dormancy fluctuates depending on temperatures obtained. During the wintering of 1976-1977 and 1977-1978 temperatures reached 0° F in many areas and grasses became completely dormant as far south as Macon, Ga. and Dallas, Tex. A completely dormant grass is one whose stems, stolons and leaves have been killed back but whose roots, rhizomes and crowns are alive. The length of the dormant season may be long (October-March) in the northern areas and short (December-February) in more southern areas.

Warm-season grasses pass through two transitions: fall, from growth to dormancy; and spring, from dormancy to growth. Grasses must be managed differently during each. In the fall transition, grasses must be managed to enter dormancy in a healthy condition. In the spring transition, they must be brought out of dormancy as quickly as feasible for their particular use.

Healthy root system reduces the vulnerability of bermudagrass to winter-kill.

Man and nature impose many conditions which may adversely affect the grasses while in dormancy, causing winter injury and preventing satisfactory re-appearance in the spring. Man usually has the greater impact. Some of the practices of man which adversely affect dormant turf are:

non-relief of traffic-induced compaction
permitting excessive thatch development
unbalanced or excessive rates of fertilizer elements
use of non-adapted cultivars
non-correction of poor water drainage
use of improper mowing heights
over-irrigation
allowing shade on critical turf areas
misuse of pesticides

Nature capriciously adds to the effect with:
dessication by high velocity, drying winds
low temperatures of varying lengths of time
snow and/or ice cover
disease

These factors, and combinations of them, are capable of killing bermudagrasses during the dormant period. The resulting condition is commonly called winter-kill and can occur on swards in golf greens, tees, roughs and fairways, as well as in other important turf areas.

Fall Transition

Management for fall transition should begin (if it has a point of origin) in the summertime. The grass should be maintained in a healthy condition and at a reasonable rate of growth. Cultivation procedures, such as aerification, should be performed early enough to allow the grass to recuperate before the onset of conditions which will start retarding the grass. Excessive plant nutrients that are conducive to lush growth should be avoided. Nutrients should be applied only as indicated by soil tests. In order to pass through dormancy safely, grasses should have a healthy, deep root system.

Carbohydrates provide the elements for initiation of new growth from crown adventitious tissue in the spring. Because roots are the primary storage organ for carbohydrates, late summer nutrition should include adequate amounts of those nutrients which encourage good root development. Expecially important is potash and in those areas where they are lacking, phosphorus and sulfur.

Since carbohydrate reserves (and root populations) decrease when grasses are mowed, height of cut as temperature drops becomes important, needing to be raised or mowing frequencies altered. Removing too much top growth at one time results in root system reduction.

Managing turf for entrance into dormancy is complicated in many instances when warm-season swards are overseeded with cool-season grasses.

Two very different grasses must be simultaneously managed.

There are two major reasons for overseeding. Use of grass swards in the southern region is year-round, especially on golf courses. Putting is possible on a dormant bermudagrass green but color and uniformity of putting quality is a demand of southern golfers.

The second reason is because overseeded grasses do more than just provide color and putting quality. They provide active root growth which keeps the soil in a more friable condition than that provided by a dormant sod. Overseeded bermudagrass greens thus are able to take a good bit more punishment from traffic.

The growth of the overseeded grass must continue without being of detriment to the underlying bermudagrass. In some instances, the bermudagrass, in the early phases of dormancy, is inhibited by the application of a growth retardant. Generally, the culture of the sward is maintained in such a way as to protect the bermudagrass until it becomes sufficiently dormant and then management favors the overseeded grass.

Spring Transition

Bermudagrasses begin serious growth between 60-70° F (33-38° C). Once spring temperatures stabilize above 70, they grow rapidly. This occurs quite late in the spring. Growth can, and does, occur at lower temperatues but at a much slower rate. Unwanted stimulation, brought about by temperatures which initiate some response from the grass, can occur early in spring. The grass is thus subjected to alternating periods of growth and quiescence. If these are in sharp contrast to one another, winter injury may occur. It is essential not to unnecessarily stimulate the now awakening bermudagrass with nutrients. These should be applied when the alternating periods smooth out.

Growth of dormant grass is initiated by its crown cells developing both stem and root initials. The food which nurtures these initials comes, at first, from the old roots. As new stems and roots develop into mature organs, reserves in the old roots are depleted. They no longer function, except as solute conduits for a time, and eventually slough off to become part of the soil organic matter.

If nature and man have not disrupted normal biological processes, the changeover from old roots to new ones is smooth and transition is successful. Rarely, however, is an ideal transition obtained because of the aforementioned adverse conditions. It is best to discuss these as separate entities.

Compaction

It has been shown that the most important single factor contributing to death of grass in winter is compaction resulting from foot and vehicular traffic. Compaction kills grass because it prevents normal, necessary gaseous exchanges from occurring in the soil. (This is also true for grasses growing in heavy, fine-textured soils.) The necessary pore space for holding atmospheric oxygen is lacking and chemical reactions within the roots are impaired.

In late summer, the grass enters into dormancy damaged and is thus at a disadvantage and unable to withstand other adverse conditions. Carbohydrates are not stored in amounts needed for regeneration. The same conditions prevail in spring, when grass begins to emerge from dormancy.

Winter-kill indicates failure of bermudagrass to survive the dormant period of transition.

The process by which the grass plant uses oxygen to react with carbohydrates is called respiration. In an uncompacted soil, aerobic (with soil oxygen) respiration takes place. Energy, water and carbon dioxide gas are produced. In a compacted soil, respiration becomes anaerobic with less energy and greater amounts of carbon dioxide are produced. This quite toxic gas is trapped in compacted soil with resulting injury to the grass plant. In the anaerobic process, oxygen comes from stored carbohydrates and other substances within the roots. These are abnormal reactions and can only result in unhealthy or dead grass.

Cultural practices against compaction should be preventive. Traffic, both foot and vehicular, should be routed onto more tolerant areas and re-routed frequently. On high-use areas such as golf greens, cups must be moved frequently to protect the area around the hole.

In many places in the South temporary greens are established in the fairway near the permanent ones and no traffic is allowed on the latter. In some mid-South areas, mulches have been used on golf greens but the verdict on their success has not yet been rendered. In some few instances alternate greens or alternate areas on greens have been tried. Space restrictions and expense involved in erecting such greens limit their feasibility. Greens have been dyed with colorants for play but the disadvantage is that compaction is enhanced because there are no white roots, as with overseeding, to naturally relieve the effects of foot traffic. Certainly, turf areas shouldn't be used while they are exceedingly wet.

Coring, spooning, and other forms of aerification are effective cultural tools for relieving compaction. However, any such practice can be used only at the time it does the least damage to roots. As far as bermudagrass is concerned, aerification should be practiced early enough in summer for the root system to recuperate sufficiently and es-

tablish an underground system which will carry it safely through the dormant period.

Conversely, in the spring, aerification should not occur until the new grass has established itself sufficiently to withstand the loss of some roots. Any tool which harms the grass, even temporarily, should never be used when it is doubtful that the grass will recover in time to enter a stress period. Any factor which allows or promotes compaction will encourage loss during dormancy.

Thatch

Thatch is an important component in turf swards but only when excessive. A certain amount is needed to maintain balance in the microbiological community in the soil. Excessive nutrition is one cause of excessive thatch.

Soil under heavy thatch is deficient in roots or rhizomes and is more easily compacted because those plant parts are predominantly situated higher up in the thatch layer. When dry, heavy bermudagrass thatch sheds water and the soil under it becomes dry; but if wet, the thatch loses water rapidly because of evaporation.

It can readily be seen that roots and rhizomes situated in thatch are much more easily killed by low temperatures than those growing in mineral soil. Thatch, an organic medium, is also the site for pathogens which affect grasses. Since the microfloras of thatch and soil are not the same, these pathogens are not kept in balance and, given the right conditions, may parasitize plants. This relationship is discussed further under diseases.

One of the keys to thatch control is timely and judicious use of fertilizers. Excessive nitrogen results in lush growth. Bermudagrass will do well on no more than one pound of nitrogen per 1000 sq. ft. during the growing season.

Verticutting is essential, especially under higher fertilization.

Verticutting is essential, especially under higher fertilization. However, it should never be severe or deep. It should be frequent enough throughout the year to keep undesirable grass parts combed out. The use of the brush with the triplex riding mower has, unfortunately, been reduced. Brushing greens in advance of the mower will keep thatch at a minimum, reduce the need for frequent verticutting, and be less harmful to the grass.

Where thatch is very heavy, its complete removal at one time would be very detrimental. Such turf must be brought back slowly over a long period of time. Aerification is perhaps the best practice to employ in this case. This opens the thatch to air and water and allows regrowth around the aerifier holes. Topdressing should be coupled with aerification to ensure a more reliable comeback. Timing in the application of these procedures is of prime importance.

The emphasis here is that excessive thatch, among other things, leads to pathogenic problems. It, together with other factors considered in this treatise, is a prime contributor to many transition failures. Thatch control is essential to the subsequent control of turf diseases and to the production of satisfactory turf.

Turf Nutrition

It has been alluded to many times that unbalanced rates of fertilizer elements result in damage to grass. The damage comes from predisposition of the grass to the effects of adverse conditions. The most prevalent type of damage comes from lushness promoted by excess nitrogen, but there are others.

Minor elements need to be considered, chief of which may be sulfur.

Deficiencies are equally as important. Low potassium will not allow hardening of grass tissues so that they may withstand rigorous conditions. Minor elements need to be considered as well, chief of which may be sulfur.

How does one know what he does or doesn't need? The use of a soil test! Turf managers should submit soils for testing, ideally, once a year. The timely use of all fertilizer elements at the correct rates is essential for grass which withstands adversity.

The standard soil test provides a reading of soil pH. Fertilizers frequently change the soil pH over a period of time. It is essential that pH be maintained at the proper level for the grass being grown.

Calcium and magnesium are necessary minor elements in turf culture and must be maintained in the correct relationship to one another. These elements are supplied, and pH is corrected, by dolomitic limestone. This substance does not immediately alter pH but takes considerable time to be broken down. One must, therefore, be aware of the entire soil situation well enough ahead of time for correction so that bermudagrass will not be at a disadvantage as it enters dormancy.

Cultivars

Bermudagrass varieties, hybrids, and cultivars of many different kinds are used throughout the region in which we are considering transition. They do not react similarly to conditions and each requires its own form of management. The importance of this can be seen in the change in use of grasses which has come about in recent years. Zoysiagrass has replaced certain bermudagrasses on fairways and tees in the Kentucky-Missouri-Kansas region. Throughout the upper South bermudagrass greens have been replaced in many places with those of creeping bentgrass because of the former's susceptibility to spring dead spot of bermudagrass (SDS).

Continues on page 22

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