GOLF COURSE TREE PROGRAM — Where Do You Start?

By Danny Quast
Milwaukee Country Club

How important are your trees on your golf course? Too many times trees are secondary if not even thought about in the conscious mind of the Golf Course Superintendents. Here in Wisconsin, Dutch Elm has virtually eliminated every big tree on some courses leaving only 2½" to 3" trees to take their place. The loss of trees can destroy the character of a Golf Course.

How do we protect our valuable trees and still maintain high quality playing? Turf? First we must make the membership at your club understand the importance of their trees, and also make them realize that the perpetuation of a tree care program is vital to their club's future. Next we must realize that proper tree care can't be accomplished on a one day a week basis.

I feel any established club should have an arborist on it's staff. A man put on the same level as an assistant. In our case, the arborist is also responsible for the club house area, and has two people working under him, at peak season. The point I am trying to make is you, as a Superintendent, need a tree specialist able to identify and cope with tree problems, and doing something long before the problem is obvious to others. I feel the responsibilities of the arborist are as described in the following area.

SAVE THE ELM

In our case it is the Elm, in other cases it may be a Maple or an Oak problem. The idea is the same. Let's do everything in our power to prolong the life of the big trees. In our part of the country many have the attitude—"We can't stop the Dutch Elm Disease, let's let them die, cut them down and get it over with, it's too expensive to fight." I for one do not concur with this thought. I feel every year we can prolong the life of an elm, it is one more year that a smaller tree is getting larger. Can the elm really be saved? Let's face one fact. Trees as does every living thing, do not have the ability to achieve immortality.

We know we can prolong the life of a diseased tree. We know we can prevent Dutch Elm at a high percentage rate. We also realize it is almost a hopeless venture, when root graft is present. If preventive treatments are to do any good when there is a line or grouping of Elm, you must inject before any of the trees contact the disease, our arborist, Dennis Fermenich has had our elm on a preventive program which started in 1976; his findings were that we had 76 new infections showing 12 carryover. In 1977, we had 21 carryovers and 8 new infections. These figures show that we had 2.5 times as many diseased trees and 9.5 times more new infections in 1976 than in 1977. Dennis stated in his yearly report, "Experiencing this type of results in the first year is very encouraging, since I did not expect to see any changes in the loss rate for at least two to three years after program inactment."

PLANTING PROGRAM

Since coming to the Milwaukee Country Club we have planted over 1,000 trees, our loss rate has been minimal. The chosing of the location is the responsibility of the Golf Course Superintendent. Obviously he must choose the location as it relates to the game.

Once the location and species is decided upon it is Dennis' responsibility to see that the trees are planted, properly staked, wrapped, and pruned, so as the tree has the best chance for survival. All trees are planted with a tree spade which is hired with a operator from a local tree service. We have found it cheaper to plant with a tree spade than to have the trees bald and burlaped. Doing it this way you get larger trees for less money, plus you also save on labor. Each year a set dollar figure is established and we try to buy the best trees for the money.

TRIMMING AND REMOVAL

I don't believe anything looks worse than a dead tree, or for that matter a partially dead tree on a course. To keep the golf course attractive, Dennis must stay after these removals. There are no removals from key locations without permission from myself.

Any trees that are located near a green or building, are taken down by a professional tree service. Other than that Dennis handles it himself.

When trimming and removal are in the picture, the thing which must come to mind first is safety. Don't ask a tree man to work in a tree without: No. 1 — Knowledge of proper technique. No. 2 — Safety equipment, such as saddle with a scare strap, fiberglass ladder, and two 100 ft. ropes. These ropes should be replaced each year; your man's life depends on it. Good pruning tools and power saws are a must. The climber also should not work alone. The cost of the proper safety equipment adds up in dollars to about the cost of two large tree removals done by a professional service. To have a man on removals is a good investment, a professional service, charges between 200 and 500 dollars per tree, depending upon the size and location.

Once the tree is down and removed, the tree service will grind out the stump. The cleaning up and sodding of the remaining hole is turned over to the Golf Course Crew for completion.

OUR MOST VALUABLE TREES

In my opinion, the most valuable trees are the smaller ones. As these trees mature they must be properly pruned, sprayed, and of course, fertilized. When a tree is kept pruned properly from the time it is planted to when it reaches maturity it will be healthier and more resistant to storm damage. Small trees, the club's investment in the future and if your club will maintain it's character into the next generation, strong emphasis must be placed on these trees today.

Proper timing is so critical to small tree development. From the time we place them into the ground, and as we watch them mature, proper care comes in hand with proper timing, just as it does in good turf management. You, as a superintendent and your arborist must be actually aware of this fact.

THE TREE NURSERY

A tree nursery can save your club a considerable amount of money. Every year we purchase

about 100 trees at a cost of about $1,000. These trees are 1" to 1½" in caliber. We try to get varieties that have shown good over the years plus maybe add 20 to a new variety. This is done so we may have a larger selection to place on the golf course in later years. For example, we have started London Plane tree this year. These trees are not really recommended in our locality, but we have put some on the course in previous years and it has proven to work out beyond our expectations.

A tree nursery should be somewhat sheltered and have water close by. The tree should be spaced so when it comes time to transplant on the course they can be moved with a tree space without disturbing the adjacent trees. The tree nursery should be cultivated or partially cultivated and kept mowed. Your arborist must keep a constant watch over these trees to ward off any diseases or insects that will hamper their establishment and future growth.

RECORD KEEPING

As you all well realize in turf management record keeping is paramount. We must record our day's activities, our finances, spray programs and cultural practices if we are to be a successful Superintendent. This also holds true when working with trees.

It must be the responsibility of the arborist to keep track of fertilization, tree removal, his own work, and that of the tree service. These records are so important when it comes time to approve the bills at the end of the month. Cost of tree services, just as other services are increasing and we must be able to justify the figures which appear on the monthly work sheets.

Records must be kept on the Elms in order to determine our loss rate and monitor our progress. Much information has come from record keeping in the fight against this disease. Past records have headed field researchers into investigating uptake and proper timing for preventive injections.

WHERE DO YOU FIND AN ARBORIST?

If you think you are going to find one at $4.00 per hour, give up the search right now. You must appreciate this person for what he is, a professional, and should be compensated for the knowledge and ability he must possess to do you the type of job that is necessary.

Dennis came from Milwaukee Area Technical College through the Forestry Department of River Hills. The community which the Milwaukee Country Club is located in. If I would start a search I would be contacting the University and top-notch Technical College, in a search for a qualified man, someone to continue this excellent program which has been established over these past years. Your arborist is an important part to the success of your job, and the physical assets of the club. Money, properly spent on your trees, starts with qualified personnel.

Editor's Note: Danny H. Quast, CGCS, has been the Superintendent at Milwaukee Country Club since 1973.

His previous positions have been: Springfield Country Club, Springfield, Ohio 1968-1973; Troy Country Club, Troy, Ohio 1965-1968; and W.A. Cleary Corp. 1963-1965.

His professional accomplishments include: Member of CGSAA since 1963 — Certified March 15, 1976; Past President of Midwest Regional Turf Foundation 1976-77; Past President of Miami Valley GCSA; Board Director and Editor, Wisconsin GCSA; Member O.J. Noer Foundation; Member Ohio Turf Grass Foundation; and Speaker at GCSAA Conference 1977 & 1985.

He holds an Associates Degree, Stockbridge School of Agriculture, University of Massachusetts, Amherst, Massachusetts.

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EVALUATING THE TREE POPULATION OF A GOLF COURSE

By Jeffrey Parks
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Lake Arrowhead Golf Course

Nearly everone is aware that trees play a role on the golf course. To the casual observer, the greenery and texture of trees provide a pleasant contrast to the stark concrete and bustling streets of the city. To the golfer, who finds his ball snuggled against the buttress root of a forty-foot silver maple, with three feet of solid timber between his dimpled orb and the green, trees possess an entirely different significance.

So it is accepted that trees play a role and, therefore, have some value. But, for all of their redeeming qualities, the values of trees have always been defined in intangible terms like sturdy, rugged, graceful, bigger than yours, etc. In 1947, the National Shade Tree Conference (presently the International Shade Tree Conference), together with the National Arborist Association, moved to develop a systematic method of evaluating trees in their landscape setting. The Shade Tree Evaluation Committee was formed. Their task was to place a monetary value on trees.

Ten years were spent studying the problem. Finally, in 1957, the committee published a booklet entitled "Shade Tree Evaluation." The booklet described a method which divided the value of a tree into three basic components:

1. the size of the tree (i.e., the cross-sectional area)
2. the type of tree — genus, species, variety
3. the general condition of the tree

Each of the above factors has a value assigned to it. They will be described in more detail later.

Our involvement with this method began in an effort to evaluate the plantings at Blackhawk Country Club. The reasons that prompted the evaluation were these:

1. to create an inventory of the trees, both natural and planted, on the course
2. to make a map showing the location of each tree and devise a key which uniquely associated each tree to its location on the map — the map would also demonstrate the species distribution of the trees on the course
3. to calculate the replacement value of the trees

Making the Map:

Before any calculations regarding the value of the trees could be made, a map had to be drawn showing the position of each tree. Fortunately, air photos had been taken of Blackhawk within the past five years as a prelude to some construction work on the course. The photos had been enlarged and made into contour maps showing the entire course. Unfortunately, while the map showed the larger trees fairly clearly, very few of the younger trees could be seen. The new plantings, as well as those trees that had been removed recently, had to be drawn on, or excluded from, the map.

Drawing the new plantings on the map proved to be a long, arduous process. Using the larger trees as reference points, we would find two trees that a smaller tree lay between. A line was drawn between the two reference trees. The same thing was done using two other trees from a different direction. The intersection of the lines pinpointed the location of the smaller tree. This method was an expedient as any we tried, yet accurate to allow anyone to take the map into the field and find whatever tree he might be looking for.

Once the trees were drawn in, we traced the map to eliminate some of the background confusion (buildings, contour lines, etc.). A grid system was then drawn on this tracing. The grid was typical of those found on most road maps. It was necessary to subdivide the course in this way so that when the key (a listing of all the trees, their identity, condition, and value) was made, finding a tree and all the pertinent information about it would be easier.

The next step was to take the tracing to a blueprinting company where we had blueline copies of the map made. These copies were to be used in the field when we started the identification and measuring phase of our project. We walked the course again, stopping at each tree, measuring it, identifying it down to the species level, assigning it a number in the key, evaluating its condition and noting its position on the map. When we were finished, we had found over forty different species of trees and had catalogued thirty pages of notes.

Using the Shade Tree Evaluation Method:

In the first few paragraphs of this report, a brief description was given of the evaluation method we used to determine the value of the trees at Blackhawk Country Club. In this section we will present a more detailed account of the process, as well as some of the problems we encountered while using it.

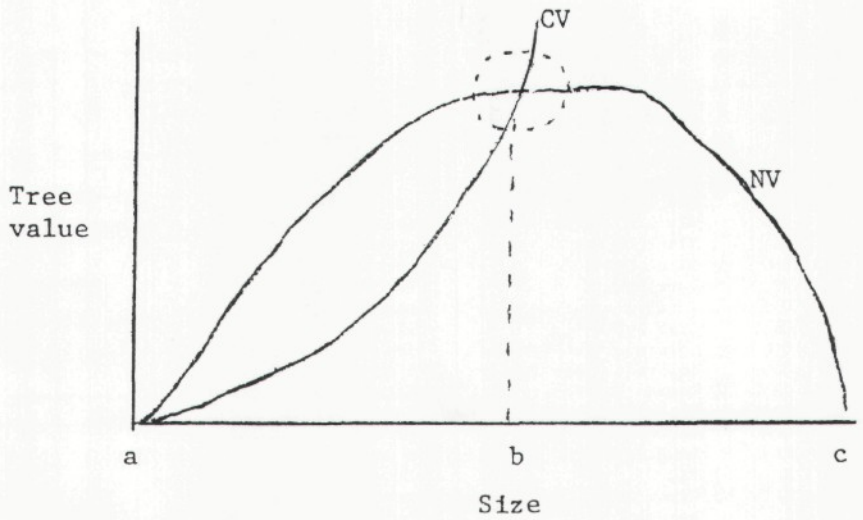
As was mentioned earlier, the value of a tree was subdivided into three components: size, types and condition.

1. Size. The size is represented by the cross-sectional area of the trunk at breast height (4 1/2 feet above the base).
   a) for large trees, where it is easier to measure the circumference (c), the forumla: Area = 0.0796 c^2 should be used.
   b) for smaller trees, where it is possible to measure the diameter (d) with a caliper, the forumla: Area = 0.7854 d^2 should be used.

The National Shade Tree Conference adopted a price of $6.00 per square inch of cross-section as a conservative, yet reasonable value for the size component of a tree. So, once the area is calculated, it is simply multiplied by the six dollar figure to obtain the size value.

However, when we started to calculate the size value of the smaller trees, we discovered a problem, as illustrated in the following graph.

Line CV, in the above graph, represents the calculated value (CV) of trees using the Shade Tree Evaluation Method. One can see



that between points a and b, the calculated value is less than the nursery value (NV). But the calculated value continues to escalate with each increase in the diameter of the tree. On the other hand, the nursery value is subject to market pressures. As the tree grows larger, the market for it decreases and therefore its value plateaus until, at some point, it literally grows out of any market and its value plummets. At some theoretical point, b, lines CV and NV will intersect. After that point, the calculated value is going to be greater than the nursery value. With the prices of the trees leapfrogging each other in this way, the dilemma of which value is the more accurate arises.

We settled on this solution. The committee report suggests that where an exact replacement value can be obtained for a tree, this is the value that should be assigned to the tree. To get this information we used the 1979 prices found in the Charles Fiore Nurseries catalogue.[1/] For those trees that were clearly too large to be carried on a nursery's inventory, we used the calculated value. This still left us with one troublesome group of trees. The trees in this group lay somewhere in the area represented by the dashed circle on the graph. The sizes of the trees were such that they were larger than those listed in the nursery catalogue but in part of the circle, the calculated value is less than the nursery value. To solve this problem, we extrapolated the nursery prices to fit the size of the tree, than calculated the value using the Shade Tree Evaluation method, and assigned whichever value was greater to the tree.

2. Type. The Shade Tree Evaluation Committee spent a great deal of time classifying trees regarding their value within geographic-climatic boundaries. The boundaries were necessary because trees perform differently in different parts of the country. The committee report lists the genus and species of the trees under one of five groups. The groups range from 100% to 20%. The most preferred trees within a region would naturally be placed in the 100% group; the poorest in the 20% group. While the lists of trees in each region are quite extensive, we did find trees on the course that weren't rated in our particular region. In these cases we borrowed the ratings from neighboring regions.
3. Condition. This component of the evaluation was dependent to a great extent on the judgment of the evaluator. The National Shade Tree Conference suggests that the image of a perfect specimen be kept in mind while evaluating the subject tree. By comparing the tree with this mental image, the evaluator assigns a relative percent value to the tree.

The report goes on to say that flexibility is important to the assessment. If the subject tree has some remarkable quality or its position in the landscape is significant, then the value of the speciment may be of more value than the perfect specimen. In our evaluation, we assigned a value of 100% to a perfect specimen and, because a tree can play an important role in how a hole will be played, we added on a percentage factor that reflected the tree's influence on the hole.

Other problems:

1. Multiple trunked trees. How do you measure them? We measured the diameter at breast height of each trunk and added the diameters together.
2. Small conifers and deciduous trees. All conifers and those deciduous trees with a diameter of less than one inch are listed by height in nursery catalogues. This meant one more trip out on the course to measure the heights of the trees that fell into this size category.

A Sample Calculation:

As was mentioned earlier, the values for smaller trees were obtained directly from the Charles Fiore Nursery catalogue. The nursery value was multiplied by the condition factor to reflect the tree's overall health.

Calculating the value for the larger trees was a simple matter of plugging the numbers for each of the components into this formula:

Value = \$6.00(area in ^{2}) (type%) (condition%)

So, for a burr oak, with a 9'3" circumference and a condition rated at 130%, the value would be:

Area = .0796 c^2 = .0796(111 in^2) = 980.75 in^2

Value = \$6.00(980.75 in^2) (100%) (130%)

= \$7,650

A Few Words About the Key:

The key has been referred to several times in this report without any real explanation of what it is or how it works. The twelve pages of numbers that appear at the end of the report, like something out of an accountant's nightmare, constitute the key. It works like this. Suppose that you discover late in December that one of your white fir trees has been sawed off at the base (and is presumably decking

[1/]Charles Fiore Nursery; Season Wholesale; Prairie View, Illinois (60069)

someone's halls with a lot of fa la la la la). For insurance purposes, you have to submit an estimate of the tree's value. To do this you then go to you map and locate the tree. The tree will lie within one of the squares on the grid that was described earlier. Each square is identified by a letter on the vertical axis of the map and a number on the horizontal axis. Assume that the square is F12. Now you turn to the key and find the trees listed under F12. There you should find the code number — F12WF. (WF = white fir; abbreviations for all types of trees are listed in Table 1, preceding the key). Behind the code number will be listed the type rating, the size, the condition rating, and the value of the tree.

Summary:

While we found that the Shade Tree Evaluation method was not devoid of weaknesses, we also discovered that it was a workable system, capable of transforming the intangible qualities of trees into more concrete terms—money.

Editor's Note: The authors completed this project as a part of the requirements for a Coordinative Internship project at the University of Wisconsin — Madison CALS Turf Management Program. The total value of the trees on the golf course exceeded $1.5 million.

Table 1. Tree Abbreviations

Symbol	Common Name	Scientific Name
A	Alder	Alnus glutinosa
AL	American Linden	Tilia americana
AP	Austrian Pine	Pinus nigra
ARB	Arbor Vitae	Thuja occidentalis
BE	Box Elder	Acer negundo
BHS	Black Hills Spruce	Picea glauca densata
BL	Black Locust	Robinia pseudoacacia
BLO	Black Oak	Quercus velutina
BO	Burr Oak	Quercus macrocarpa
C	Catalpa	Catalpa speciosa
CA	Crab Apple	Malus spp.
CBS	Colorado Blue Spruce	Picea pungens glauca
CGS	Colorado Green Spruce	Picea pungens viridis
CH	Common Horsechestnut	Aesculus hippocastanum
CO	Chestnut Oak	Quercus prinus
CsH	Cockspur Hawthorne	Crataegus crusgalli
DF	Douglas Fir	Pseudotsuga menziesii
E	Elm	Ulmus americana
GA	Green Ash	Fraxinus pennsylvanica
GL	Honeylocust	Gleditsia triacanthos
GsL	Greenspire Linden	Tilia cordata 'Greenspire'
Hb	Hackberry	Celtis occidentalis
L	Larch	Larix decidua
LLL	Littleleaf Linden	Tilia cordata
MA	European Mountainash	Sorbus aucuparia
MJ	Mountbatten Juniper	Juniperus chinensis 'Mountbatten'
NM	Norway Maple	Acer platanoides
NS	Norway Spruce	Picea abies
P	American Plum	Prunus americana
PB	Paper Birch	Betula papyrifera
PO	Pin Oak	Quercus palustris
Pop	Poplar	Populus spp.
RB	River Birch	Betula nigra
RdL	Redmond Linden	Tilia euchlora 'Redmond'
RO	Red Oak	Quercus rubra
RP	Red Pine	Pinus resinosa
SbGL	Sunburst Honeylocust	Gleditsia triacanthos 'Sunburst'
SH	Shagbark Hickory	Carya ovata
SiM	Silver Maple	Acer saccharinum
SM	Sugar Maple	Acer saccharum
SP	Scotch Pine	Pinus sylvestris
WA	White Ash	Fraxinus americana
WC	White Cedar	Juniperus virginiana glauca
WF	White Fir	Abies concolor
WO	White Oak	Quercus alba
WP	White Pine	Pinus strobus

RANDOM SAMPLE PAGES FROM EVALUATION

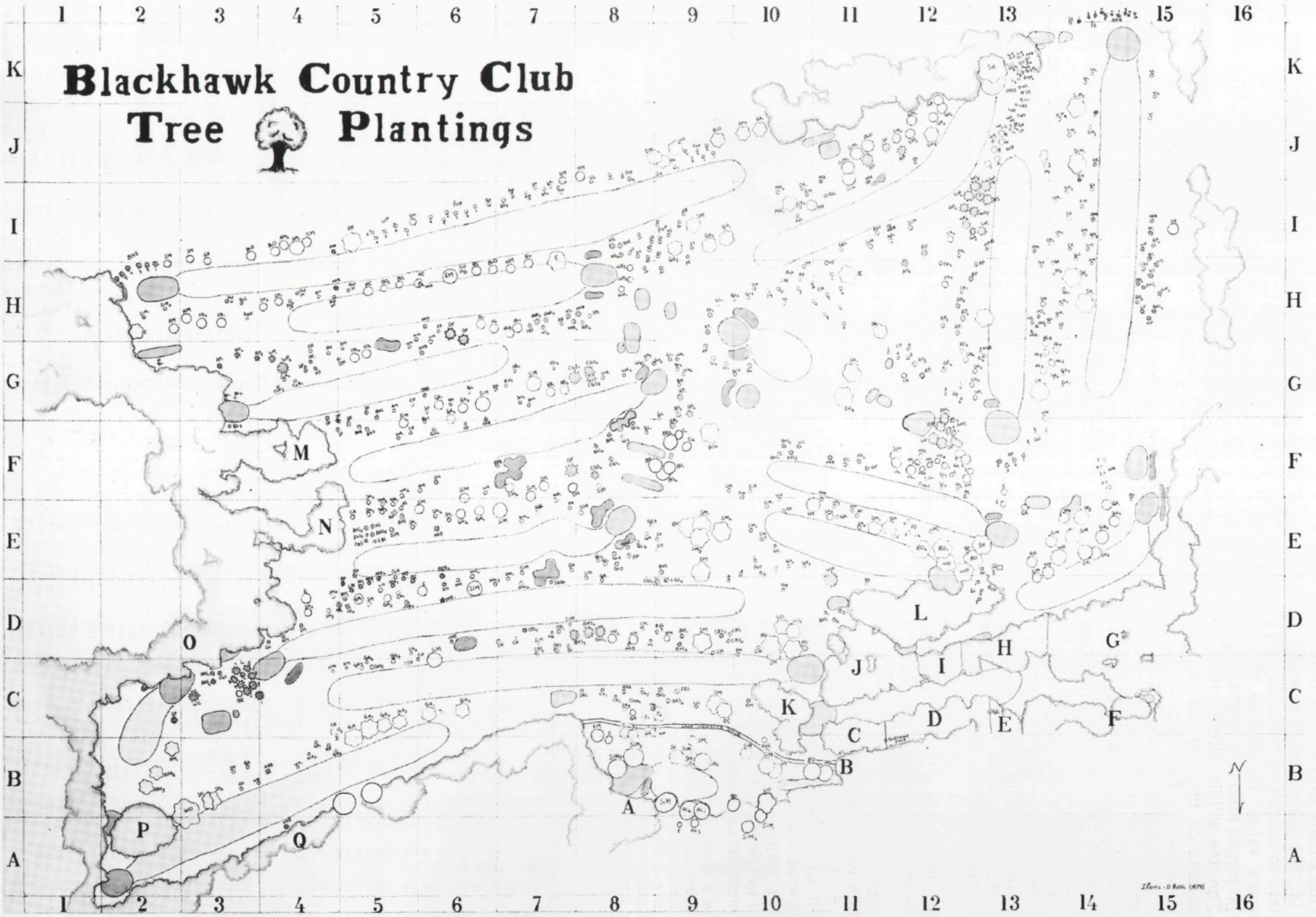
Location	Class	Cond.	Size*	Cost
A2 RO	100	100	7'4"C	$2900
AB2-3 WO	100	120	7'4"C	3487
A4 ARB	100	80	3.5'HT	30
A9 E	80	100	4'C	880
A9 AL_3	40	100	3'1"C	262
AB9 AL_2	40	110	7'6"C	1702
AB9 AL_1	40	110	6'8"C	1345
A10 SiM_2	20	70	4'4"C	181
AB10 SiM	20	100	6'7"C	596
B2 NM_1	100	90	4'6"C	1253
B2 NM_2	100	90	3'9"C	870
B2 NM_3	100	100	3'5"C	803
B3 SH_1	80	100	3'4"C	611
B3 SH_2	80	100	3'3"C	581
B3 SM	100	90	1.5"D	50
B3 RO	100	100	.75"D	36
B3 GA	80	100	1.6"D	60
B3-4 WA	80	100	2"D	85
B4 ARB	100	90	6'HT	40
B4 WA_1	80	70	1.5"D	75
B4 WA_2	80	100	1.6"D	75
B4 GA_1	80	100	1.75"D	70
B4 RO	100	100	.75"D	36
B4 GA_2	80	90	1.75"D	70
BC4 CA	100	100	2.5"+3"D	143
BC5 GA	80	80	5'HT	1100
B8 SiM_1	20	40	8'9"+6'5"C	1294
B8 C	20	70	3'4"C	107
B8 SiM_2	20	70	5'4"C	274
B8 SiM_3	20	70	8'9"C	737
BC8 C_1	20	90	6'9"C	564
BC8 C_2	20	100	6'8"C	611
B9 SiM	20	120	8'11"C	2625
B9-10 BO	100	100	5'3"C	1896
B9 SM_1	100	120	4'2"C	1433
B9 SiM	20	120	7'5"C	908
B9 SM_2	100	120	5'6"C	2497
B9 SH	80	120	6'1"C	2443
B9 AL	40	120	4'8"+5'+8'C	5152
B10 WO	100	120	7'6"C	4642
B10 SiM_1	20	60	7'11"C	517
B10 SiM_2	20	60	9'1"C	681
B10 SH	80	100	4'6"C	1114
B10-11 BO	100	100	7'6"C	3869
B10 RdL	100	100	2'8"C	552
B11 BO	100	100	5'6"C	2080

Location	Class	Cond.	Size	Cost
C2 DF	80	95	2.5"D	$ 208
C3 CGS	80	100	.75"D	29
C3 BHS_1	80	100	.75"D	27
C3 BHS_2	80	100	.75"D	27
C3 WC	100	90	4'10"+3'7"C	4385
C4 CA	100	100	2.25+2.50D	106
C4-5 CA	100	100	3.5+1.75D	130
C4 NM	100	100	2.5"D	29
C5 CA	100	100	1"D	16
C5 GA_6	80	90	1.75"D	60
C5 GA_5	80	100	6.25"D	147
C5 GA_7	80	100	5.5"D	114
C5 NM	100	100	.75"D	28
CD5-6 CA	100	100	.75"D	16
C5 GA_4	80	100	1'9"C	168
C5 GA_1	80	100	3'9"C	774
C5 GA_2	80	100	4'5"C	1285
C5 GA_3	80	100	3'7"C	706
CD6 SiM	20	100	4'9"+4'5"+5'4"C	2892
C6 GA_1	80	100	4'10"C	1285
C6 GA_2	80	90	3'4"C	550
C8 SRC	100	100	1.25"D	40
C8 C 1	100	100	1.25"D	40
C8 C 2	100	100	.75D	40
C8 ARB	100	100	8'HT	56
C8 C 3	100	80	6.75"D	172
C8 GA	80	100	2'5"C	321
C8 C 4	100	100	.75"D	40
C8 C 5	100	100	.75"D	40
C8 C 6	100	100	3.6"D	61
C8-9 C_1	20	60	5'1"C	213
C8-9 C_2	20	130	8'10"C	1395
C8 WA	80	100	8'25"D	2570
C8-9 WA	80	90	2'5"C	290
C9 GA	80	100	7"D	185
C9 BHS_1	80	100	4'HT	36
C9 BHS_2	80	100	3'HT	27
C9 CBS	80	100	4'HT	39
C9 LLL	100	100	6"D	170
C9 SM	100	20	7'5"C	739
C9 BE	20	70	7'10"C	590
C9 WA	80	100	3"D	95
C10 RM	100	60	6'HT	14
D4 E	80	100	3'11"C	837
D4 SM	100	100	1.75"D	34
D4 NM	100	100	3.5"D	100
D4 GL	100	100	2.25"D	95
D4 SM_2	100	100	3.2"C	679

*circumference (C), diameter (D), and height (HT).

Location	Class	Cond.	Size	Cost
Group L				
RO	100	140	7'8"C	$5659
RO	100	140	6'8"C	4279
RO	100	140	6'7"C	4173
WO	100	140	4'7"C	2023
WO	100	140	6'7"C	4173
WO	100	140	5'4"C	2739
WO	100	140	4'1"C	1605
WO	100	140	5'2"C	2570
WO	100	140	4'6"C	1950
WO	100	140	5'4"C	2739
WO	100	140	4'9"C	2172
WO	100	140	6'4"C	3862
WO	100	140	6'3"C	3761
WO	100	140	6'8"C	4279
PO	100	140	7'9"C	5783
RO	100	140	7'10"C	5908
RO	100	140	6'9"C	4387
WO	100	140	6'3"C	3761
WO	100	140	5'5"C	2825
PO	100	140	6'7"C	4173
PO	100	140	6'7"C	4173
PO	100	140	7'11"C	6034
E	80	140	3'4"C	1182
RM_b	20	140	2'7"C	92
Group M				
BO	100	120	3'4"C	917
BO	100	120	2'11"C	1470
BO	100	120	3'3"C	872
BO	100	120	4'1"C	1376
BO	100	120	3'2"C	828
BO	100	120	2'11"C	585
BO	100	120	8"D	464
BO	100	120	4'2"C	1433
BO	100	120	2'10"C	663
BO	100	120	4'5"+4'C	5846
BO	100	120	4'7"C	1734
BL	20	120	4'4"C	1310
BO	100	120	4"D	232
BO	100	120	2'8"C	587
E	80	120	3'C	743
BL	20	120	3'9"C	232
BL	20	120	3'9"C	232
Group N				
BO	100	150	9'5"C	9148
RO	100	150	4'10"C	2410
RO	100	150	4'3"+3'9"C	6603
RO	100	150	3'4"C	1146
BO	100	150	5'6"C	3121
BO	100	150	2'4"C	562

Location	Class	Cond.	Size	Cost
Group N (cont)				
BO	100	150	5'5"C	$3027
BO	100	150	4'4"C	1937
BO	100	150	8'7"C	7600
BO	100	150	6'4"C	4138
BO	100	150	3'8"C	1387
RO	100	150	3'3"C	1090
RO	100	150	4'7"C	2167
RO	100	150	5'8"C	3313
RO	100	150	4'2"C	1791
BO	100	150	4'11"+3'3"C	6880
BO	100	150	3'C	1944
BO	100	150	5'3"C	2843
BO	100	150	4'C	1651
BO	100	150	4'5"C	2012
BO	100	150	3'4"C	2400
BO	100	150	2'C	413
BO	100	150	1'9"C	316
BO	100	150	3'5"C	1204
BO	100	150	3'9"C	3038
BO	100	150	5'4"C	2934
BO	100	150	7'C	5055
PB	100	110	10'HT	100
DF	100	110	11'HT	176
RO	100	110	6'4"C	3034
BO	100	110	4'11"C	1829
BO	100	110	4'11"+3'5"C	5254
RO	100	140	7'C	4718
RO	100	140	6'9"C	4173
PO	100	140	5'3"C	2654
PO	100	140	5'7"C	3002
ARB	100	140	25'HT	245
PO	100	140	4'8"C	2097
DF	80	140	2'2"C	362
PO	100	140	5'8"C	3092
PO	100	140	6'9"C	4387
RO	100	140	3'10"C	1415
SH	80	140	4'1"C	1284
PO	100	140	6'3"C	3761
BO	100	140	6'9"C	4387
Group O				
SiM	20	100	4'3"+5'5"+ 4'5"C	2728
GA	80	100	4'2"C	955
AL	60	100	7'2"C	2119
AL	40	100	3'10"+3'7"+ 3'4"C	3179
AL	40	100	6'2"+3'5"C	2527
AL	40	100	4'7"+4'6"C	2269
AL	40	100	6'5"C	1133
C	20	100	5'8"C	442
C	20	100	3'8"C	185


Blackhawk Country Club
Tree Plantings
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
K J I H G F E D C B A
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56th GCSAA Conference

"WASHINGTON WEEK IN REVIEW"

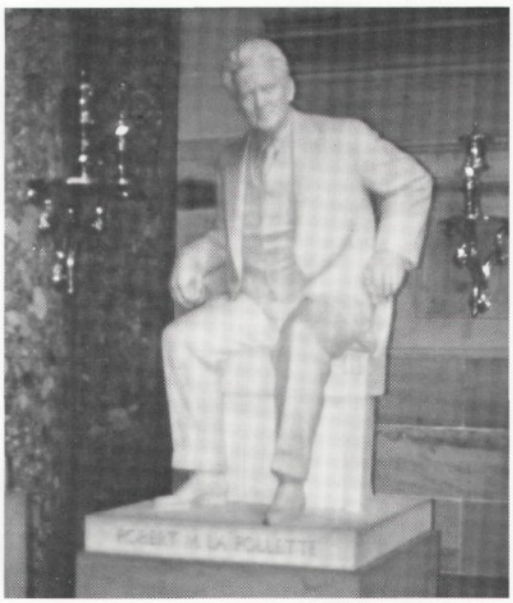
The week of February 6 through February 13 saw a strong contingent of Wisconsin Golf Course Superintendents in Washington, D.C. to attend the 56th annual Golf Course Superintendents Association of America Conference and Show. Although the weather was far from good, it nevertheless provided a pleasant and educational break from Wisconsin's long and cold winter.

It was an educational week in every sense of the word. A record number of WGCSA members attended pre-conference seminars on topics ranging from computer use to plant physiology to golf course architecture. Many wives and children were present this year to visit the wealth of museums and historical sites our nation's capital has to offer. It afforded many their first opportunity to visit the Capitol Building and White House, to reflect at the Viet Nam Veterans' War Memorial, the Lincoln Memorial and Jefferson Memorial and the tomb of the Unknown Soldier at Arlington Cemetery. It was the first chance some had to ride to the top of the Washington Monument or visit Ford's Theater where President Lincoln was killed. For everyone there, the city gave them a renewed good feeling about our country.

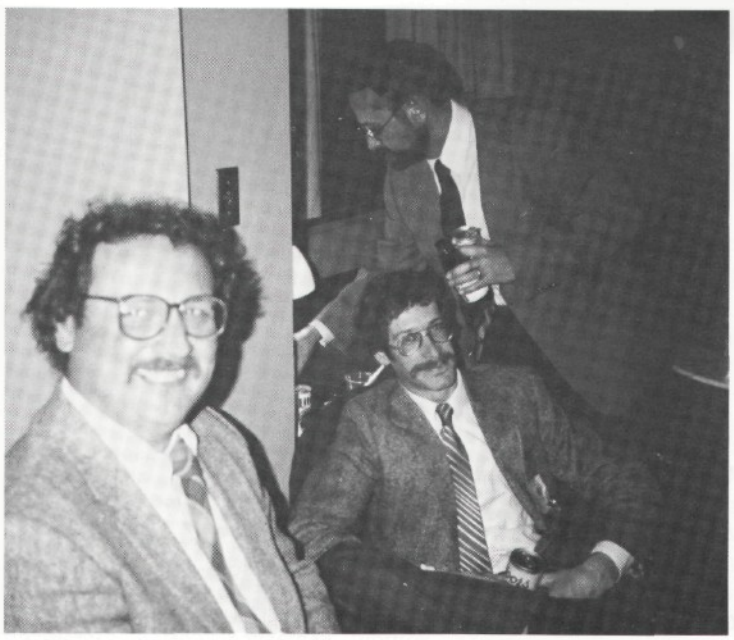
The educational program was rated among the best, and Wisconsin played a strong role as a contributor. Milwaukee Country Club's Dan Quast was not only on the GCSAA "Thinking Superintendent I" program, but he also participated as a panel member on the USGA Program. His GCSAA lecture was entitled "In-House Nursery." The USGA panel discussion, which he was a member of, was centered around the subject "Six Deadly Sins of Superintendents and Green Committees."

"Using a Weather Consultant" was the subject of Monroe Miller's talk on the "Thinking Superintendent II" program given both Saturday and Sunday afternoons of the Conference.

An attentive audience at the opening session included Tom Parent, Mike Semler and Tom Schwab.



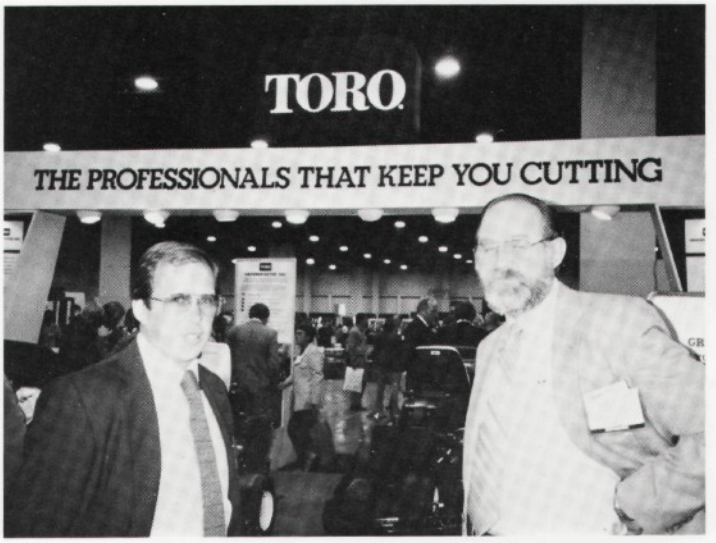
Statute of Wisconsin's own "Fightin' " Sen. Bob LaFollette in the nation's Capitol Building.



Pat Mertz, Steve Blendell and John Krutilla socialize in WGCSA hospitality room.

Pat Roberts, wife of GCSAA candidate Bill Roberts.

Bill Roberts and John Krutilla visit with GCSAA Past President Bob Mitchell.



Chad Ball and Bob Reinders.

John Belfield, Dan Quast, Roger Bell, Dennis Robinson & Ralph Christopherson.

Suzanne Bell, speaker on GCSAA Spouse Program.

Suzanne Bell, Roger's better half, shared her thoughts on how to be supportive of a Superintendent husband and get what you want out of life together. Suzie's talk received rave reviews and she was a real talent for public speaking. Everyone from Wisconsin was proud of her.

Needless to say, the election efforts of the WGCSA were an important part of the Washington conference. Be sure to read Bill Roberts' "Reflections" elsewhere in this issue of the GRASSROOTS.

The trade show had an all-time high number of participants, and our state was again well represented. Jacobsen, headquartered in Racine, Ransomes, Inc. (North America), headquartered in Johnson Creek, and Toro, with a manufacturing facility in Tomah, anchored Wisconsin's industry contingent. Other manufacturers representing Wisconsin were the Columbia ParCar Corporation of Deerfield, Ametek, Inc. of Sheboygan, Briggs and Stratton Corp. of Milwaukee, Menasha Corp./Lewisline from Watertown, Milwaukee Sewerage Commission/Milorganite of Milwaukee, Kohler Co. of Kohler and Terracare Products of Pardeeville. Their presence amplified Wisconsin's important role in the national and international turfgrass industry.

Even the opening session had references to our state when Pat Summerall, responding to a question, reflected for several minutes on playing for former Head Coach of the Green Bay Packers, Vince Lombardi.

Also capturing some attention for the WGCSA during the opening session was the presentation of newsletter awards. Our own GRASSROOTS was recognized twice — as winner of the original editorial category and as one of the overall ten best newsletters.

There can be little argument that it was a memorable and educational week. Nor is there any dispute that we did our chapter and our state proud. Good for us!

"Pictures compliments of official GRASSROOTS photographer Ed Devinger."

(Continued from page 1)

The cultures are kept in temperature-controlled growing rooms under low-intensity fluorescent lights. Eventually, technicians insert the shoots into a plug made from pasteurized peat and glue. In a matter of days or weeks, the new plants develop root systems. The end result: tiny trees in easily handled planting plugs.

McCown estimates that with this technique, 30,000 to 100,000 propagules—depending on the species—can be produced routinely every year using only one square meter of growing space. He adds that herbaceous plants are the quickest and easiest to culture; potatoes take only two weeks to go from cultured shoot to field. Deciduous woody plants such as birches and conifers are trickier to culture and to "harden off," or acclimatize to outdoor conditions, extending the time they must spend in the propagation room.

Horticulturist Brent McCown examines the developing shoots of a woody plant micropropagated via tissue culture.

Advantages of Shoot Cloning

If perfected, micropropagation of trees on a commercial scale could sidestep the costly maintenance of stock nurseries, since large numbers of new trees could be grown from existing cultured stocks. Being clones of their parents, the genetically identical new stock will produce trees of a uniform nature, which McCown lists as the procedure's biggest advantage.

He notes that micropropagation would have other advantages as well over traditional seedling propagation programs. For one thing, in a field of research whose time frame is determined by the maturation time of a tree—from a few years to hundreds of years—the time savings can be considerable. Micropropagation doesn't require the seed of mature trees; instead, tissue—the "growing stock"—is selected from immature plants with superior characteristics. This allows many "generations" of otherwise slow-maturing species to be grown in a relatively short time, says McCown.

Because micropropagated stock is also free of pathogens, pests, and unwanted chemicals and is not subject to environmental stresses such as frost and drought, its rate of growth and development is highly predictable under a given production program. McCown believes disease resistance can one day be incorporated into the culturing system. This would be a boon to tree improvement programs in the United States. One target, he says, might be scleroderris canker, a devastating disease in red pines, which is a potential threat to Wisconsin forests.

If researchers could come up with a single disease-resistant red pine, that tree's tissue could be "multiplied" in the laboratory. Since red pine is a high-priority improvement species in Wisconsin, "it really brings the nature of this research home," says McCown. However, because of the complexity of conifer life cycles, scientists have yet to commercially shoot-culture pines.

Although woody plant micropropagation brings exciting prospects to tree production programs, it's not without its drawbacks. For instance, the working gene pool is limited to the chromosomes of the parent tree. When entire crops of a monotypic, or single-parent, plant are grown (a prevalent practice in revenue-hungry developing countries), the whole crop reflects the particular weaknesses as well as strengths of the parent. The weaknesses can be an open invitation to widespread damage by pests and disease. Micropropagation of trees can be "abused" in this way as in any agricultural system. McCown notes, however, that by cloning from a variety of parent trees, "you can program diversity into the system to avoid monotypes."

Another problem, difficult to detect, is maturation in the stock culture. "This could go unnoticed for years," McCown says, "until the plants produced from it are in the field or in the customer's hands."

When Protoplasts Fuse

McCown notes that woody plant tissue culture is also moving ahead on a cellular level. Much of the work is focused on protoplasts—cells without their cell walls. Once the cell walls are removed, isolated genes can be inserted into protoplasts. Or, protoplasts from selected parents can be "fused" in a test tube, forming a "somatic hybrid."

Protoplast culture, according to McCown, is one of the most dramatic developments in plant science and could become an important research tool. "The use of isolated protoplasts may provide a key for unlocking many fundamental research problems in plant