USE

Lots of lawn care jobs you do are easier and faster with Roundup.

Wherever you use it, Roundup® herbicide helps make weed control around your customers' homes fast, easy and effective. Just one application of Roundup controls tough labeled weeds right down to the roots, so they won't grow back. That means less need for time-consuming repeat treatments.

And Roundup has no residual soil activity, so it can't wash or leach from treated areas to injure desirable vegetation.

Whether you apply Roundup with a backpack sprayer or a hand-held wiper, it effectively controls weeds *wherever* they grow. Around shrubs and bushes. In sidewalk cracks. Along driveways. At the base of trees. Along fences. In and around flowering ornamentals. Spot lawn renovation. Edging around obstacles. You name it—there's virtually no limit to the uses of Roundup!

So reach for Roundup before you begin your next lawn care job. It'll help make weed control faster and easier—which can mean more profit for you.

FOR A FREE GUIDE TO ROUNDUP, CALL 1-800-621-5800 TOLL FREE. IN ILLINOIS, CALL 1-800-972-5858.

Monsanto

Circle No. 111 on Reader Inquiry Card

COMPACTION - PART 3

SOILLESS GREENS MEAN LESS COMPACTION AND BETTER TURFGRASS

By RON FREAM

No amount *of maintenance can correct severe compaction problems. Redesign and rebuilding may be necessary.*

Greensites receive more turf management attention in response to compaction than do tees. Successful consideration of greensite design should provide for playability, challenge and variety, beauty, proper subsurface drainage, the correct seedbed mixture, environmentally adapted turfgrass varieties, and efficient long-term maintenance.

One profound misconception about greens is grass cannot grow without "soil" or "topsoil". In fact, the less soil in a putting surface seedbed, the better. It has been the word of various august authorities that soil must be part of the putting green seedbed mixture. Practical, in-the-field results have just as vigorously demonstrated that less soil equals better turfgrass.

Where custom, habit or misconception have encouraged the construction of putting greens entirely of locally available "soil" or "topsoil", greens of varying degrees of playability - from outstanding to miserable - are the result. Certainly, at various times of the year, even clay-based greens can appear healthy and vigorous. Outstanding examples of fine old soil greens can be pointed to, generally at courses where the climate is mild and golfer traffic is light.

Any putting green should look good when climatic conditions are at their optimum and play is at a minimum. It is what happens after an extended rainy period or when the temperature shoots rapidly upward to bake the putting surface or when 225 rounds of play per day occur for long, continuous periods that the problems become apparent.

Design

Before seedbed materials are either specified or delivered to the jobsite, the design of the greensite should be carefully considered. The majority of greens in the world are round or nearly so. Attractive putting greensites with individual appearance and character are not prohibited in the rules of golf. It only seems that way when so many greens offer no diversity, drain only to the front and are framed by two cashew or almond shaped sand traps.

The design of the greensite must allow for reasonable access by golfers and maintenance equipment. When the sand bunkers block or restrict access to limited or narrow areas, compaction problems are sure to follow. Greens with only one limited route of access will have severe compaction problems no matter how intense the maintenance effort to counteract the traffic.

Sand bunkers, lakes or other hazards are a natural and normal feature around many greensites. Their presence is both necessary and desirable. However, when designing the greensite and its associated protective or challenging hazards, an awareness of the potential problems of inadequate access or insufficient equipment turning area must be considered.

Providing a diverse greensite shape, with varying adjacent hazard placements, will permit the turfgrass manager to change pin positions frequently - daily with heavy play - to assist in moderating the impact of golfer traffic on any particular portion of the putting surface. Changing of pin positions also assists in dispersing traffic on the putting surfaces.

Although putting surfaces must be large enough to offer several distinct pin placements, excessively large putting surfaces can be wasteful of construction and main-

tenance funds.

Exaggerated putting surface contours, which restrict usable pin positions can contribute to excessive traffic over limited areas of a seemingly large greensite. Subtle to dramatic contours have their place and position. The individual approach shot to each greensite should basically define the surface contours desired and the arrangement and use of hazards.

Surfaces with several drainage flow outlets help to minimize future compaction problems. Frontal drainage into the approach area must be avoided whenever possible. Putting surfaces of around 4000 square feet (380 square meters) to 8000 square feet (750 square meters) are a generally logical size range.

The designer's impact upon longterm greensite maintenance is very real and very lasting. There is more to consider in the design of a greensite than just how the 4 iron should be hit into the green. Maintenance can be directly affected by greensite design. Turning space off the putting surfaces for mowers and other equipment is vital. Bunkers or other hazards must be positioned with this fact in mind. Tight convolutions of the green surface shape can encourage wheel compaction by triplex greens mowers. Poorly considered contour changes which are too abrupt can contribute to scalping.

Seedbed Components

Longterm greensite seedbed mixture components should be carefully considered and carefully specified.

Mixing of a coarse aggregate-organic humus, a medium aggregate-sand and a fine aggregate-soil together approximates the recipe for concrete. The very last thing a putting green needs is a compactable seedbed. Every putting green needs a deep, well-drained seedbed.

A golf course architect knowledgeable in soil science should be able to prepare a precise, concise set of specifications which will direct the preparation of a well-drained, water-retaining, compaction resisting seedbed.

Subsurface drainage within the putting surface area is unnecessary only when constructing a greensite on a pure sand natural site. The total volume of drainage pipes within the area of the putting surface would vary as subgrade conditions and local climatic factors determine. In general, 350 feet (110 linear meters) or more of four inch (10cm) diameter perforated drainage line is perhaps "average" for a greensite. Discharge of subsurface drainage lines and surface flow, as well, should be directed away from primary golfer entry or exit paths. Drainage line outlet points should be well away from the fairway area. Yet, all too often, the putting surfaces only slope to midcenter front, directly into the fairway approach and traffic area. Subsurface drainage lines, if used, frequently discharge a short distance in front of the putting surface, again in the fairway approach. Is it any wonder that soggy areas develop just where all the golfers converge and the maintenance equipment makes it turns when such a procedure is followed?

Any green should look good when weather is nice and play is slow.

The type of gravel for encasement of perforated drainage lines and the gravel layer beneath the seedbed mixture (for teeing surfaces and for putting greens) should be carefully selected. A uniform particle size distribution is recommended. Fine gravel, pea-gravel or similar, is recommended. A gravel having a particle size distribution between 6mm (0.25 inch) and 18mm (0.75 inch) is quite ideal. Large diameter gravels, in excess of 25mm (1 inch) generally have interspaces which will permit a filtering down of the finer textured particles from above or the native soil adjacent. The filtering-in can, in time, result in clogging of the drainage passages. Crushed gravel is as usable as natural "river-run" rounded particles so long as the size distribution range is within the desired tolerances.

If only very coarse gravel is available, an intermediate layer of coarse sand or polyester filter cloth may be necessary to separate the sand-humus layer above from the gravel below.

Well-washed gravel, free from silt and clay particles, is important. Gravel contaminated with silt and clay will soon inhibit proper water flow. The gravel layer should extend fully beneath each putting green seedbed mixture to the limits of the putting surface. A uniform layer, four inches (10cm) in thickness, is to be considered the minimum depth.

The lack of drainage lines and gravel layer beneath the seedbed will result in soggy and puffy drainage areas both at the putting surface edge and into the apron area - a sure invitation to compaction. It is not a wise economy move to dispense with subsurface drainage lines within the putting surface. Poor drainage induces compaction more rapidly than any other causative agent.

It has been noted that soil in any form is not recommended for inclusion within the putting green seedbed mixture. The sought after mixture should be one which is comprised of only select sand and organic humus. What is select sand? The generally recommended particle size range for putting green seedbed purposes would be a sand which provided more than 80 percent by volume between 0.20mm and 1.20mm particle size range. From 1.20mm to 1.60mm and from 0.20mm to 0.10mm can comprise another 5 to 10 percent each. Less than 5 percent in total should consist of combined silt and clay particles and very fine sand (those particles smaller than 0.10mm). The "ideal" sand would be one with a uniformity of particle diameter around the 0.50mm size range. The more consistent and uniform the particle size, the more resistant it will be to compaction problems. The major determining factor must be the combined clay and silt content. It is these fine textured materials which will plug up the coarser materials and assist directly in helping to induce the compaction problems. Insist on water washed,

clean sand, as free as possible of silt and clay.

If given a choice, a more coarse sand should be preferred over a finer one. Ordering sand by a type or local-use name is not advised. What is "plaster sand" and acceptable in one locality may be called "plaster sand" in another area but consist of 20 percent unacceptable fines, as an example. Select the sands using mechanical sieve analysis to insure proper sizing and particle distribution. In some situations, even a chemical analysis of the proposed sand should be undertaken before the final selection is made to screen for salts or other contaminants.

The organic humus component of seedbed mixture can be quite diverse in origin. The humus material is included primarily to act as a "softening" agent to provide resiliency and to prevent the sand from being too hard in the first year or two of play and to act as a water retaining medium. Once the turfgrass is established, the normal root system regeneration will provide adequate humus.

Peat moss, ground pine or fir tree bark, rice husks, composted animal manure, grape and olive pomace, cocopeat, bagasse and similar sources of organic humus have been successfully used. Whatever organic material is locally available, so long as its chemical analysis is favorable, may provide the organic portion of the seedbed mixture. Particle size range is not as critical as for sand. A particle size providing 80 to 90 percent passing a 6mm (0.25 inch) screen is generally sufficient and usually available.

The porportions of sand to humus will vary depending upon the sand particle size distribution, type of humus, local climatic conditions (primarily rainfall) and organic material accessibility. In general, a ratio of 70:30 to 85:15, sand:humus has been proven to be quite successful. The seedbed mixture should be thick enough to provide ample waterholding capacity and deep root growth. A thickness of 12 inches (30cm) would be recommended as a minimum inplace thickness.

The seedbed mixture must be completely, thorougly and totally pre-mixed before placement on the individual green or tee surface. Only under rare conditions and specific situations should in-place, on site mixing of the sand and humus be permitted. Inadequate mixing will lead to problems of layerage, poor water movement and potential soggy problems.

Always select and use the finest quality seed or vegetative stolons available. Weed-free, certified clean seed of the latest crop is essential. Cheap seed is never a bargain. Vegetative stolons should be obtained from reputable sources with assured varietal quality.

Once the greensites have been constructed, do not make the common mistake of topdressing the turf surfaces with a mixture containing soil. If the seedbeds were constructed properly; that is, without any soil in the mixture, then using soil in the topdressing will only induce and promote the very problems the soil-free seedbed mixture was designed to prevent or counteract. WTT

WE REACH THE PEOPLE YOU NEED TO REACH!

Place a classified ad in any of these HARCOURT BRACE JOVANOVICH PUBLICATIONS - and you know your ad dollar is wisely spent.

HBJ PUBLICATIONS does a better job of reaching those who count *(your potential customers)* than any other business publisher.

Magazine	Circulation
Beverage Industry	22,000
Body Fashions/Intimate Apparel	10,162
Candy & Snack Industry	3,500
Dairy Field	18,134
Dental Laboratory Review	17,297
Dental Management	100,005
Drug & Cosmetic Industry	9,929
Flooring	22,241
Food & Drug Packaging	54,853
Food Management	50,077
Hearing Instruments	17,095
Home & Auto	22,228
Hotel & Motel Management	36,061
Housewares	12,863

Magazine	Circulation
Industrial Education	46,594
LP/Gas	14,684
Lawn Care Industry	12,310
Neurology	13,069
Paperboard Packaging	12,111
Paper Sales	12,592
Pest Control	14,684
Professional Remodeling	36,627
Quick Frozen Foods	20,785
Rent All	11,139
Roofing/Siding/Insulation	18,310
Snack Food	9,138
Toys Hobbies & Crafts	13,982
Weeds Trees & Turf	43,041

Don't forget that classified advertising works just as effectively in locating employees as it does if you are looking for a position, have a line, machinery or a business to sell, are seeking representatives or wish to buy a specific item. Let it go to work for you!

HBJ PUBLICATIONS - COUNT ON US TO REACH THOSE WHO COUNT!

HBJ

Harcourt Brace Jovanovich Publications
One East First Street
Duluth, Minnesota 55802

Call Dawn Anderson at 218-727-8511

B

REGIONAL TREE TYPES INCREASE WITH CHANGES IN PROPAGATION

By DOUGLAS CHAPMAN

As tree production in the nursery becomes more complex, we the users, should stay abreast of current production techniques. Graft incompatibility or incongeniality became a significant problem during the last 15 years.

Davidson at Michigan State University first noted a problem with Red Maple (*Acer rubrum*) in 1965. The symptoms included early fall color (late July), vertical or longitudinal cracks in the trunk, and, finally, sudden collapse during mid-summer of the tree. Since his original determination, graft incompatibility has been confirmed on 'Sovereign' Pin Oak (*Quercus palustris* 'Sovereign'), numerous Red Maple cuttings, 'Rosehill' White Ash (*Fraxinus americana* 'Rosehill'), 'Autumn Purple' White Ash (*F. a.* 'Autumn Purple'), 'Bloodgood' London Planetree (*X Platanus hybrida (acerifolia)* 'Bloodgood'), and excessive suckering on 'Greenspire' Littleleaf Linden (*Tilia cordata* 'Greenspire'), to mention a few. A way to overcome this problem is to change the method of propagation. This change could be seed propagation, propagation by cuttings, or tissue culture.

Seed propagation has been and remains a valid technique. Obviously, the trees grown from seed don't have incompatibility as a problem. But the real reasons to move to propagation by grafting or budding included development of cultivars or superior trees, more uniform trees, lacking the genetic variation (one would expect from seed propagation), decrease production time (holding down the cost of tree production).

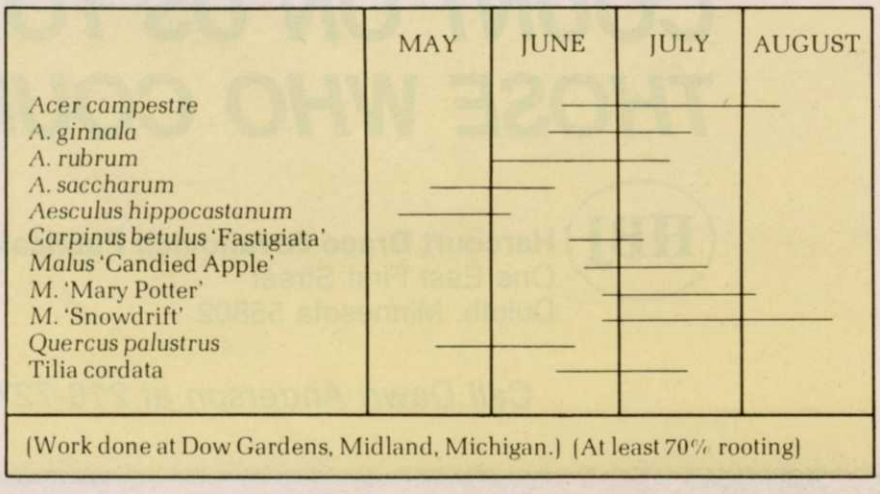
Propagation by seeds, especially seeds from your region of the country, e.g. Great Lakes States, Northeast, Southeast, is a valid technique where local adaption would be considered. Local adaptation, or provenance is the genetic adaption of trees to specific regions of the country. Red Maple is native from Northern Michigan to Northern Florida, but a Northern Michigan Red Maple would not survive in Florida, nor would a Florida native survive in Northern Michigan. It is, therefore, important to know the seed source. Further, it is important that this provenance be considered not only in seedling grown trees but also in the development or regional cultivars.

Propagation of trees by cuttage is a relatively new phenomenon. This is accomplished by simply taking a cutting of a desired tree or cultivar, sticking it in the propagation media, misting, and/or some other technique. Multiple propagation from sucker pieces of *A. rubrum* was first reported by Orton of Rutgers University. His work showed that one could take sucker pieces that develop on young trees and propagate the cultivars under mist and develop a viable root system and, therefore, total plant. His technique was unique in that more than one cutting was taken from each stem piece.

We, at Dow Gardens, initiated propagation studies aimed at production of Red Maple, Sugar Maple (*A. saccharum*), Hedge Maple (*A. campestre*), Common Horsechestnut (*Aesculus hippocastanum*), crab apple cultivars, hornbeam, oak, and linden. These studies have been ongoing since 1978 and reported in the proceedings of the International Plant Propagators Society. If the cuttings were taken at the right time, using the correct media, and other unique conditions, one can propagate cultivars of Red Maple, Sugar Maple, Hedge Maple, 'Mary Potter' Crab Apple (*Malus* 'Mary Potter'), 'Snowdrift Crab Apple (*M.* 'Snowdrift'), 'Candied Apple' Crab Apple (*M.* 'Candied Apple'), 'Fastiagata' European Hornbeam (*Carpinus betulus* 'Fastiagata'), Little Leaf Linden (*Tilia cordata*), and Pin Oak (*Quercus palustris*) by softwood cuttings. Further, a nursery in Ontario is

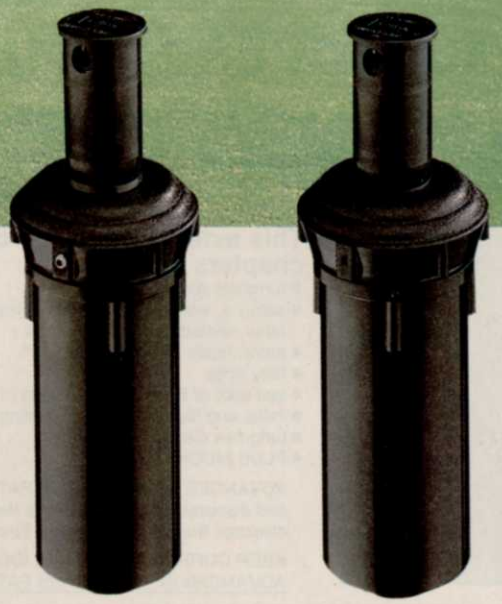
TABLE 1

Time to Take Softwood Cuttings, North Central U.S.



(Work done at Dow Gardens, Midland, Michigan.) (At least 70% rooting)

New Toro® Super 600C . . . we didn't make it bigger, we just made it better!



The non-identical twins; can you tell the difference?

They *look* identical, except for the small set screw on Toro's new Super 600C sprinkler head. That's for the locking cap feature, assuring even greater vandal-resistance. The check valve in the new model is *inside* so you can't see it at all, but it puts a stop to low-head drainage. And the big difference (which you can see only in performance) is the new nozzle selection that lets you apply about twice the gallonage. Just the thing for demanding large-turf applications. Of course, *both* heads offer adjustable radius . . . adjustable arc . . . and locking nozzle. For super results, specify and install Toro Super 600 . . . or, for the bigger job, just add the "C."

SUPER 600C
$23.95 *

SUPER 600
$20.95 *

The Toro Company, Irrigation Division
Dept. WT-1282, P.O. Box 489, Riverside, CA 92502

**Manufacturer's suggested list price, subject to dealer option*

TORO®

Circle No. 117 on Reader Inquiry Card

propagating Paperback Maple (*A. griseum*) by softwood cuttings and Ed Mezitt at Weston Nurseries, Hopkinton, Massachusetts, has been successful in propagating Japanese Maple (*A. palmatum*) by cuttings.

From some work done by Dirr, while at the University of Illinois, on crab apples, it would seem that timing of softwood cuttings was important. We tested this hypothesis and wholeheartedly concur. The chart suggests when to take cuttings of varieties of trees (under Midland conditions).

Tissue culture is another tool used in asexual propagation, or cultivar propagation, of trees. Sink at M.S.U. has been a leader in the development of tissue culture of *A. rubrum*. It is our hope, he will continue to work with various ash species, which we have had no success by using the cuttage technique, and the various oaks, e.g. White (*Q. alba*), Scarlet (*Q. coccinea*), and Bur Oak (*Q. macrocarpa*).

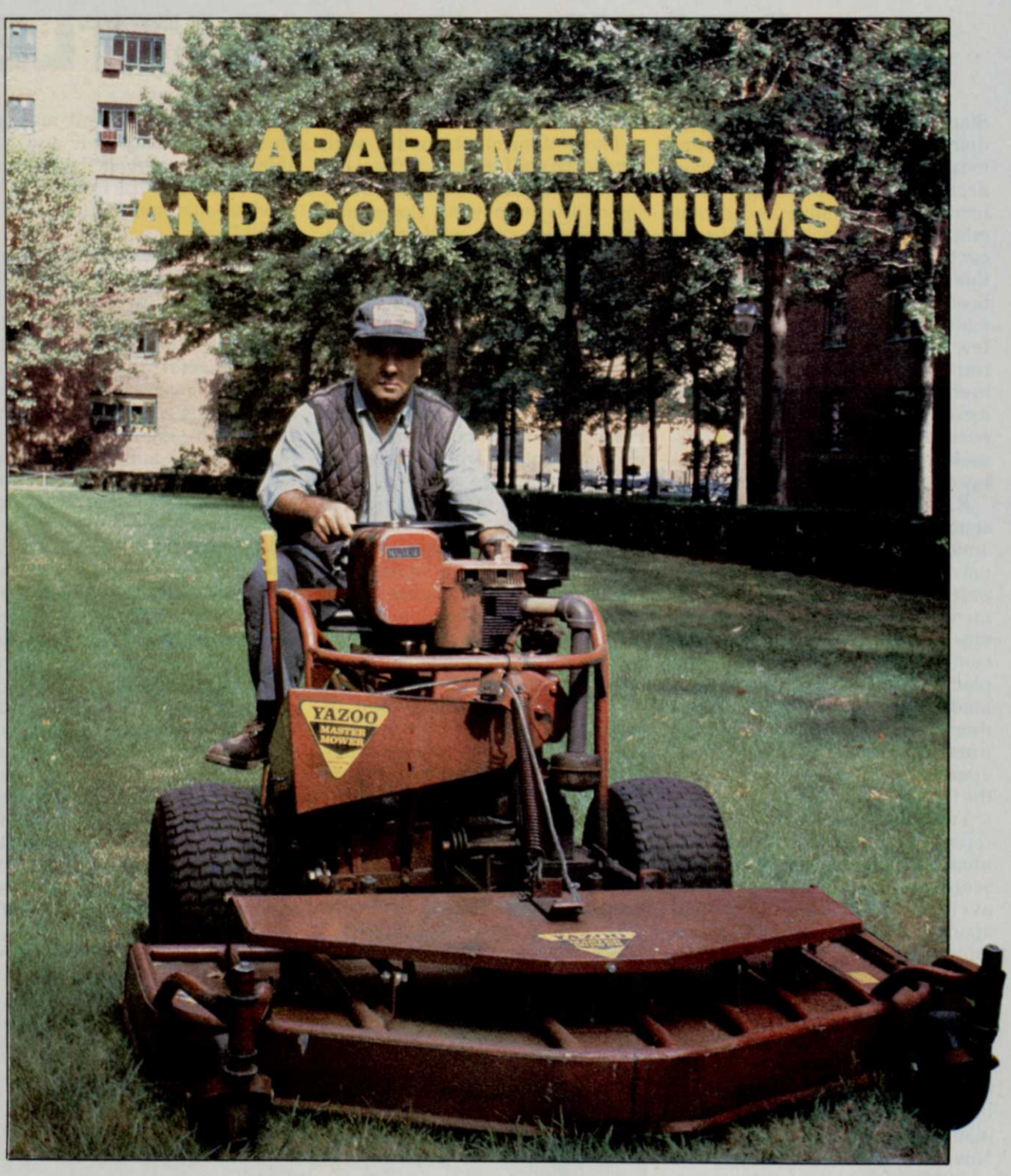
How does this affect the ultimate user, the urban forester, the landscape architect, and the landscape contractor? These developments in propagation mean that the problems we have noted in the past, related to graft incompatibility, can be overcome. Trees will be growing on their own root system, and, therefore, problems of rejection, incompatibility, or incongeniality (whatever term you want to use) would be eliminated.

Propagation changes allow more regional plants, higher resistance and greater urban tolerance

Further, it gives us an opportunity to have regional cultivars, that is plants native to a region of the country, that have been selected for disease resistance, environmental tolerance, or aesthetics, would be propagated and grown by our local nurseries. This will increase the diversity of plants available for landscape use, while fine tuning, if you will, quality trees for our difficult urban conditions. Specifically, diversity will result in increased environmental tolerance, while reducing maintenance requirements, insect and disease effects, and the need for supplemental water and fertilizer with the end product—healthier landscapes.

Presently, there are a significant number of nurseries offering trees propagated by cuttage. These include Frank Schmidt and Sons, Oregon; William Moller, Oregon; Lake County Nursery Exchange, Ohio; ('Bloodgood' London Planetree); and Weston Nurseries, to mention a few. These significant developments should help you, the designer-manager, or installer of landscapes, to select healthy, vigorous trees that will be best adapted for your unique landscape. **WTT**

LANDSCAPE MANAGEMENT



WEEDS TREES & TURF

Research in LANDSCAPE MANAGEMENT

CONDOMINIUM MARKET FACES COST vs STANDARDS BATTLE

Standards for apartment and condominium landscapes are rising today while more of the landscape decision-making is falling into the hands of cooperative and condominium associations. As landscape contractors sense the potential of this growing market, association boards are contemplating in-house maintenance programs. Since very few (less than 25 percent) of those responsible for landscape management belong to a landscape association, resolving the differences between contractor and association board will be on a case-by- case basis.

Rising landscape standards stem from increasing competition among apartments and condominiums. "Curb appeal" may draw a potential tenant to one development over another. All respondents in *Weeds Trees & Turf's* recent survey agreed residents are placing an increasing value on the landscape of apartments and condominiums. They also see the number of condominiums and apartments increasing greatly in the future.

Two thirds of the respondents reported the apartment/condominium staff performed some landscape services. To maintain an average of 16 acres the typical apartment/condo owned 2 riding mowers, 5 push mowers, 2 line trimmers, 2 spreaders, 1 tractor, 1 spray unit, and 2 chain saws. This machinery is operated by 3 full-time and 3 part-time personnel. The average chemical budget was $2,800 and the average equipment budget was $3,500. Most budget planning is done in October and November. More than a fifth of the respondents said there was no separate budget for landscaping.

Equipment buying is done primarily on an as needed basis. Chemical buying takes place primarily in February through April.

Those apartment/condos with landscape staff tend to contract out chemical applications, concentrating efforts on mowing, flower and groundcover care, and trimming. Tree planting and seeding are the second most common functions performed by contractors for apartment/condos.

A fourth of the respondents purchase chemicals and seed supplies from local garden centers rather than specialized wholesale distributors. Equipment, however, is purchased largely from landscape equipment dealers.

More than a quarter of the respondents were owners of apartment buildings. Landscape responsibility falls chiefly in the hands of the building or maintenance supervisor. In the case of condominiums, members of the association board review landscape programs.

The contractor or the supervisor of the landscape staff tend to specify the work. The owner and the maintenance supervisor depend upon these people for setting guidelines and budgets.

Communication and tact in dealing with residents are the two most critical keys to successfully working for an apartment/condo. "The landscape staff has to work closely with the residents and management, be conscientious and reliable," one apartment owner said. "The landscape has to show to the resident attention to trimming and detail."

On the other hand, management is leaning toward in-house landscape staff to lower costs and increase control, according to the survey. While standards are going up contractors' prices must increase to cover higher standards. One solution is to have apartment/condo staff take care of trimming, flower beds, and groundcovers, while the contractor performs mowing and chemical applications.

Metropolitan Insurance Co., owner of apartments in New York City, contracts all the work out to avoid labor relations problems with the union. At the same time, Metropolitan supervisors direct the contract staff.

Landscape supervisors of apartments and condominiums should join associations to help work out some of the potential differences between costs and expectations. The number of apartment/condo units will rise in the 80's as will the landscape standards. Associations are the best way to work out necessary compromises. **WTT**

TABLE I

Who Performs Landscape Services

Service	by Apartment/Condo	by Contractor
mowing	60%	40%
trimming turf	66%	34%
fertilize turf	50%	50%
turf weed control	55%	45%
turf insect control	55%	45%
tree spraying	80%	20%
tree trimming	75%	25%
groundcover/flower care	90%	10%
tree planting	66%	34%
turf seeding	66%	34%
turf aerifying	70%	30%