



Accomplishment Report 1981

Minnesota's
**FEDERAL
DUTCHELM
DISEASE
DEMONSTRATION
PROJECT**

Minnesota Department of Natural Resources
Division of Forestry

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Prepared by the
Federal Dutch Elm Disease
Demonstration Program

Minnesota Department of Natural Resources
Division of Forestry

PART II
INFORMATION AND EDUCATION PROGRAM

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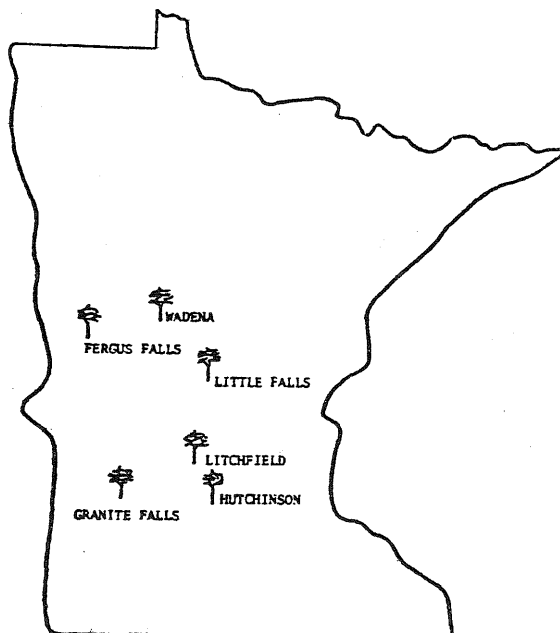
The Federal Dutch Elm Disease
Demonstration Program

wishes to acknowledge

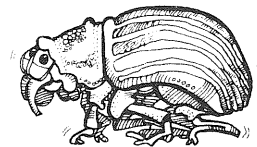
the assistance and cooperation
given during 1977-1981
by the cities of:

FERGUS FALLS
GRANITE FALLS
HUTCHINSON
LITCHFIELD
LITTLE FALLS
AND,
WADENA

*Without the help of these cities,
the success achieved by the demonstration
program could never have been reached.*



INTRODUCTION



A STATEMENT OF THE DISEASE SITUATION IN MINNESOTA

Minnesota is no stranger to Dutch elm disease... it's still around, but the worst is over.

This brief statement summarizes the way in which Minnesotans now regard the disease. Five years ago, 1977, interest in Dutch elm disease was at its highest. People were so conscious of this disease problem that they automatically visualized stump-lined boulevards whenever it was mentioned. St. Paul, Minnesota's Capitol, was losing its trees at an alarming rate. It seemed as though overnight, whole blocks of elms became infected and were removed. People quickly recognized the terrible destructiveness of this disease and eventually came to understand that planting new trees could not be accomplished fast enough to cover the barrenness created by the loss of hundreds of elms. For once, too, people began to understand the value of a tree. It suddenly became noticeable how hot it was during the summer without the big elm in front to shade the house; it suddenly became noticeable how hard the wind blew against the house and how high the snow piled-up during the winter without the elm trees around to break the effects of the weather; and, it became noticeable how hard, bleak, and ugly the landscape looked without living trees present to lend their softening influence. If people were not yet aware of the disease situation, the media soon informed them. By this time, Dutch elm disease was enough of a problem to make front page headlines.

In 1977, as Dutch elm disease encroached upon the Twin City area and municipal concern surfaced, the Minnesota Legislature passed a large and comprehensive grant-in-aid program. Within the next five years (1977-1981), the State spent over \$50 million to help municipalities absorb the costs incurred when implementing

shade tree disease management and reforestation projects. To handle the large monetary appropriations, the Legislature created the Shade Tree Program within the Minnesota Department of Agriculture. Any municipality could receive financial help from the State through this program, if it complied with certain rules and regulations detailing the ways in which disease management programs were to be developed. These rules and regulations made each municipality responsible for maintaining a certified tree inspector, carrying-out two to three intensive disease detection surveys throughout the growing season, removing all dead, dying and/or diseased elm trees within twenty (20) days of detection, and disposing of all non-debarked elm material by burying, burning, chipping, or utilizing in some other manner.

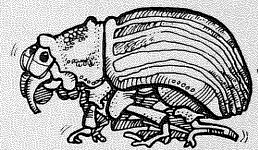
Since Minnesota had made a large commitment to suppressing Dutch elm disease, it was one of five states selected in 1978 to participate in a disease management and utilization program administered by the United States Forest Service. Minnesota proposed to demonstrate the effectiveness of known Dutch elm disease management practices in six of its cities. It was hoped that this federally sponsored program of technical assistance and education, together with active state and municipal cooperation, would provide the coordination necessary for communities to develop effective Dutch elm disease management programs of their own. Through this demonstration project, the value of municipal disease management programs could be examined in terms of the expenses incurred when implementing such a program as well as in the terms of the aesthetic considerations which become necessary when having to remove and eventually replace a large portion of the tree population.

At the end of 1980, much had been accomplished in Dutch elm disease management. With the financial and technical assistance available from state personnel,

municipalities developed and maintained effective disease management programs. Public information and outreach programs made people realize that Dutch elm disease could not be eradicated, but that it could be suppressed. Losses could be spread over a number of years enabling a city to absorb the financial burden of removing diseased trees and establishing a new urban forest. But, as disease losses slowly dwindled over the years and as people became involved with new problems, Dutch elm disease was pushed to a "back burner" and was regarded with complacency. Even the summer of 1981 when disease incidence began to rise due to an increase in elm bark beetle populations, concern was minimal. Now, in 1982, with budget cuts and the attitude "people are more important than trees" so prevalent, Dutch elm disease is surfacing again as a serious problem. Financial aid from state and federal sources is almost non-existent, so many communities, instead of making budget reductions, are eliminating entirely their disease management programs. To many, the threat of losing vast numbers of trees to Dutch elm disease is no longer present. Perhaps programs working with Dutch elm disease did their job too well. Perhaps by keeping disease losses to a minimum in many cities by enforcing good management practices, many people were encouraged to believe that the threat of a state-wide Dutch elm disease epidemic was just another "scare tactic".

Dutch elm disease is still "on the move" in Minnesota. It is spreading northward--each year, more communities are reporting their first losses. Beetle populations appear to be heavy and with communities doing less and less in disease management, the conditions for an epidemic have once again been created. The Dutch elm disease situation in Minnesota is EXPLOSIVE.

PROGRAM DEVELOPMENT



PROGRAM DEVELOPMENT

The intent of Minnesota's federally funded Dutch elm disease program was to demonstrate the effectiveness of known disease management practices. With the assistance given by this federal program--both financial and technical--the increase in tree losses due to Dutch elm disease has been slowed-down and gradually reduced to a level which each city can now handle, economically, with its own finances. The combined efforts of city and state personnel elevated each demonstration community's tree removal program to a high level sanitation program. The results of this work have provided information to answer the questions of "how much" and "how practical is it" to implement disease management practices, singly or in combination. Suppressing Dutch elm disease over this four-year period (1978-1981), has enabled each of the demonstration cities to develop an economical and orderly transition from its predominant urban elm forest to one of mixed stands of shade trees.

Municipal officials were concerned that the disease management recommendations made by program personnel could not be worked into a day to day program where economics and politics, as well as biology, would have to be considered. However, a program was organized that addressed the problem of reducing losses due to Dutch elm disease and which complied with the economical and political philosophy of the small city. The following management practices, listed on a priority basis, were those recommended by project personnel and were the concepts upon which Minnesota's demonstration program was based:

1. DISEASED TREE AND WOODPILE INSPECTION

What it involves: The surveying of each demonstration city to find and mark for removal all hazardous elm wood and all

trees with Dutch elm disease. When one survey of the city is completed, another will follow so that inspections are continuous.

Its importance to the program: Since bark beetles breed in non-debarked elm wood, the removal and subsequent destruction of the "brood" material can help to reduce beetle populations. The beginning of any good Dutch elm disease program is the inspection for, and the marking of, all diseased elm trees.

2. DISEASED TREE REMOVAL

What it involves: The removing and disposing of those trees infected with Dutch elm disease. In conjunction with this, the removing or debarking of the remaining tree stumps.

Its importance to the program: Prompt tree removal is the basis of any good Dutch elm disease management program. Removing diseased trees quickly prevents other healthy elms from getting root graft infections. Since bark beetles tend to breed in dead and dying elms, prompt removal also eliminates potential beetle "brood" material. Debarking or removing tree stumps will eliminate, too, this additional source of "brood" material.

3. ROOT GRAFT BARRIER PLACEMENT

What it involves: The severing of roots which are shared between two or more elm trees. Root graft barriers should be placed in those areas where an elm tree with a greater than 5% disease infection is within 40 feet of other healthy elm trees. Mechanical methods (for example, the vibratory plow or trencher) and chemical methods (for example, vapam) are available for disrupting these common root grafts.

Its importance to the program: Until this management practice is extensively used as a preventative tool, the fungus has the capability to spread up and down the streets of each demonstration city, reducing the effectiveness of all other management efforts.

4. PROGRAM ORDINANCES

What it involves: The passing by the council of a Declaration of Policy on how Dutch elm disease will be dealt with by the city. An ordinance addresses the questions of time limits for removing diseased trees on private as well as public property; restricting the stockpiling of non-debarked elm logs during certain times of the year; and, the city's ability to enter on private property when implementing management practices.

Its importance to the program: Having a strict ordinance supported by the city council enables a disease program to run smoothly. The ordinance gives the city forester leverage when dealing with difficult people who absolutely refuse to remove a diseased tree or get rid of hazardous non-debarked elm firewood. The ordinance gives the city forester the legal right to enter private property to institute a management program consisting of root graft barrier installation, Dursban spraying, etc.

5. RE-DEFINING MANAGEMENT AREAS

What it involves: Reducing the boundaries of a city's disease management area to include only those residential sections containing heavy populations of elm.

Its importance to the program: Since managing a disease program is costly in both time and dollars, it is necessary to apply management practices only in those areas where they will be most effective. Areas where management of the disease will be, at best, minimal, should be designated as a lower priority or excluded entirely.

6. TRIMMING/REMOVAL OF WEAKENED OR DEAD ELMS

What it involves: The removing of dead wood from healthy elm trees. Also, the taking down of those elms which are dead or in a weakened condition from causes other than Dutch elm disease.

Its importance to the program: Any dead branch in an otherwise healthy elm tree is a potential breeding site for bark beetles. Trees can still be sending nutrients and water (at a reduced rate, however) to nearly dead branches. Removing these weakened branches, therefore, enables the nutrients and water to be redirected to healthy parts of the tree. Weakened elms are more susceptible to disease infections, the primary one being Dutch elm disease. Dead elms which remain standing are yet another source of beetle "brood" material.

7. APPLICATION OF DURSBAN

What it involves: The spraying with Dursban of a designated portion of the urban elm population in the spring and fall as an attempt to reduce overwintering populations of the native elm bark beetle.

Its importance to the program: In those areas where the native elm bark beetle is a predominant vector, reducing its population levels could also reduce the rate of disease infection. Following the mild winters Minnesota has experienced in the last two years (winter of 1979-1980 and winter of 1980-1981), Dursban could help to prevent a substantial build-up of this beetle vector.

8. THERAPEUTIC PRUNING

What it involves: Pruning the diseased branches from those trees showing early Dutch elm disease symptoms. For most effective results, no more than 5% of the tree's crown should show early disease symptoms, and pruning must be completed immediately after detection. Infected branches should be pruned back to the main trunk.

Its importance to the program: Therapeutic pruning is a management practice that is often ignored and discredited. It can become an important approach to managing Dutch elm disease if removing infected branches can prevent the sacrifice of the entire tree.

9. INJECTION

What it involves: The injecting of high value elm trees with a systemic fungicide (for example, Arbotect), protectively or therapeutically. Therapeutic injections should not be applied to any elm tree if more than 5% of the upper crown is wilting. Injection does not fully guaranty that elm trees will either be immune to, or cured of, Dutch elm disease. It should not be used in place of other disease management practices (for example, tree removal) but rather, is to be used as an additional management effort (for example, injection combined with therapeutic pruning).

Its importance to the program: It is hoped that injecting high value elm trees with a systemic fungicide will provide them with some protection against the disease. This method of treatment could also have some beneficial effect as far as retarding the movement of the fungus into adjacent healthy elm trees.

10. ELIMINATION OF WILD ELMS

What it involves: Removing or in some way killing those elms which are growing wild. Often these wild areas are not easily accessible to men and equipment, so tree removal is not practical. Killing the trees quickly, perhaps by using chemicals, might be the only possible way in which to eliminate these trees.

Its importance to the program: Wild areas containing a good number of elms border some of the demonstration cities. Disease management is impractical in these areas due to poor cost effectiveness and men and equipment not being able to find easy access to the trees. Dutch elm disease is usually running rampant in these areas and has threatened to spread to the urban elm populations. These trees must be removed or in some way rendered harmless in order that the urban elms are protected.

11. IMPLEMENTATION OF UTILIZATION PROJECT

What it involves: The processing of unmarketable elm material into non-hazardous firewood.

Its importance to the program: The majority of diseased trees removed in the demonstration cities is disposed of by burning. Everyone concedes that it is a great waste not to utilize this resource in some way, especially now with firewood in demand because of the energy "crunch". Each city's disease management program will be made complete if the unmarketable elm material can be processed into non-hazardous firewood.

Although a program consisting of the aforementioned management practices is the most inclusive and comprehensive, quality can still be maintained when reductions become necessary due to a cut in funds. Disease management programs can be structured to adhere to the confinements of a community's strained budget. Each municipality must prioritize its management practices so that in times of budget cuts, those of least benefit to the city can be recognized and accordingly reduced or eliminated. When prioritizing its management practices, a community must also analyze what needs its disease program must fulfill...

...is the program to be simply tree removal?

...is the program to be more a public outreach effort than anything else?

...is the program to be made as intensive as possible?

During the four years of the demonstration program (1978-1981), it was found that a community's needs were easiest to identify when the disease management practices were divided into the following categories:

1. those practices essential to maintaining even the simplest disease management program--woodpile and

diseased tree inspection, diseased tree removal,
and root graft barrier placement;

In more detail... Thorough inspection surveys, prompt diseased tree removal, and root graft barrier installation are the three most important ingredients of a good management program. These are the practices that when reduced or eliminated, diminish or destroy the effectiveness of the entire program. After all, any dead dying, or diseased elm must first be found before it can be eliminated; after all, removing diseased trees and hazardous woodpiles is still the most effective way to suppress the spread of the disease; and, after all, installing a barrier when the disease is spreading by root graft has an impact on reducing losses.

2. those practices which cut corners and save money--
re-defining management areas and elimination of
wild elms;

In more detail... Attention should be paid to re-defining management areas. Expenses can be cut and men, equipment, and time better utilized when those places containing an insignificant number of elms are eliminated from the program. Disease management in areas containing populations of wild elm is impractical due to poor cost effectiveness and men and equipment not being able to find easy access to the trees. Eliminating these wild elm trees in one operation saves money and removes a very real threat to the urban elm population.

3. those practices necessary for a good public outreach program--trimming/removal of weakened or
dead elms, program ordinances, and utilization;

In more detail... Dead wood pruning of healthy elms not only helps trees, but it is of benefit to the overall program, too. City residents are very quick to recognize the improved appearance of the trees and are often heard to remark on how they enjoy their urban forest. Dead wood pruning of public trees also encourages residents to do the same thing to the trees on their property. When a city passes an ordinance, Dutch elm disease is "officially" recognized. People realize the disease is no longer a private problem, but is of public concern, thus demanding their attention and support. Utilizing elm wood completes the "picture" of Dutch

elm disease management. Making use of this resource instead of destroying it does much to increase public support of the entire management program.

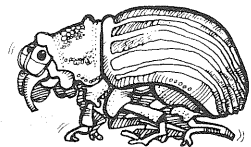
And,

4. those practices which can be reduced or eliminated when budgets become strained--application of Dursban, therapeutic pruning, and systemic fungicide injection.

In more detail... Therapeutic pruning, injection of systemic fungicides, and the spraying of Dursban are useful, but are those management practices which can be reduced or eliminated if funds are cut. Although these practices help protect trees against Dutch elm disease, they require time to implement, and as is so often the case in Dutch elm disease management, time is money. When manpower is short, it must be spent on those things essential to the program.

To establish the most effective management program, the practices recommended for use in the demonstration cities should be implemented. However, during the four years of the federal Dutch elm disease program (1978-1981), the political and economical philosophies of the demonstration cities changed. Most drastic were the budget cuts that had to be made. Municipal officials were under the misapprehension that if all the recommended disease management practices were not implemented, the entire program should be dropped. After all, wouldn't any elimination bring program effectiveness down to nothing? By prioritizing management practices and identifying the needs of the city, when budget cuts became necessary, it was shown that certain management practices could be reduced or eliminated entirely, without significantly diminishing the program's effectiveness. Since municipal officials were concerned more with the economics of the disease rather than with its biology, they had to be made to realize that management programs could be structured to adhere to the confinements of their community's strained budget.

DISEASE STATISTICS



DISEASE STATISTICS

FERGUS FALLS

1977

Total number of elm trees--14,315

Elms lost--40 trees

1978

Projected elm loss--initially, 90 trees - revised, 100 treesActual elm loss--117 treesProjected elm loss--215 treesActual elm loss--100 trees

1979

Trees removed due to Dutch elm disease---49

Weakened/dead elms removed-----49

Elms removed due to other causes----- 2

Projected elm loss--150 trees

1980

Actual elm loss--217 trees

Trees removed due to Dutch elm disease----- 64

Elms removed due to other causes (storm damage)---153

Projected elm loss--115 treesActual elm loss--117 trees

1981

Trees removed due to Dutch elm disease--94

public property--56 trees removed; all American elm

54 beetle infections

2 root graft infections

private property--38 trees removed; 37 American elm, 1 Siberian elm

37 beetle infections

1 root graft infection

1981

continued

Elms removed due to other causes--23 trees

public property--13 trees removed; 9 American elm, 4 Siberian elm

private property--10 trees removed; 8 American elm, 2 Siberian elm

1981

continued

Total cost of tree removal work--\$8,272.00

Average cost per tree--\$78.78

1981
continued

•All trees were removed within the twenty (20) day time limit required by the Minnesota Department of Agriculture's Shade Tree Program. The remaining stumps were ground-out or debarked.

•All trees removed due to Dutch elm disease were laboratory tested. A total of 100 samples were cultured; 96 were positive (this includes those trees that were therapeutically pruned, too).

•The native elm bark beetle is the insect vector present in Fergus Falls.

1981
continued

•Other disease management practices implemented--
 Root graft barriers installed--95 feet (vapam)
 Trees therapeutically pruned--3 (one elm remained healthy)
 Pruning of dead wood--1,481 elm trees
 Woodpiles detected--470 (hazardous wood was removed or debarked)

1982

Projected elm loss--125 trees

•1978 Federal grant-----\$18,870.75
 Supplemental federal grant----- 8,500.00
 \$27,370.75 in total

1978 Municipal budget for Dutch elm disease
 City's contribution-----\$18,340.00
 Minnesota Shade Tree Program's contribution----- 14,410.00
 \$32,750.00 in total

•1979 Federal grant-----\$55,260.40

1979 Municipal budget for Dutch elm disease
 City's contribution-----\$20,990.28
 Minnesota Shade Tree Program's contribution----- 19,318.38
 \$40,308.66 in total

•1980 Federal grant-----\$33,907.50

1980 Municipal budget for Dutch elm disease
 City's contribution-----\$26,592.50
 Minnesota Shade Tree Program's contribution----- 21,400.00
 \$47,992.50 in total

•1981 Federal grant-----\$12,500.00

1981 Municipal shade tree program budget-----\$48,795.00

DISEASE STATISTICS

GRANITE FALLS

1977 Total number of elm trees--17,040
Elms lost--77 trees

1978 Projected elm loss--initially, 300 trees - revised, 500-600 trees
Actual elm loss--532 trees

1979 Projected elm loss--525 trees
Actual elm loss--408 trees
Trees removed due to Dutch elm disease--206
Weakened/dead elms removed-----193
Elms removed due to other causes----- 9

1980 Projected elm loss--375 trees
Actual elm loss--479 trees
Trees removed due to Dutch elm disease--246
Weakened/dead elms removed-----193
Elms removed due to other causes----- 40

1981 Projected elm loss--450 trees
Actual elm loss--369 trees
public property - 123 trees removed
private property - 246 trees removed

1981 continued
Trees removed due to Dutch elm disease--328
233 beetle infections
95 root graft infections

1981 continued
Weakened/dead elms removed--13 trees
Elms removed due to other causes--28 trees

1981 continued
American elms removed---313 trees
Siberian elms removed--- 30 trees
Red elms removed----- 23 trees
Rock elms removed----- 3 trees

Total cost of tree removal work--\$24,635.60

Average cost per tree--\$69.20

1981
continued

•All trees were removed within the twenty (20) day time limit required by the Minnesota Department of Agriculture's Shade Tree Program. The remaining stumps were ground-out or debarked.

•Both the native elm bark beetle and the smaller European elm bark beetle are present in Granite Falls.

1981
continued

•Other disease management practices implemented--

Root graft barriers installed--237 feet (vapam)

Trees therapeutically pruned--3 (two elms remained healthy)

Woodpiles detected--29 (hazardous wood was removed or debarked)

1982

Projected elm loss--425 trees

•1978 Federal grant-----\$30,680.00

Supplemental federal grant----- 12,500.00

\$43,180.00 in total

1978 Municipal budget for Dutch elm disease

City's contribution-----\$15,573.60

Minnesota Shade Tree Program's contribution----- 12,236.40

\$27,810.00 in total

•1979 Federal grant-----\$74,747.00

1979 Municipal budget for Dutch elm disease

City's contribution-----\$13,989.60

Minnesota Shade Tree Program's contribution----- 16,010.40

\$30,000.00 in total

•1980 Federal grant-----\$44,990.00

1980 Municipal budget for Dutch elm disease

City's contribution-----\$33,900.00

Minnesota Shade Tree Program's contribution----- 15,000.00

\$48,900.00 in total

•1981 Federal grant-----\$12,500.00

1981 Municipal shade tree program budget-----\$36,824.00

DISEASE STATISTICS

HUTCHINSON

1977 Total number of elm trees--9,008
Elms lost--141 trees

1978 Projected elm loss--initially, 600 trees - revised, 850-900 trees
Actual elm loss--875 trees

Projected elm loss--1,750 trees
Actual elm loss--600 trees

1979 Trees removed due to Dutch elm disease---436
Weakened/dead elms removed-----156
Elms removed due to other causes----- 8

Projected elm loss--600 trees
Actual elm loss--509 trees

1980 Trees removed due to Dutch elm disease---469
Weakened/dead elms removed----- 12
Elms removed due to other causes----- 28

Projected elm loss--400 trees
Actual elm loss--624 trees

1981 public property - 216 trees removed
private property - 408 trees removed

Trees removed due to Dutch elm disease--599
435 beetle infections
164 root graft infections

1981 continued Weakened/dead elms removed--14 trees
Elms removed due to other causes--11 trees

American elms removed---509 trees
Siberian elms removed--- 9 trees
Red elms removed-----105 trees
Rock elms removed----- 1 tree

1981 continued

Total cost of tree removal work--\$49,541.00

Average cost per tree--\$79.39

1981
continued

•By city ordinance, all diseased trees were removed within fourteen (14) days and even problem trees did not stand longer than the twenty (20) day removal time limit required by the Minnesota Department of Agriculture's Shade Tree Program. The remaining stumps were ground-out or debarked.

•Both the native elm bark beetle and the smaller European elm bark beetle are present in Hutchinson.

•Other disease management practices implemented--

Root graft barriers installed--1,026 feet

mechanical barriers (vibratory plow) - 946 feet

chemical barriers (vapam) - 80 feet

Systemic fungicide injections (Arbotect)--11 trees

note: Private homeowners injected these trees having bought their own chemical and having rented city equipment--the city also provided men to assist the homeowners in properly injecting their trees.

Trees therapeutically pruned--19 (18 elms remained healthy)

Woodpiles detected--41 (hazardous wood was removed or debarked)

1981
continued

1982

•Projected elm loss--475 trees

•1978 Federal grant-----\$11,388.00

Supplemental federal grant----- 10,000.00

\$21,388.00 in total

1978 Municipal budget for Dutch elm disease

City's contribution-----\$41,126.96

Minnesota Shade Tree program's contribution----- 32,314.04

\$73,441.00 in total

•1979 Federal grant-----\$174,159.00

1979 Municipal budget for Dutch elm disease

City's contribution-----\$26,129.76

Minnesota Shade Tree Program's contribution----- 26,129.76

\$52,259.52 in total

•1980 Federal grant-----\$63,946.00

1980 Municipal budget for Dutch elm disease

City's contribution-----\$19,000.00

Minnesota Shade Tree Program's contribution-----28,000.00

\$47,000.00 in total

•1981 Federal grant-----\$12,500.00

1981 Municipal shade tree program budget-----\$60,000.00

DISEASE STATISTICS

LITCHFIELD

1977 Total number of elm trees--7,141
Elms lost--91 trees

1978 Projected elm loss--250 trees
Actual elm loss--267 trees

Projected elm loss--385 trees
Actual elm loss--232 trees
1979 Trees removed due to Dutch elm disease---173
Weakened/dead elms removed----- 56
Elms removed due to other causes----- 3

Projected elm loss--230 trees
Actual elm loss--230 trees
1980 Trees removed due to Dutch elm disease---217
Weakened/dead elms removed----- 12
Elms removed due to other causes----- 1

Projected elm loss--initially, 230 trees - revised, 250 trees
Actual elm loss--323 trees
1981 public property - 146 trees removed
private property - 177 trees removed

1981 continued Trees removed due to Dutch elm disease--311
310 beetle infections
1 root graft infection
Weakened/dead elms removed--10 trees
Elms removed due to other causes--2 trees

1981 continued American elms removed---312 trees
Siberian elms removed--- 8 trees
Red elms removed----- 3 trees
Rock elms removed----- 0 trees

Total cost of tree removal work--\$36,279.36

Average cost per tree--\$112.32

1981
continued

•All trees were removed within the twenty (20) day time limit required by the Minnesota Department of Agriculture's Shade Tree Program. The remaining stumps were ground-out or debarked.

•Both the native elm bark beetle and the smaller European elm bark beetle are present in Litchfield.

•Other disease management practices implemented--

Root graft barriers installed--361 feet (mechanical trencher)

Trees therapeutically pruned--27 (23 elms remained healthy)

Pruning of dead wood--546 trees

Woodpiles detected--41 (hazardous wood was removed or debarked)

Girdling--318 diseased trees were treated in this manner as soon as they were detected

1981
continued

1982

Projected elm loss--250 trees

•1978 Federal grant-----\$28,756.60

1978 Municipal budget for Dutch elm disease

City's contribution-----\$ 6,944.00

Minnesota Shade Tree Program's contribution----- 5,456.00

\$12,400.00 in total

•1979 Federal grant-----\$64,188.00

1979 Municipal budget for Dutch elm disease

City's contribution-----\$13,891.13

Minnesota Shade Tree Program's contribution----- 10,834.63

\$24,725.76 in total

•1980 Federal grant-----\$45,150.00

1980 Municipal budget for Dutch elm disease

City's contribution-----\$17,738.00

Minnesota Shade Tree Program's contribution----- 17,737.00

\$35,475.00 in total

•1981 Federal grant-----\$12,500.00

1981 Municipal shade tree program budget-----\$41,525.00

DISEASE STATISTICS

LITTLE FALLS

1977 Total number of elm trees--12,515
Elms lost--350 trees

1978 Projected elm loss--initially, 500 trees - revised, 640-690 trees
Actual elm loss--677 trees

1979 Projected elm loss--715 trees
Actual elm loss--516 trees
Trees removed due to Dutch elm disease---340
Weakened/dead elms removed-----175
Elms removed due to other causes----- 1

1980 Projected elm loss--500 trees
Actual elm loss--365 trees
Trees removed due to Dutch elm disease---279
Weakened/dead elms removed----- 84
Elms removed due to other causes----- 2

1981 Projected elm loss--350 trees
Actual elm loss--487 trees
public property - 89 trees removed
private property - 398 trees removed
Trees removed due to Dutch elm disease--407
294 beetle infections
113 root graft infections

1981 continued
Weakened/dead elms removed--71 trees
Elms removed due to other causes--9 trees

1981 continued
American elms removed---464 trees
Siberian elms removed--- 22 trees
Red elms removed----- 1 tree
Rock elms removed----- 0 trees

Total cost of tree removal work--\$28,896.15

Average cost per tree--\$59.33

1981
continued

•All trees were removed within the twenty (20) day time limit required by the Minnesota Department of Agriculture's Shade Tree Program. The remaining stumps were ground-out or debarked.

•The native elm bark beetle is the insect vector most prevalent in Little Falls. The smaller European elm bark beetle has not been found in significant numbers.

•Other disease management practices implemented--

Root graft barriers installed--26 locations

mechanical barriers (trencher) - 4 locations

chemical barriers (vapam) - 9 locations

mechanical and chemical barriers used in combination - 13 locations

Trees therapeutically pruned--12 (eight elms remained healthy)

Pruning of dead wood--98 trees

Woodpiles detected--61 (hazardous wood was removed or debarked)

1981
continued

1982

Projected elm loss--480 trees

•1978 Federal grant-----\$60,817.00

Supplemental federal grant----- 2,500.00

\$63,317.00 in total

1978 Municipal budget for Dutch elm disease

City's contribution-----\$ 1,176.00

Minnesota Shade Tree Program's contribution----- 924.00

\$ 2,100.00 in total

•1979 Federal grant-----\$91,498.85

1979 Municipal budget for Dutch elm disease

City's contribution-----\$ 6,879.28

Minnesota Shade Tree Program's contribution----- 6,879.28

\$13,758.56 in total

•1980 Federal grant-----\$53,647.50

1980 Municipal budget for Dutch elm disease

City's contribution-----\$ 9,786.00

Minnesota Shade Tree Program's contribution----- 9,785.00

\$19,571.00 in total

•1981 Federal grant-----\$12,500.00

1981 Municipal shade tree program budget-----\$42,156.86

DISEASE STATISTICS

WADENA

1977 Total number of elm trees--4,230
Elms lost--4 trees

1978 Projected elm loss--100 trees
Actual elm loss--81 trees

1979 Projected elm loss--140 trees
Actual elm loss--64 trees
Trees removed due to Dutch elm disease---38
Weakened/dead elms removed-----26

1980 Projected elm loss--75 trees
Actual elm loss--88 trees
Trees removed due to Dutch elm disease-----65
Weakened/dead elms removed----- 8
Elms removed due to other causes (storm damage)---15

1981 Projected elm loss--initially, 75 trees - revised, 120 trees
Actual elm loss--94 trees
public property - 65 trees removed
private property - 29 trees removed

1981 continued
Trees removed due to Dutch elm disease--92
79 beetle infections
13 root graft infections

Elms removed due to other causes--2 trees

1981 continued
American elms removed---92 trees
Siberian elms removed--- 2 trees
Red elms removed----- 0 trees
Rock elms removed----- 0 trees

Total cost of tree removal work--\$13,814.94

Average cost per tree--\$146.97

1981
continued

•All trees were removed within the twenty (20) day time limit required by the Minnesota Department of Agriculture's Shade Tree Program. The remaining stumps were ground-out or debarked.

1981
continued

•The native elm bark beetle is the insect vector present in Wadena.

•No other disease management practices were implemented this year.

1982

Projected elm loss--150 trees

•1978 Federal grant-----\$11,592.00

1978 Municipal budget for Dutch elm disease

City's contribution-----\$11,200.00

Minnesota Shade Tree Program's contribution----- 8,800.00

\$20,000.00 in total

•1979 Federal grant-----\$27,466.75

1979 Municipal budget for Dutch elm disease

City's contribution-----\$2,436.84

Minnesota shade Tree Program's contribution----- 2,436.84

\$4,873.68 in total

•1980 Federal grant-----\$26,150.00

1980 Municipal budget for Dutch elm disease

City's contribution-----\$4,524.00

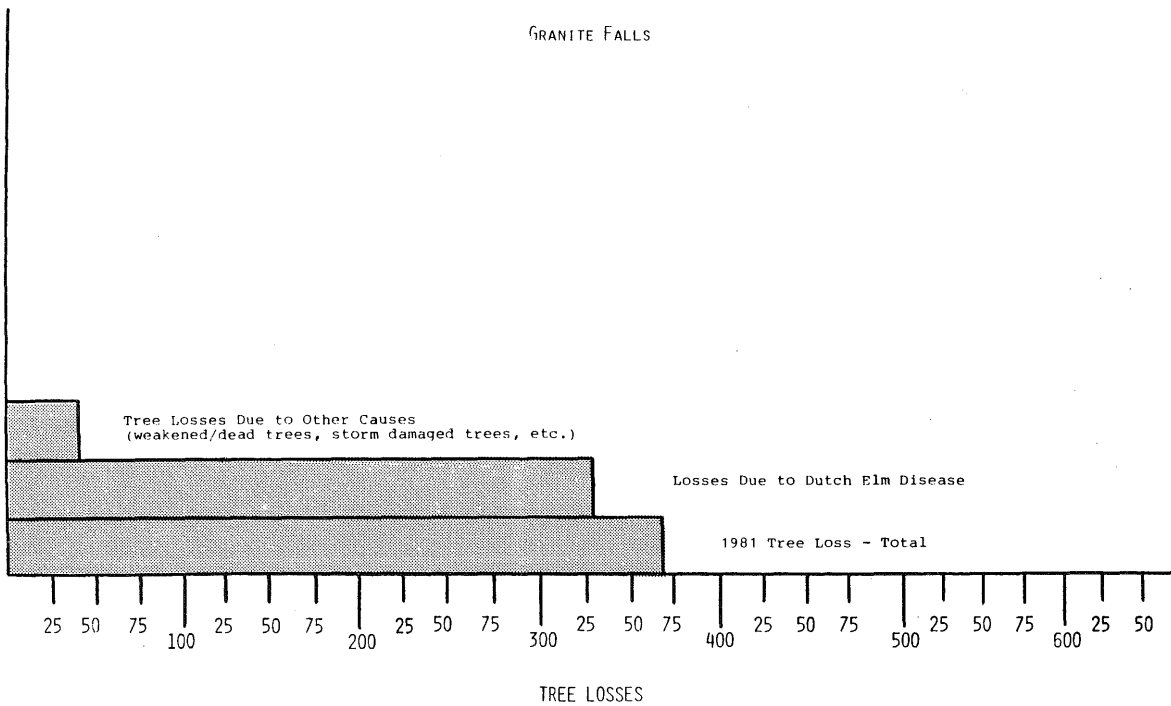
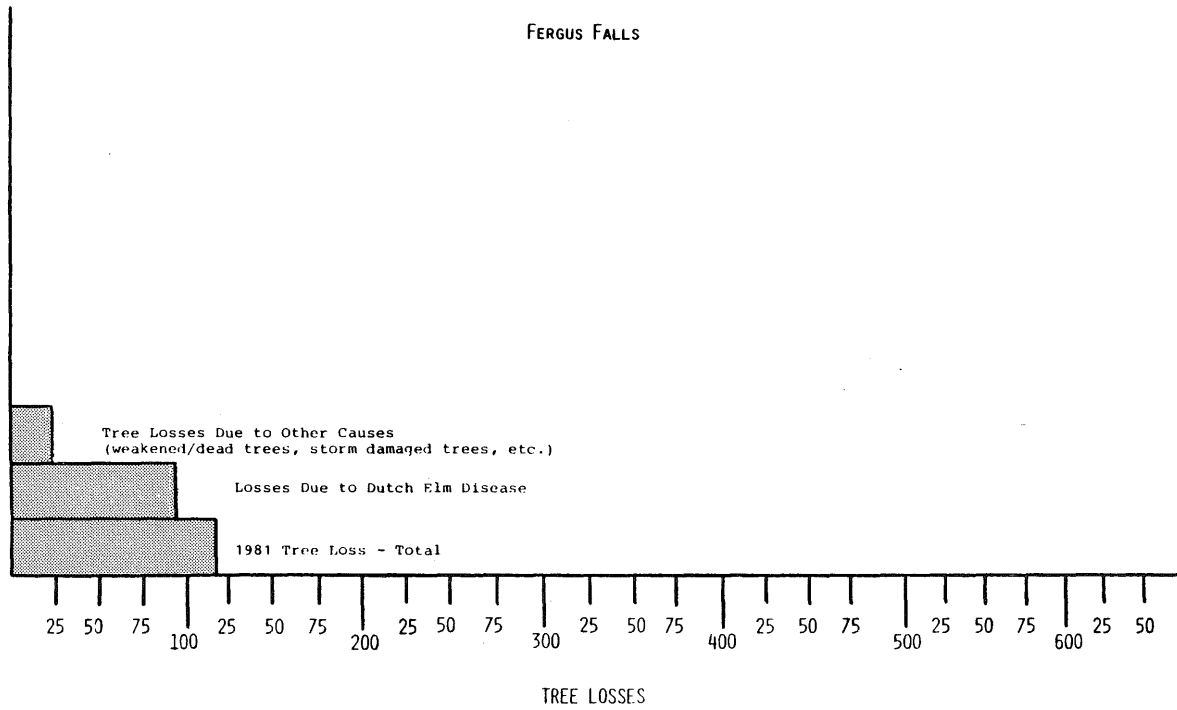
Minnesota Shade Tree Program's contribution----- 4,784.00

\$9,308.00 in total

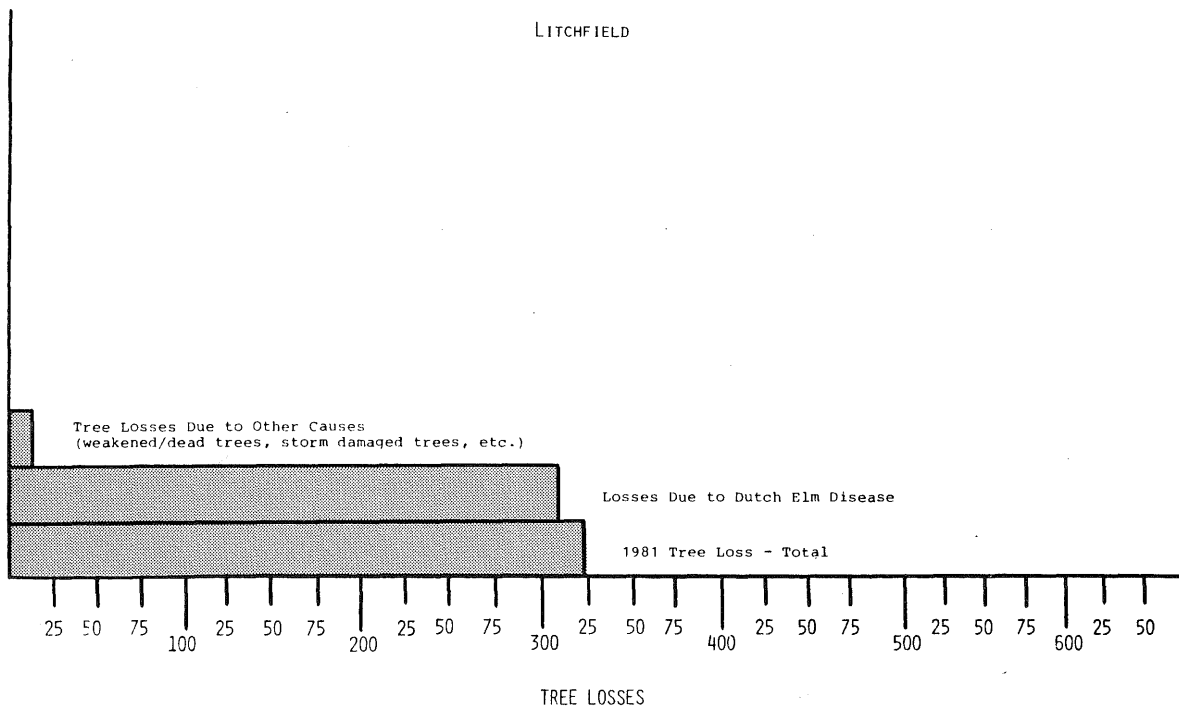
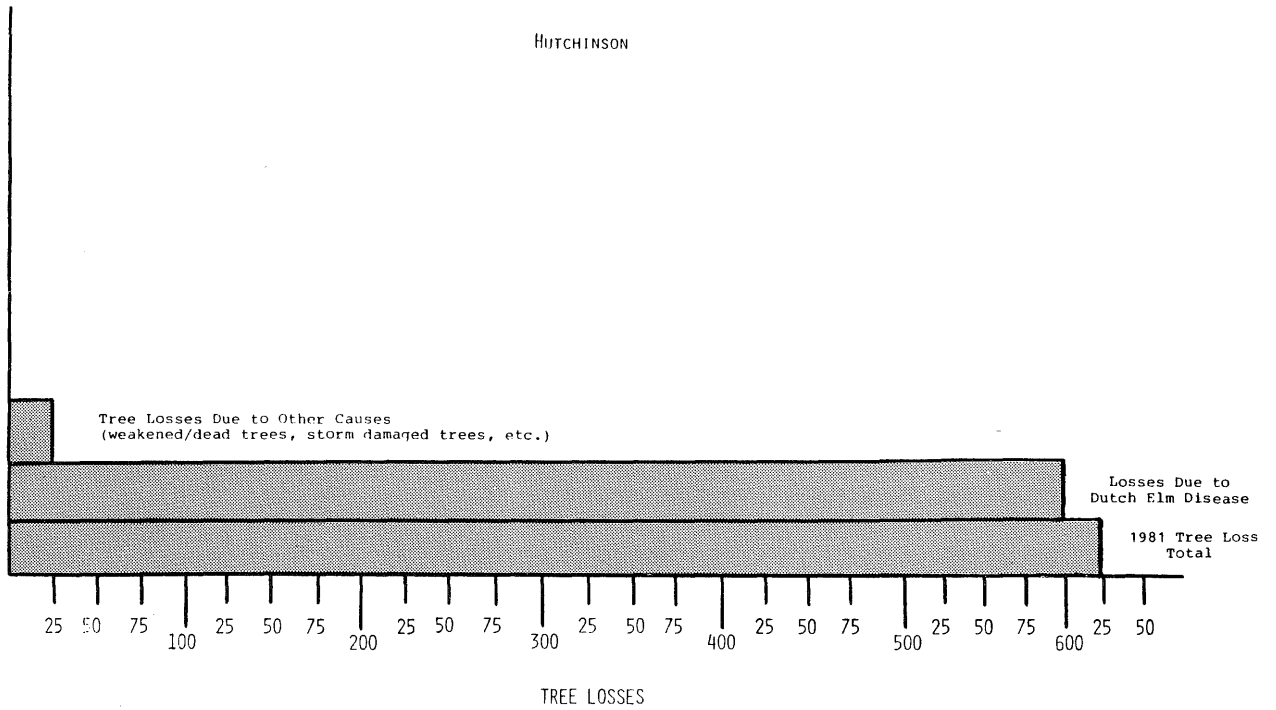
•1981 Federal grant-----\$12,500.00

1981 Municipal shade tree program budget-----\$4,000.00

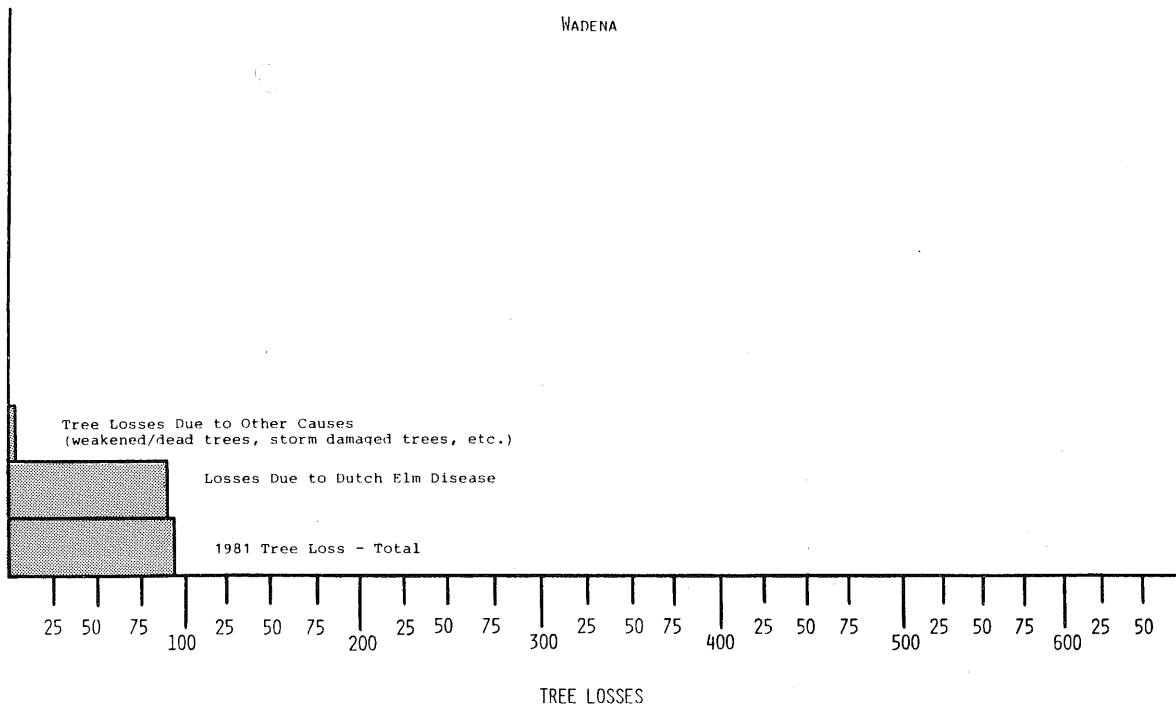
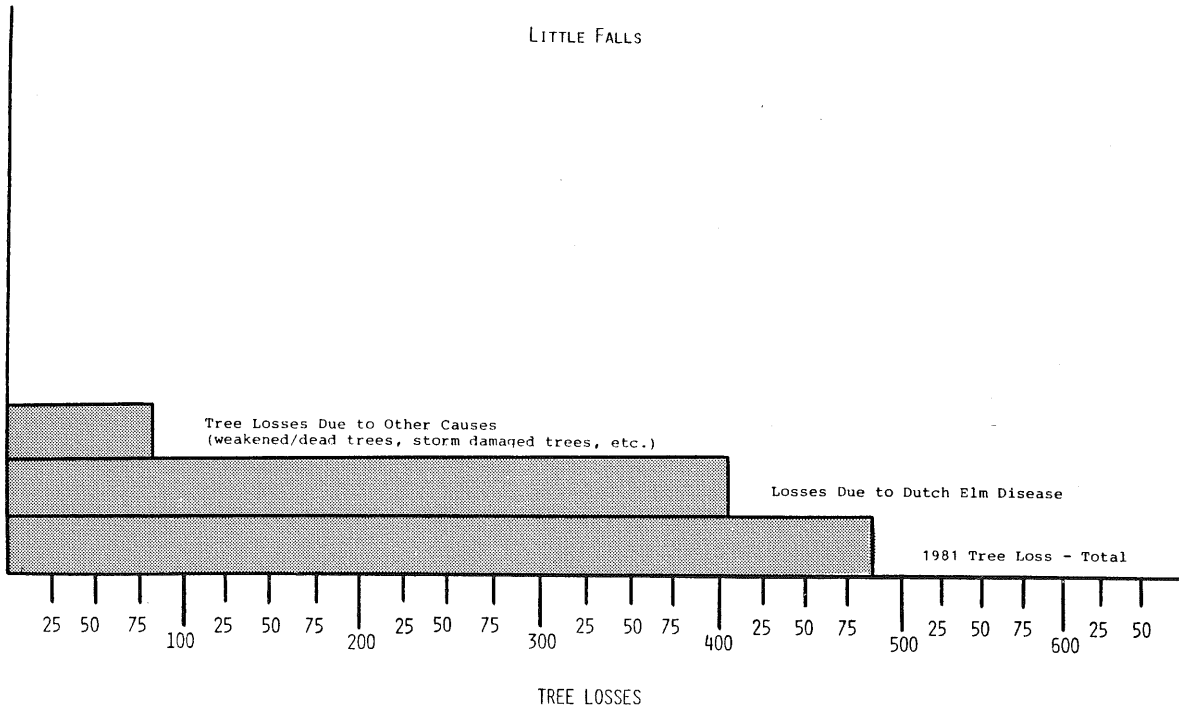
1981 MUNICIPAL TREE LOSSES



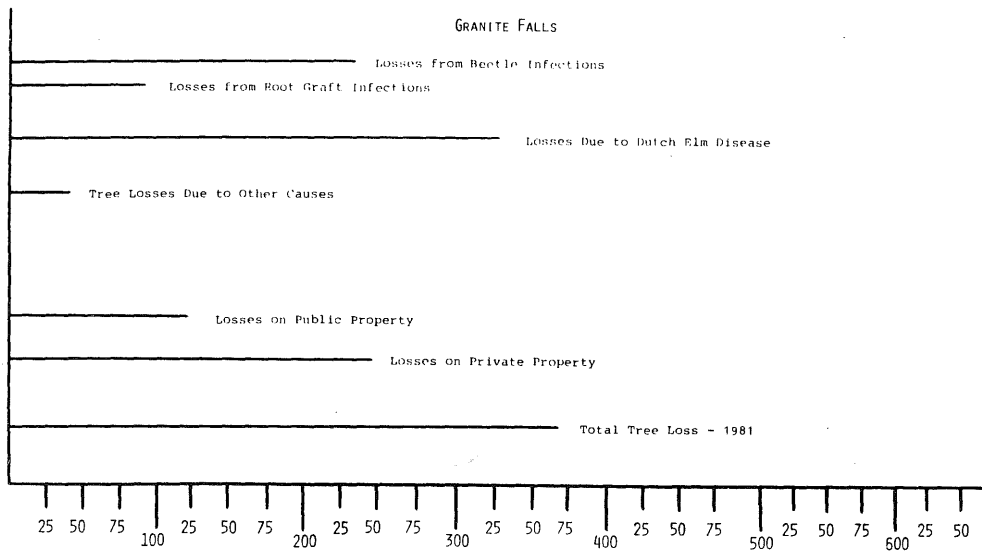
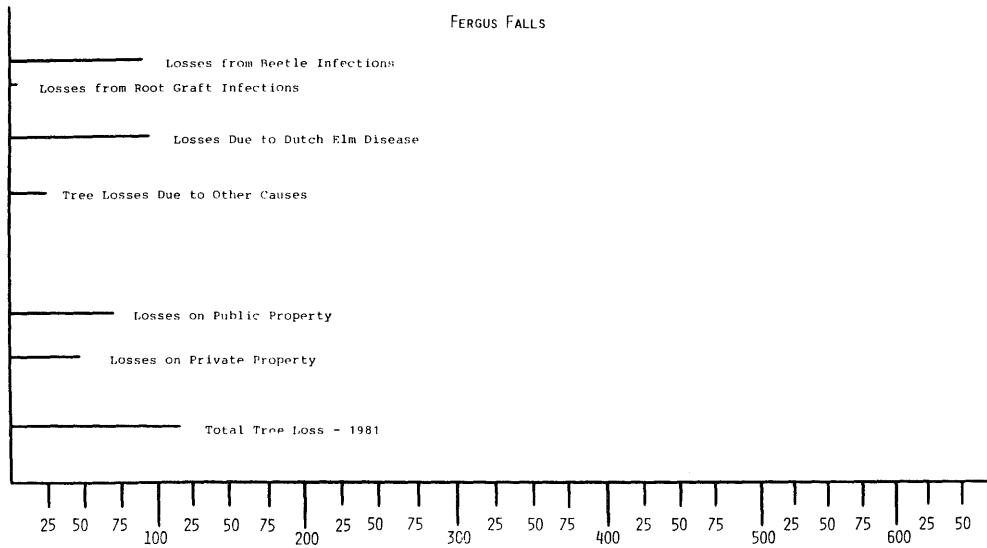
1981 MUNICIPAL TREE LOSSES



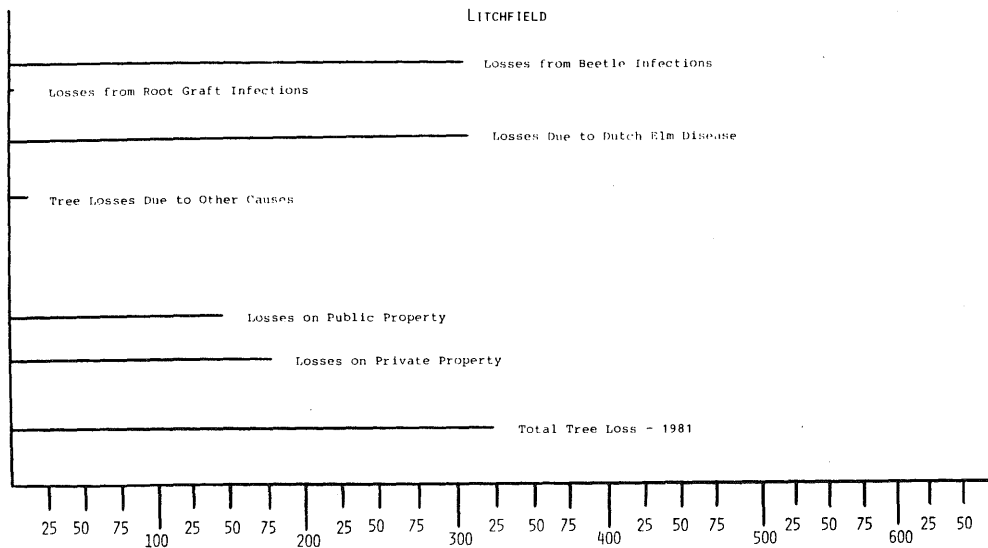
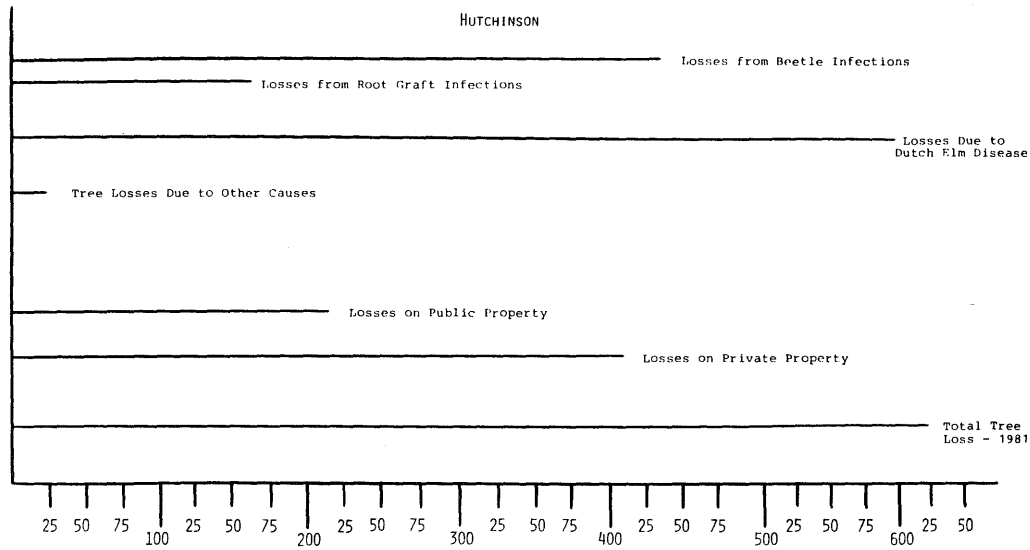
1981 MUNICIPAL TREE LOSSES



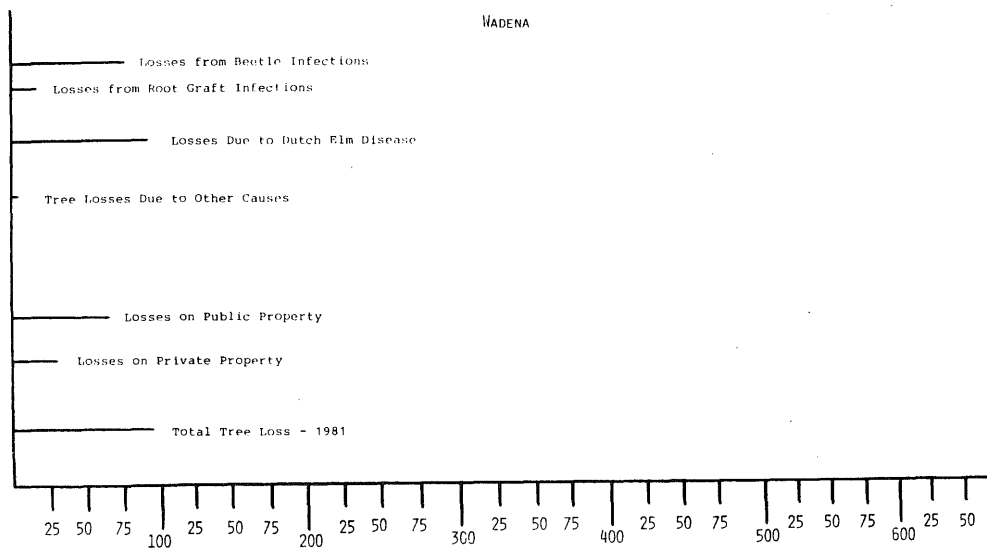
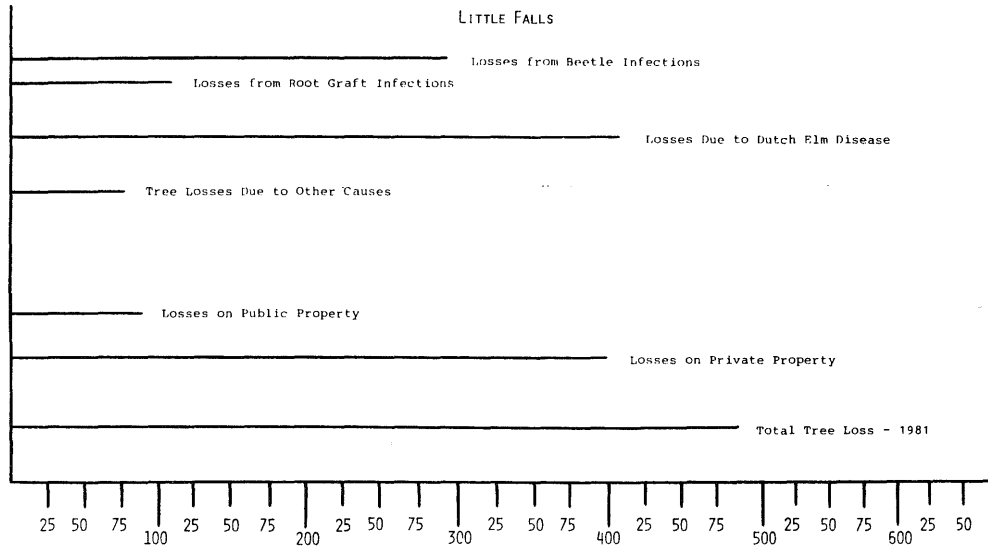
SUMMARY OF TREE LOSSES



SUMMARY OF TREE LOSSES



SUMMARY OF TREE LOSSES



FERGUS FALLS

<u>Year</u>	<u>Elm Population</u>	<u>Dutch Elm Disease Losses *</u>	<u>Disease Incidence</u>
1977	14,315	40	0.28%
1978	14,275	117	0.82%
1979	14,158	98	0.69%
1980	14,060	64	0.46%
1981	13,996	<u>94</u>	0.67%
413 TOTAL TREES			

- There has been a 2.89% tree loss due to Dutch elm disease from 1977-1981.
- Results from the program's tree inventory show that Fergus Falls had an elm population in 1977 of 14,315 trees rather than the 16,500 trees referred to in past Accomplishment Reports.

GRANITE FALLS

<u>Year</u>	<u>Elm Population</u>	<u>Dutch Elm Disease Losses *</u>	<u>Disease Incidence</u>
1977	17,040	77	0.45%
1978	16,963	532	3.14%
1979	16,431	399	2.43%
1980	16,032	439	2.74%
1981	15,593	<u>341</u>	2.19%
1,788 TOTAL TREES			

- There has been a 10.49% tree loss due to Dutch elm disease from 1977-1981.
- Results from the program's tree inventory show that Granite Falls had an elm population in 1977 of 17,040 trees rather than the 6,920 trees referred to in past Accomplishment Reports.

*Elms that were actually infected and elms that were removed because they were dead or in a weakened condition are counted here as Dutch elm disease losses.

HUTCHINSON

<u>Year</u>	<u>Elm Population</u>	<u>Dutch Elm Disease Losses *</u>	<u>Disease Incidence</u>
1977	9,008	141	1.57%
1978	8,867	875	9.87%
1979	7,992	592	7.41%
1980	7,400	481	6.50%
1981	6,919	<u>613</u>	8.86%

2,702 TOTAL TREES

- There has been a 30.00% tree loss due to Dutch elm disease from 1977-1981.
- Results from the program's tree inventory show that Hutchinson had an elm population in 1977 of 9,008 trees rather than the 16,000 trees referred to in past Accomplishment Reports.

LITCHFIELD

<u>Year</u>	<u>Elm Population</u>	<u>Dutch Elm Disease Losses *</u>	<u>Disease Incidence</u>
1977	7,141	91	1.27%
1978	7,050	267	3.79%
1979	6,783	229	3.38%
1980	6,554	229	3.49%
1981	6,325	<u>321</u>	5.08%

1,137 TOTAL TREES

- There has been a 15.92% tree loss due to Dutch elm disease from 1977-1981.
- Results from the program's tree inventory show that Litchfield had an elm population in 1977 of 7,141 trees rather than the 7,798 trees referred to in past Accomplishment Reports.

*Elms that were actually infected and elms that were removed because they were dead or in a weakened condition are counted here as Dutch elm disease losses.

LITTLE FALLS

<u>Year</u>	<u>Elm Population</u>	<u>Dutch Elm Disease Losses *</u>	<u>Disease Incidence</u>
1977	12,515	350	2.80%
1978	12,165	677	5.57%
1979	11,488	515	4.48%
1980	10,973	363	3.31%
1981	10,610	<u>478</u>	4.51%
2,383 TOTAL TREES			

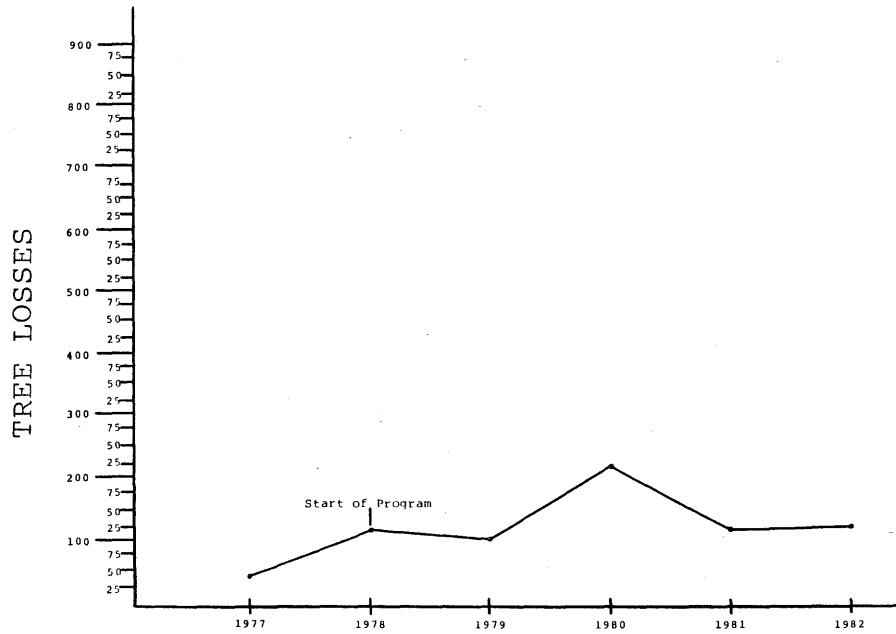
- There has been a 19.04% tree loss due to Dutch elm disease from 1977-1981.
- Results from the program's tree inventory show that Little Falls had an elm population in 1977 of 12,515 trees rather than the 7,174 trees referred to in past Accomplishment Reports.

WADENA

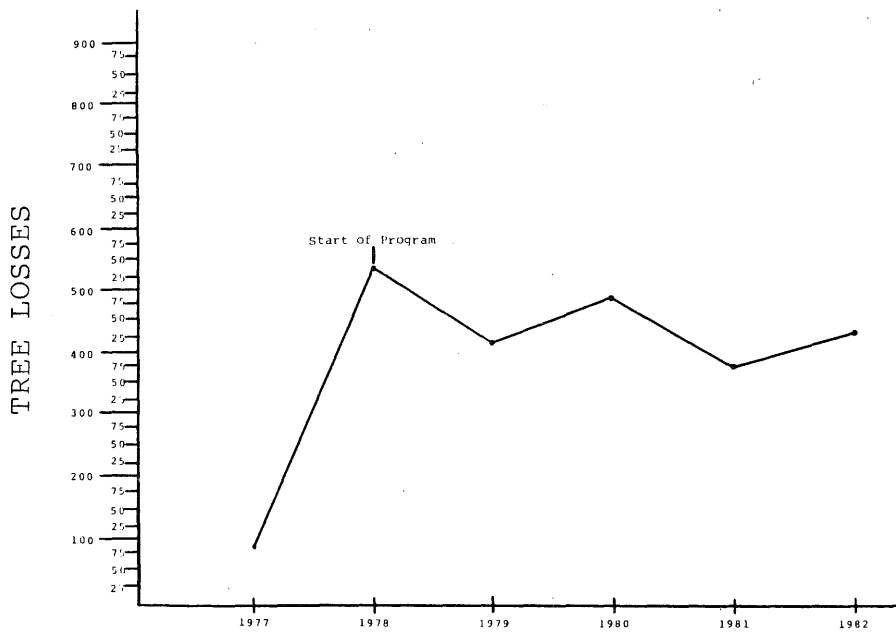
<u>Year</u>	<u>Elm Population</u>	<u>Dutch Elm Disease Losses *</u>	<u>Disease Incidence</u>
1977	4,230	4	0.09%
1978	4,226	81	1.92%
1979	4,145	64	1.54%
1980	4,081	73	1.79%
1981	4,008	<u>92</u>	2.30%
314 TOTAL TREES			

- There has been a 7.42% tree loss due to Dutch elm disease from 1977-1981.
- Results from the program's tree inventory show that Wadena had an elm population in 1977 of 4,230 trees rather than the 4,800 trees referred to in past Accomplishment Reports.

*Elms that were actually infected and elms that were removed because they were dead or in a weakened condition are counted here as Dutch elm disease losses.

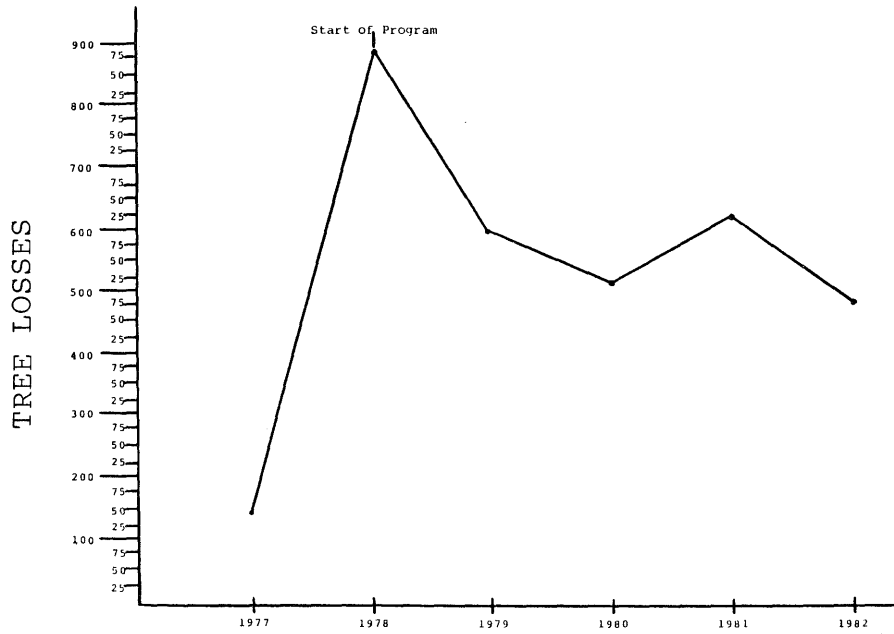


Fergus Falls - Elm Tree Loss Trend

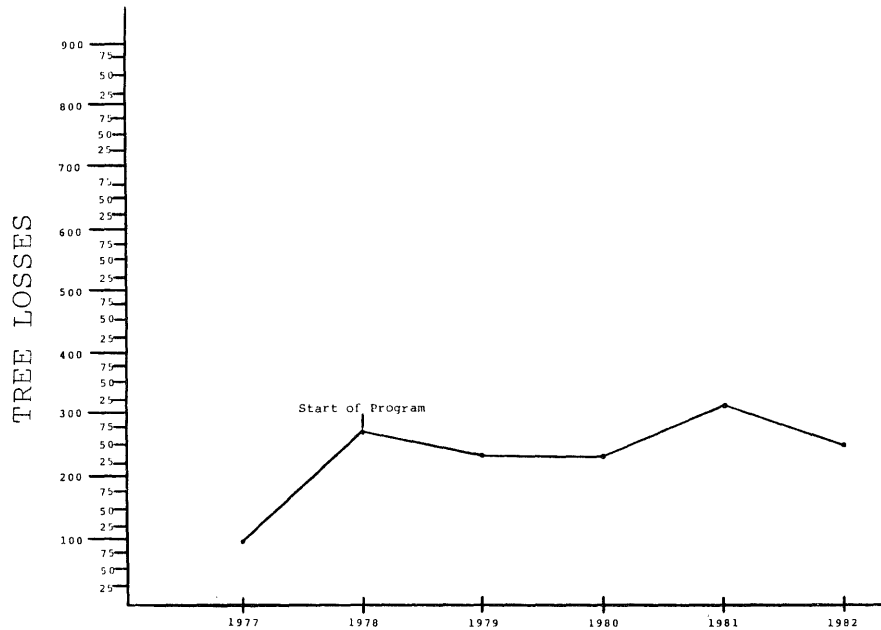


Granite Falls - Elm Tree Loss Trend

All 1982 figures are projected tree losses

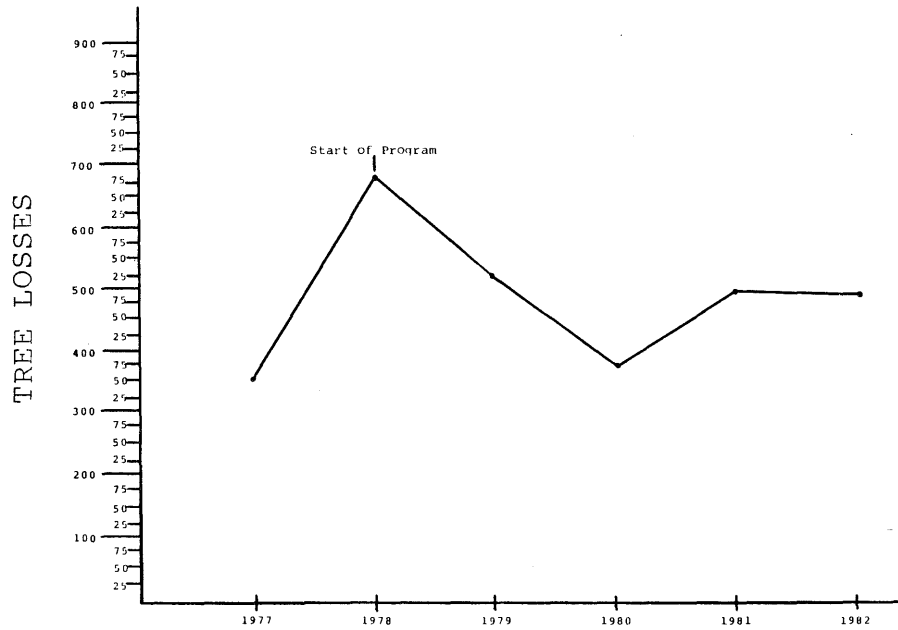


Hutchinson - Elm Tree Loss Trend

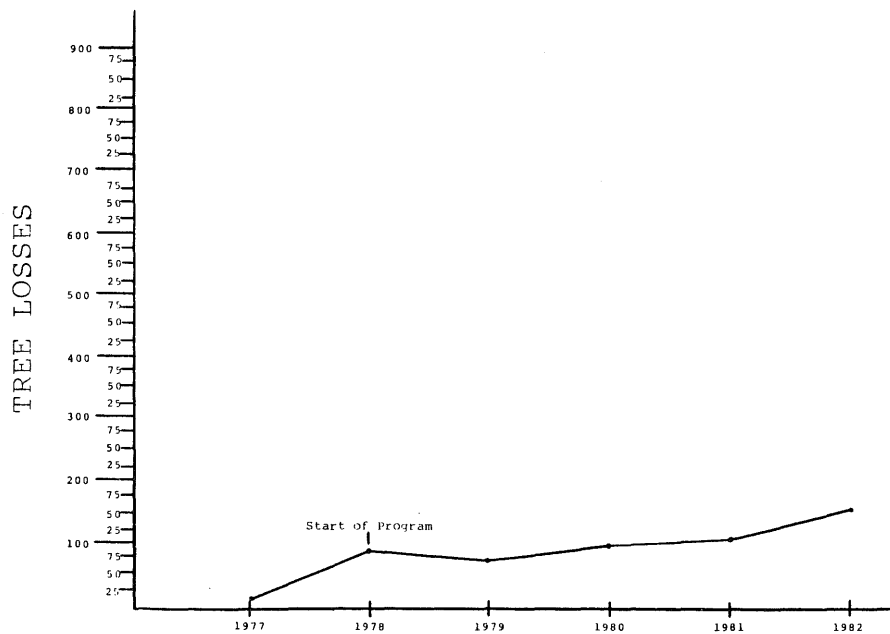


Litchfield - Elm Tree Loss Trend

All 1982 figures are projected tree losses



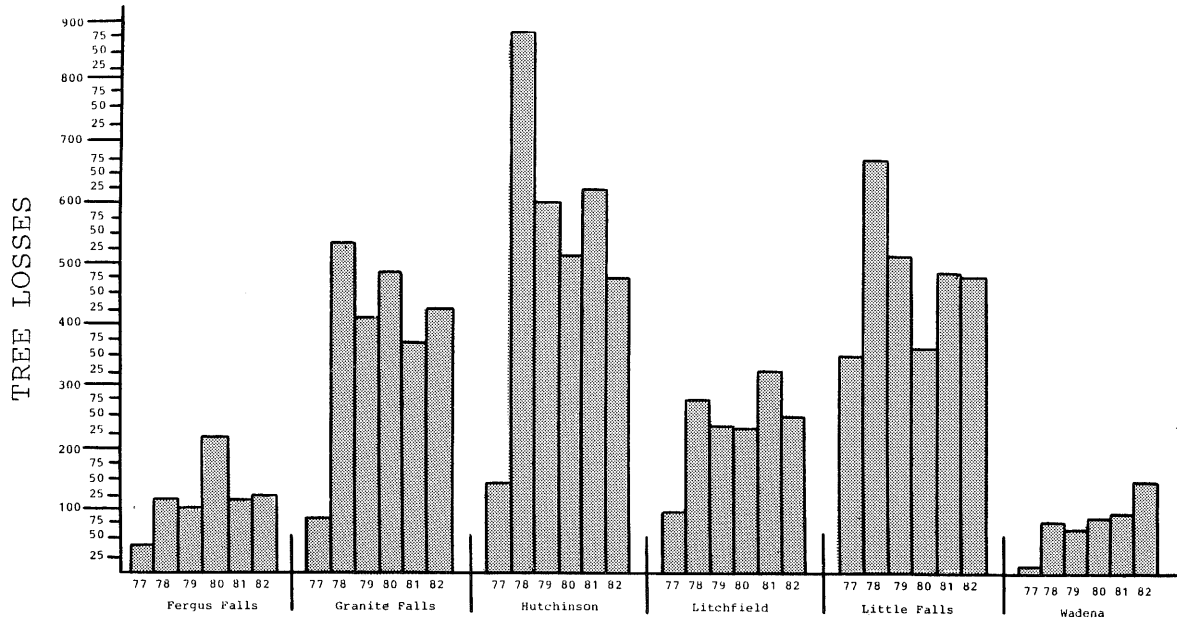
Little Falls - Elm Tree Loss Trend



Wadena - Elm Tree Loss Trend

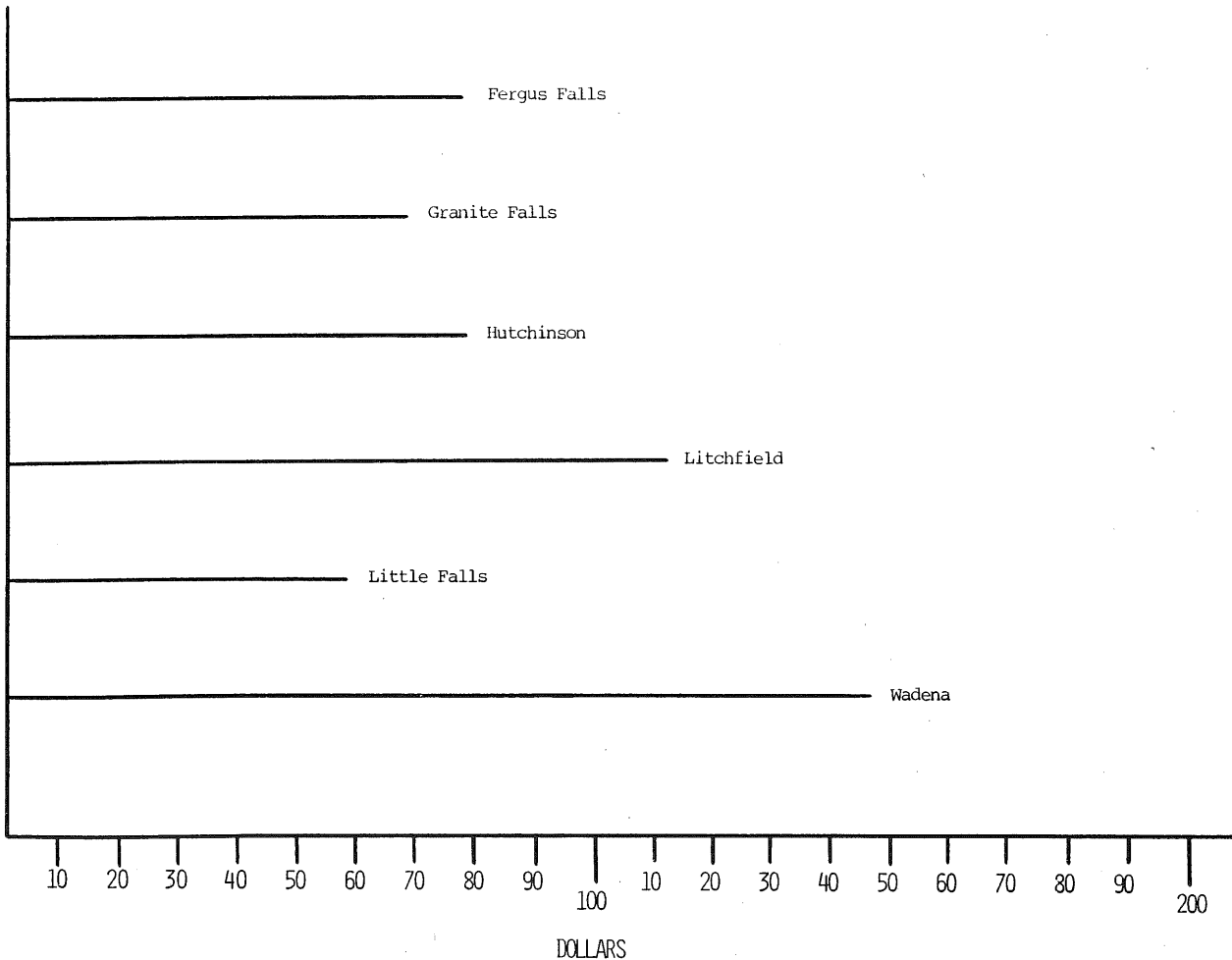
All 1982 figures are projected tree losses

TREE LOSSES IN THE DEMONSTRATION CITIES



All 1982 figures are projected tree losses

AVERAGE TREE REMOVAL COST - 1981



PROGRAM EVALUATION



PROGRAM EVALUATION

In 1978, Minnesota was one of five states selected to participate in a Dutch elm disease special project administered by the United States Forest Service. Minnesota was well-acquainted with the impetus of this disease and like so many other states, was watching its cities painfully stumble while attempting to slow the onslaught. Because methods used to manage the disease in other states were duplicated without much success in Minnesota and because the vast majority of people were still so unfamiliar with its killing potential, the State proposed to address these problems through the federally sponsored program. The United States Forest Service accepted Minnesota's proposal to establish a program administered by the Department of Natural Resources which would demonstrate in six selected cities the following objectives:

1. elevate basic tree removal programs to high level sanitation programs by implementing known disease management practices-- inspection, tree removal, root graft barrier placement, systemic fungicide injection, therapeutic pruning, etc.;
 2. spread losses due to Dutch elm disease over a number of years, thus enabling each city to develop a workable plan on how to absorb the financial burden of removing all diseased trees and establishing a new urban forest;
 3. examine the value of municipal disease management programs in terms of the expenses incurred when implementing such a program as well as in the terms of the aesthetic considerations which become necessary when having to remove and eventually replace a large portion of the tree population;
- and,
4. educate the people through public information and outreach programs on the how's and why's of Dutch elm disease so that

when financial and technical help would no longer be available through state and federal programs, municipalities would continue to implement disease management programs on their own.

If these objectives were met, time and money, two precious commodities, would be saved. Municipalities would finally have available the documented facts on how to handle their Dutch elm disease problem and would not end-up duplicating what other communities did with little or no success.

To best accomplish the aforementioned objectives, thus documenting information most usable to Minnesota communities, two types of demonstration areas, each replicated three times, were developed. The first demonstration area was to

- 1) cover one to two square miles
- 2) have a population of 5-15,000 people
- 3) have 6-10,000 elm trees which comprised at least 60-70% of the total tree population
- 4) have a Dutch elm disease incidence of 1-3%, and
- 5) be well isolated from wild elm populations.

The second demonstration area was to

- 1) cover one to two square miles
- 2) have a population of 5-15,000 people
- 3) have 5-15,000 elm trees which comprised at least 60-70% of the total tree population
- 4) have a Dutch elm disease incidence of 1-5%, and
- 5) have a wild elm population in, or adjacent to, the management area.

Fergus Falls, Granite Falls, Hutchinson, Litchfield, Little Falls, and Wadena were selected to participate in this demonstration program because they closely met the criteria.

The management practices implemented in the participating cities would form the basis of Minnesota's demonstration program, for once implemented, their effectiveness could be documented and their expense evaluated. Also, as these practices were put into everyday use, the people could be educated as to the why and how. Finally, when these practices became a part of the municipality's urban forestry program, the platform would be developed from which the rest of the objectives could be accomplished. Therefore, it was essential that the following disease management practices (listed on a priority basis) be implemented in each of the selected cities--

- A) Conduct a thorough late winter and early spring inspection for the detection of all downed elm wood, elm firewood piles, felled elm trees, stumps, and brush.
- B) Destroy all detected, non-debarked elm material by April 1.
- C) Conduct on a continuous basis throughout the year, thorough inspections for the detection of all diseased elm trees.
- D) Therapeutically prune diseased branches from those trees identified by project personnel as showing early Dutch elm disease symptoms.*
- E) Immediately remove all diseased elm trees with a greater than 5% wilt infection. Those diseased trees having a wilt infection of less than 5% and not selected by project personnel for therapeutic pruning or systemic fungicide injection should also be immediately removed. A strong effort should be made to remove diseased trees detected before June 1, by June 1, and to remove diseased trees detected before July 15, by July 15. June 1 and July 15 coincide with the main emergence periods of elm bark beetles.

*Therapeutic pruning is not a higher priority than tree removal. It is listed first in this text only because when using this management practice, a decision must be made to therapeutically prune before the tree is marked for removal. In actual importance, this practice belongs with (G) root graft barrier installation.

- F) Remove all felled elm trees to a disposal site approved by the Department of Agriculture (regulatory agency). Once at the site, burn, bury, chip, debark, or in other ways, render the elm wood pest-risk free.
- G) Provide and install root graft barriers in areas where an elm tree with a greater than 5% disease infection is within forty (40) feet of other healthy elm trees.
- H) Remove from healthy elm trees all dead and dying branches during the period extending from late October to late February/March.
- I) Reduce the Dutch elm disease control area when project personnel feel that high level management can no longer be provided within the boundaries originally designated.
- J) Inject, protectively or therapeutically, high value elm trees with systemic fungicides.
- K) Destroy low-vigor, non-diseased elm trees which in the opinion of the tree inspector are a hazard to the overall effectiveness of the project. In conjunction with said destruction, debark or cause to be removed the remaining tree stumps.
- L) Remove those wild elm populations located within and adjacent to the control area which are, or could be, hazardous to the overall disease management program.

Minnesota's six demonstration programs were conceived, developed, and implemented in 1978. For four years (1978-1981), the participating cities were given financial and technical aid by this federally sponsored project. Now in this, the fifth and final year (1982), the demonstration is being terminated and its results evaluated. To determine just how much success was achieved, it is necessary to outline just what program personnel hoped to accomplish. To fulfill the

program's objectives, it was necessary to complete the following:

1. All essential disease management practices had to be worked into each existing tree removal program and implemented on a day to day basis;
2. the effectiveness, and thus the value, of these disease management practices had to be evaluated from year to year;
3. disease management practices had to be prioritized so that in times of budget constraints, those of least benefit to the cities could be recognized and accordingly reduced or eliminated;
4. losses due to Dutch elm disease had to be reduced so that the financial burden of removing large quantities of trees could be spread over a number of years;

and,

5. the people in the demonstration cities had to be educated as to the why's of Dutch elm disease--that the disease can be suppressed not eradicated, that the idea is to spread elm losses over a number of years so that there is time to plant and allow to grow, a new urban forest.

The recommended management practices were implemented by the demonstration cities and over the years, became the integral part of the urban forestry program. By incorporating these practices into the daily routine of each city's disease program, the effectiveness, and thus the value, of each was discovered.

'Inspection, sanitation, and root graft barrier placement comprised the backbone of these good management programs.

'Therapeutic pruning and systemic fungicide injection were those practices which when reduced or entirely eliminated, did not diminish the overall effectiveness of the programs.

'Dead wood pruning was not only of benefit to the trees, but it also increased public awareness, for people noticed how much healthier the trees looked.

It also became evident through the years that when budgets did become strained, there were many places where dollars could be saved.

'Re-defining disease control zones to include only those areas containing a heavy population of elm, ensured that men and equipment were efficiently utilized.

'Clear-cutting those places within the city boundaries where wild elms were abundant proved to be economical, too. Carrying disease management into these areas was found to be costly and impractical since they were often inaccessible to both men and equipment. Eliminating these wild elms at one time by clear-cutting destroyed "pockets" of infection that were a threat to the cultivated urban elms.

'Engaging the services of a private contractor when a large number of trees had to be removed was less costly than assigning city crews the task. In areas suffering from heavy disease loss, competition among tree services is high. Through the bidding process, a municipality can get a good price for all tree removal work which must be done.

Also, over the years, people became quite knowledgeable about the disease. By developing an ordinance dealing with Dutch elm disease, each demonstration city encouraged its residents to recognize that this disease was now "official", that it was no longer a private problem but was also of public concern. Explaining through the media--radio, television, and newspapers--why certain things were being done or implemented, the demonstration cities generated the public's interest rather than its concern.

Success was high, but not everything was accomplished. The following are those areas in which work still needs to be done.

1. Implementing disease management practices correctly. For example, installing root graft barriers is an integral part of the program, but so much is still not known... just how far down must the barrier be placed to be effective?... are primary and secondary barriers enough, or is a tertiary one necessary as well?... should trees be girdled first before a root graft barrier is placed?
2. Finding a good method of utilization. The program's project of mechanically debarking and splitting diseased elm was effective and workable, but it was also costly. The necessary equipment, a debarker and a log splitter, is expensive and reaching peak efficiency with it takes time. This type of project can be effective if several communities share in its operation.
3. Preparing for environmental changes. Although losses were minimized over the four years of the program, it became apparent that even a good program cannot eliminate certain environmental factors, that they can only cushion their impact. For example, due to mild winters for two years, elm bark beetle populations increased. This increase resulted in disease incidence rising again after it had dropped significantly. The worth of a program becomes evident in circumstances like this, for if a good program isn't around to cushion the impact of these environmental developments, Dutch elm disease will probably become entrenched, thus eliminating any chance for bringing it down to a manageable level.

and,

4. Influencing people's attitude. Although the demonstration program had good results with its public outreach and information efforts, when budget cuts became necessary, the disease management programs were the first to go. It even made no difference when city officials were told where reductions could be made to ease the financial strain. The attitude could not be overcome that "people are of course a higher priority than trees".

Through the implementation of this demonstration project, it became evident that certain things were necessary to carry-out an effective program. To summarize, then, these are the steps which must be followed in order to develop not only a good management program, but a workable one as well.

- STEP 1. Have one person in charge of the forestry program. The highest level of success is achieved when the same person is retained from year to year. Dollars can be saved by employing one person on a permanent basis because no time is lost acquainting a new forester to the program each and every year.
- STEP 2. Give budget privileges to the forester. Since Dutch elm disease management is a race against time, having the power to spend the money whenever and wherever necessary enables the program to run smoothly and efficiently. Work never has to be stopped because permission to spend some of the program's allotted dollars has not been received from the city council or the city administrator.
- STEP 3. Develop a good record-keeping system. A good "set of books" kept up-to-date from year to year, enables the forester to know where time and dollars are spent within his/her program. Accurate records provide the stepping stone needed to justify financial requests or to support the forester's decision to concentrate men and equipment on one aspect of disease management.
- STEP 4. Allow the forester to have access to a work crew. This is especially necessary when city crews are responsible for removing trees. Since removal is regulated by a strict timetable--those trees, remember, must be removed as quickly as possible--men and equipment have to be "on call" for peak efficiency to be reached. Work crews are also necessary to do other jobs as well, including installing root graft barriers and injecting systemic fungicides.

STEP 5. Manage time efficiently. Since Dutch elm disease is a biological problem, time becomes the most limiting factor. Diseased trees must be removed as soon as possible, systemic fungicides must be injected during that part of the season when they will do the most good, therapeutic pruning must be done quickly, and the list goes on and on. An efficient program can only be developed when time is managed wisely.

STEP 6. Educate the city council on the how's and why's of disease management. An efficient program can be maintained only when the council is enlightened enough about the disease situation that it will provide financial assistance and will be open-minded when suggestions are made to develop ordinances concerning the Dutch elm disease management program.

and,

STEP 7. Encourage intensive public outreach and information programs. A supportive public can budge hesitant municipal officials and can pry loose tight monies. Dutch elm disease is definitely a "people" problem. People can do more to limit or improve the success of a disease management program than any other factor. Remember, the reaction of city residents to a municipal program will often determine that program's degree of success or failure.

CONCLUSION



CONCLUSION

Of all the states in the nation, Minnesota has perhaps made the greatest commitment to suppressing Dutch elm disease. The State, itself, has spent over \$50 million to assist its municipalities in implementing disease management and reforestation programs. Federal grants totalling \$1.5 million have enabled six Minnesota communities to demonstrate the effectiveness of known disease management practices. With this financial assistance, many cities have been successful in bringing Dutch elm disease to a manageable level. But, this success has bred complacency. Dutch elm disease no longer makes the headlines and dwindling tree losses state-wide have given people the false impression that the disease is under control. Municipal budgets are strained this year (1982) so urban forestry programs have been severely reduced or entirely eliminated. What people don't realize is that Dutch elm disease is still spreading in Minnesota. Every year more communities report their first losses. Because of this complacency, tree losses might again reach epidemic numbers, and, if this happens, everything gained in Dutch elm disease management over the past years will be lost.

Not everything is so grim, however. The Federal Dutch Elm Disease Program did get some good results from its four year, 1978-1981, demonstration. Hopefully, the results obtained by this demonstration program will prevent city administrators, foresters, and people working with Dutch elm disease on a daily basis from duplicating what others have done and found to be costly and ineffective. The major highlights of this program were:

1. confirming that inspection, prompt tree removal, and root graft barrier installation are the management practices which form the backbone of a good program...are the management practices that when reduced or eliminated, diminish the effectiveness of the entire program;

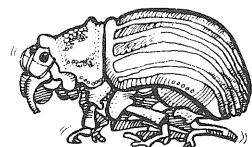
2. determining that therapeutic pruning, systemic fungicide injection, and Dursban spraying are effective management practices but are those that can be reduced or eliminated when budget cuts become necessary;
3. re-defining the disease management area to include only those places containing a heavy population of elm can reduce costs; having a city ordinance covering Dutch elm disease management improves the efficiency of the program because the forester has the city's cooperation in carrying-out the implementation of the management practices; clear-cutting of wild elm populations within a city's disease management area saves dollars because these "pockets of infection", often difficult for men and equipment to reach, are removed at once, eliminating the need to go back to these places time and time again;

and,

4. convincing the people that the intent of disease management is not to save the entire elm population, but is to spread tree losses over a number of years so that a new urban forest can be planted and has time to grow.

The Federal Dutch Elm Disease Program did have an impact in the six participating communities. Disease losses were reduced and management practices were evaluated as to their effectiveness. Through this federal project, these cities have been given the knowledge to keep their urban forestry programs going without assistance. Minnesota's demonstration program has one thing left to accomplish. The results obtained in this state, along with those obtained in the other participating states, California, Colorado, Georgia, and Wisconsin, must be documented in readable form so that others can benefit from what this program has achieved.

APPENDIX



DATE _____

DATE _____

[illegible]

—Actual size of field sheet is 8½ by 14"—

Field Sheet and Master Log Key

Tree Number: one number per tree
Address: Residential areas-use street address - make it up if necessary
 Wild areas-describe site referring to known reference points
Owner: City Property - C
 Private Property - P (owner's name if required)
Area: number code for area from city map (same codes as inventory)
High Risk: 0 - not high risk
 1 - beetle emergence possible within 20 days
 2 - root graft spread likely
 3 - both 1 and 2
dbh: diameter at 4½ feet (inches and tenths)
Species: 01 - American elm
 02 - Asian elm
 03 - red elm
 04 - rock elm
Stump: G - grind-out
 D - debark
Date removal completed: (tree and stump) month/day
Removed by: C - City Crews
 T - City tree contractor
 P - Private individual or contractor
Date marked: month/day
Reported by: C - City tree inspector
 P - Private individual
Date of notification: month/day (leave blank if notice not given)
Type of notice: P - Personal (private property only)
 M - Mail
% infection: (DED only) 1 - up to 10% 6 - 50 - 60%
 2 - 10 - 20% 7 - 60 - 70%
 3 - 20 - 30% 8 - 70 - 80%
 4 - 30 - 40% 9 - 80 - 90%
 5 - 40 - 50% 0 - 90 - 100%
Cause for removal: B - beetle infection
 R - root graft infection
 W - weakened or dying tree
 D - dead tree (note in remarks if this is only a guess)
 S - storm damage
 O - other (specify in remarks)
Determining factor: F - field diagnosis
 L - lab diagnosis
Past treatment: I - injected (date, chemical, dosage & tag number in remarks)
 R - root graft barrier (date and type in remarks)
 T - therapeutic pruning (date in remarks)
 P - dead wood pruning (year performed in remarks)
 H - pruned recently by homeowner (approximate date in remarks)
 N - none
Distance to closest elm: estimate in feet
Direction to closest elm: 1 - North 5 - South
 2 - Northeast 6 - Southwest
 3 - East 7 - West
 4 - Southeast 8 - Northwest
Number of elms within 60 feet: (including closest elm)
Closest Tree within 60 feet: insert species code for closest (non-elm) tree in each direction
Remarks: include additional details and any non-coded information

TREE REMOVAL RECORD FIELD SHEET

Tree # _____ Area _____ High Risk _____

Address: _____

Owner: _____

Location on property: _____

DBH _____ Species _____ Stump _____ RGB _____

Date removal completed ____/____ Removed by: _____

Date marked ____/____ Reported by: _____

Date of notification ____/____ Type of notice _____

% infection _____ Cause for removal _____

Determining factors _____ Past treatment _____

Distance to closest elm _____ Closest non-elm within
sixty (60) feet _____

Direction to closest elm _____

Number of elms within 60 feet _____

Remarks: _____

N	E	S	W

MAP

5-USE LOG

☐ HAZARDOUS WOOD

☐ RGB

☐ THERAPEUTIC TRIM

☐ INJECTION

☐ SAMPLE

1

2

3

4

5

6

7

8

9

10

11

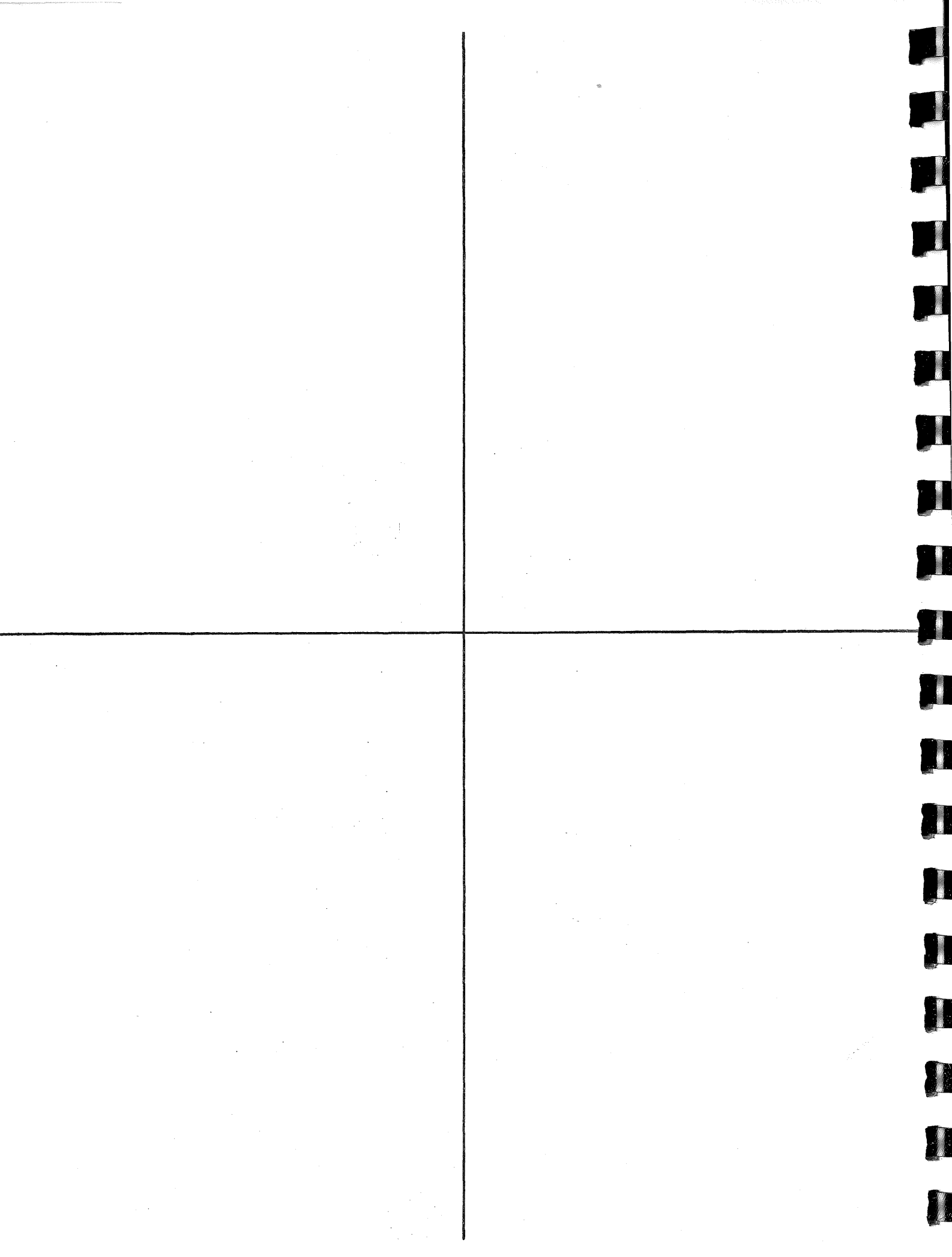
12

13

14

15

52



5-USE LOG KEY

Hazardous Wood Log

1. Hazardous wood number
2. Address (include area number in upper right hand corner)
3. Owner
4. Date of notice
5. Date hazard eliminated
- 6.
- 7.
8. Type of notice
P-Personal
M-Mail
9. Species
10. Form of wood
F-Firewood
L-Logs
S-Stumps
11. Evidence of bark beetles
N-Native
E-European
B-Both
A-Absent
12. Solution
D-debarked by property owner
R-disposed of by property owner
C-disposed of by city
U-unknown
- 13.
- 14.
15. Remarks

Root Graft Barrier Log

1. Barrier number
2. Address (include area number in upper right hand corner)
3. Reason barrier site selected (write in explanation)
4. Date recommended
5. Date installed
6. Date infected tree(s) removed
7. Field sheet number for map
8. Type of barrier
P-Plow
T-Trencher
V-Vapam
9. Feet of barrier
10. Man hours used (nearest 1/4 hour)
11. Number of personnel
12. Barrier failed
- 13.
- 14.
15. Remarks

Therapeutic Pruning Log

1. Treated tree number
2. Address (include area number in upper right hand corner)
3. Reason tree selected (write in explanation)
4. Date recommended
5. Date performed
6. DBH
7. Species
8. % infection
9. Confirmed DED
10. Wound dressing applied (N-None, Code for type)
11. Man hours used
12. Number of personnel
13. Pruning failed - tree condemned
14. Additional Treatment
I-Injection
R-Root Graft Barrier
N-None
15. Remarks (include other treatments, tree #, etc.)

Injection Log

1. Treated tree number
2. Address (include area number in upper right hand corner)
3. Reason tree selected for injection (write in explanation)
4. Date of injection
5. DBH
6. Species
7. Type of injection
P-Preventative
T-Therapeutic
8. Number of injection sites
9. Injection sites per inch
10. Gallons of solution
11. Fluid ounces of Arbotect 20-5
12. Man hours used
13. Number of personnel
14. Failure - tree infected
15. Remarks (include tree, weather conditions, uptake time and other practices)

Sample Log

1. Address (include area number in upper right hand corner)
2. Location on property
3. Date sampled
4. Date of results
- 5.
6. DBH
7. Species
8. Results (+ or -)
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
15. Remarks

PUBLISHED IN THE HUTCHINSON LEADER
FRIDAY, JULY 6, 1979

Section 1020:00

PUBLICATION NO. 2188

ORDINANCE NO. 581

SECTION 1020 - DUTCH ELM DISEASE

Section 1020:00. Declaration of Policy. The Council of Hutchinson has determined that the health of the elm trees within the municipal limits is threatened by a fatal disease known as Dutch elm disease. It has further determined that the loss of elm trees growing upon public and private property would substantially depreciate the value of property within the City and impair the safety, good order, general welfare and convenience of the public. It is declared to be the intention of the Council to control and prevent the spread of this disease and this ordinance is enacted for that purpose.

Section 1020:05. Forester.

Subd. 1. Position Created. The powers and duties of the Forester as set forth herein are conferred upon the City Forester.

Subd. 2. Duties of Forester. It is the duty of the Forester to coordinate, under the direction and control of the Council, all activities of the municipality relating to the control and prevention of Dutch elm disease. He shall recommend to the Council the details of a program for the control of Dutch elm disease, and perform the duties incident to such a program adopted by the Council.

Section 1020:10. Dutch Elm Disease Program.

Subd. 1. It is the intention of the Council of Hutchinson to conduct a program of plant pest control pursuant to the authority granted by Minnesota Statutes 1961, Section 18.022 and Minnesota Statutes 1974, Section 18.023. This program is directed specifically at the control and elimination of Dutch elm disease fungus and elm bark beetles and is undertaken at the recommendation of the Commissioner of Agriculture. The Forester shall act as coordinator between the Commissioner of Agriculture and the Council in the conduct of this program.

The Council hereby adopts, by reference, Minnesota Statutes 1961, Section 18.022 and 1974, Section 18.023 and all their amendments.

Section 1020:15. Nuisances Declared.

Subd. 1. The following things as set forth in the subdivisions which follow are public nuisances whenever they may be found within this municipality.

Subd. 2. Any living or standing elm tree, or part thereof, infected to any degree with the Dutch elm disease fungus Ceratocystis Ulmi (Buisman) Moreau.

Subd. 3. Any elm tree or part thereof, suffering from dieback, or any other disease or harmful condition, which, in the opinion of the City Forester, or his agents renders that tree or any parts thereof possible breeding or harboring sites of the elm bark beetles Scolytus Multistriatus (Eichh.) or Hylurgopinus Rufipes (Marsh).

• Section 1020:20

Subd. 4. Elm trees or parts thereof as described in Subd. 2 and 3 hereby shall be termed Hazardous Trees and Portions.

Subd. 5. Any dead elm tree or part thereof, including logs, branches, stumps, firewood or other elm material from which the bark has not been removed. Termed Hazardous Wood. See Section 1021:00.

Section 1020:20. Abatement. It is unlawful for any person to cause or permit any public nuisance as defined in Section 1020:15 to remain on any premises owned or controlled by him within the corporate limits of this municipality. Such nuisances may be abated in the manner herein set forth.

Section 1020:25. Inspection and Investigation.

Subd. 1. Annual Inspection. The Forester shall inspect all premises and places within the corporate limits of this municipality as often as practicable to determine whether any condition described in Section 1020:15 of this ordinance exist thereon. He shall investigate all reported incidents of infestation of Dutch elm fungus and elm bark beetles.

Subd. 2. Entry on Private Premises. The Forester or duly authorized agents may enter upon private premises at any reasonable time for the purpose of carrying out any of the duties assigned under this ordinance.

Subd. 3. Diagnosis. The Forester shall, upon finding conditions indicating Dutch elm infestation, immediately send appropriate specimens or samples to the Commissioner of Agriculture for analysis, or take such other steps for diagnosis as may be recommended by the Commissioner.

Section 1020:30. Abatement of Dutch Elm Disease Nuisances.

Subd. 1. The abatement of the public nuisance of Hazardous Wood (as described in Sections 1020:15, Subd. 5 and Section 1021:00) is described in Section 1021:05, Subd. 1.

Subd. 2. In abating Dutch elm disease nuisances, the Forester shall cause the infected tree or wood to be sprayed, removed, burned, or otherwise effectively treated so as to destroy and prevent as fully as possible the spread of Dutch elm disease fungus and elm bark beetles. Such abatement procedures shall be carried out in accordance with current technical and expert opinions and plans as may be designated by the Commission of Agriculture.

Whenever the Forester finds with reasonable certainty that the Dutch elm disease infestation exists in any tree or wood in any public or private place in this municipality, the procedure shall be as set forth in the subdivisions which follow.

Subd. 3. If any elm tree, or any parts thereof, determined to be a nuisance (as described in Section 1020:15, Subd. 2 and 3) is discovered on public or private property within the municipal limits of the City, the Hazardous Trees and Portions shall be condemned, removed and disposed of or rendered incapable of breeding or harboring elm bark beetles in accordance with the Commission of Agriculture's rules, regulations and specifications. This shall hereby be termed proper disposal.

Subd. 4. For Hazardous Trees and Portions found on private property, the property owner shall be given no more than 7 days for Proper Disposal from the date of notification. Notification shall be given in the form of a written notice to be presented personally or by mail by the City Forester.

Subd. 5. Failure to abate the nuisance (or properly dispose of the Hazardous Trees and Portions) by the property owner within the time limit stated shall authorize the City Forester to have the nuisance abated. The City Forester may then charge all costs of the abatement to the property owner and bill him directly or have the monies due assessed to his taxes.

Subd. 6. The Forester shall keep a record of the costs of abatements done under this section and shall report monthly to the Clerk all work done for which billings and assessments are to be made stating and certifying the description of the land, lots, parcels involved and the amount chargeable to each.

Subd. 7. On or before September 1 of each year the Clerk shall list the total unpaid charges for each abatement against each separate lot of parcel to which they are attributable under this ordinance. The Council may then spread the charges or any portion thereof against the property involved as special assessment under Minnesota Statutes Sec. 429.101 and other pertinent statutes for certification to the county auditor and collection the following year along with current taxes.

Section 1020:40 Root Graft Barrier Placement.

Subd. 1. The City recognizing the problem of the spread of Dutch elm disease from infected trees to adjacent, healthy trees through root systems and common natural connections, intends to the best of its ability, to control and prevent this means of spread of the disease.

Subd. 2. To prevent the spread of the disease the City Forester shall place, or have placed, root graft barriers in the prescribed manners as currently recommended by the Commissioner of Agriculture and the University of Minnesota.

Subd. 3. Since root systems and root grafts of public trees do not restrict themselves to public property, and proper establishment of root graft barriers may require entrance and establishment on adjacent property, the City authorizes the City Forester to establish proper root graft barriers on adjacent private property when the following conditions are followed:

1. The root graft barrier is established to protect public trees.
2. The property owner's permission (in writing) is required.
3. If any damage or distortion to the property is caused the City shall be responsible for the reasonable restoration of the property to the condition that existed before the placement of the barrier.

4. The barrier will be placed at no expense to the property owner.

Subd. 4. Placement of root graft barriers on private property may be done to protect private trees when requested by the homeowner, however, payment will be received to cover costs.

Section 1020:50. Therapeutic Pruning. The City, recognizing the potential of therapeutic pruning (the "amputation" of infected branches) as a possible tool in the control of Dutch elm disease authorizes the City Forester to enter upon private property and carry out this procedure on private trees for the protection of public trees.

The same four conditions as stated in Section 1020:40, Subd. 3 as they apply to therapeutic pruning, shall apply.

Section 1020:60. Chemical Treatment. The City, recognizing the value of chemically treating trees either with approved fungicides or insecticides as a possible tool in the management of Dutch elm disease, and recognizing that the treatment of a private tree may help to protect other private and public trees, authorizes the City Forester to enter upon private property and chemically treat the private tree.

The same four conditions as stated in Section 1020:40, Subd. 3 as they apply to chemical treatment shall apply.

Section 1020:70. Payment of Monies Owed.

Subd. 1. The payment of monies owed to the City for the abatement of nuisances (as described in Section 1020:15) from private property shall be handled in the following manner.

Subd. 2. All expenses shall be kept by the City Forester or the City Accountant. All monies will be presented in the form of individual bills to the individual property owner stating the work done and the amount owed.

Payment shall be due on the entire amount owed within 30 calendar days from the date of the bill. If the property owner fails to pay the entire amount owed, the City may charge interest on the remainder due in the form 10% per annum.

Subd. 10. After the passage of the original 30 days the City may assess the remaining amount due (including all interests and penalties) to the owner's property or may present claims in Small Claims Court for payment against the individual property owners.

Section 1020:75. Transporting Elm Wood Prohibited. It is unlawful for any person to transport within the corporate limits of this municipality any bark-bearing elm wood without having obtained a permit from the Forester. The Forester shall grant such permits only when the purposes of this ordinance will be served thereby.

Section 1020:80. Interference Prohibited. It is unlawful for any person to prevent, delay or interfere with the Forester or his agents while they are engaged in the performance of duties imposed by this ordinance.

Hazardous Wood No. _____

Name: _____

Address: _____

Date: _____

Dear Resident:

Elm wood, found in the form of:

_____ firewood _____ non-debarked stump(s)

capable of adding to the spread of Dutch Elm Disease, has been detected on your property.

You are hereby notified that in accordance with State Law (Minnesota Statute Amendment 18.023) you are required to completely debark the wood, burn the wood under proper City burning regulations, or remove the wood from your premises and transport it to the designated City Disposal Site. As much as possible, the elm wood has been marked with paint so you can distinguish it from any other.

If you wish to have City crews transport the wood to the disposal site for you, you are allowed _____ days to place the wood on your boulevard. Please then inform the City that it is there, and it will be hauled away free of charge. (Call City Clerk's Office - 693-6334)

If you choose to remove the wood yourself, you may do so. The City Elm Wood Disposal Site is located approximately 1/2 mile south of the City Limits on Old Highway 22. The disposal site gate is locked. However, someone will unlock the gate for you by calling the City Clerk's Office (693-6334) during regular working hours, or the Police Department (693-2879) on Saturday and Sunday.

Under State Law and City Ordinance you are allowed _____ days to comply with the above regulations. Should you fail to comply within the _____ day period, the City is authorized under State Law to remove the wood or stump(s) and bill you directly or levy the total removal cost against your property. The City has a contractor or City crews available to make said removal if it becomes necessary.

If you have any questions, please feel free to contact the City Clerk's Office at 126 North Marshall, Litchfield, Minnesota 55355 (693-6334)

City Tree Inspector

I, the undersigned, have been notified that elm wood, capable of adding to the spread of Dutch Elm Disease, has been detected on my property and must either be debarked or removed according to the stipulations given on the attached notice.

Signature

Name: _____

Address: _____

Date: _____

H.W. No. _____

1
(If this notice was mailed to you, you do not have to return any portion of it.)

OFFICERS

VIDA HENDRICKSON, MAYOR
 WAYNE CARLSON, ADMINISTRATOR
 BETTY ANDERSON, CLERK-TREASURER
 GEORGE H. NEPERUD, CITY ATTORNEY
 BOB HENDRICKSON, STREET COMMISSIONER
 EDWARD KURZHALS, CITY ASSESSOR
 KENNETH R. NELSON, BLDG. INSPECTOR
 CHARLES DEWOLF, WASTE TREATMENT SUPT.
 McCOMBS-KNUTSON ASSOC., ENGINEERS

57

City of Litchfield

126 MARSHALL AVENUE NORTH
 LITCHFIELD, MINNESOTA 55355
 612-693-6334

COUNCIL

RONALD JOHNSON, PRESIDENT
 PAUL JOHNSON
 DONALD KONIETZKO
 DAVID KELLER
 WILLARD NYSTROM
 KENNETH AGREN

Date: _____

Dear Resident:

A tree(s) on your property has recently been diagnosed and marked with paint by the City Forester as being a threat in the spread of Dutch Elm Disease or Oak Wilt.

You are hereby notified that in accordance with Minnesota Law (18.023) and/or City Ordinance, you are required to remove the tree(s) from your premises. Removal shall include all portions of the tree and either removal of the stump or complete debarking to just below ground level. All portions of non-debarked elm wood shall be transported to the City Elm Wood Disposal Site. You are allowed seven (7) days from receipt of this notice for complete removal. If you desire information about the Disposal Site, contact the City Forester, telephone numbers: (612) 693-3673 or (612) 693-7201.

Should you fail to comply with the 7 day period, the City is authorized under State Law to remove the tree(s) and bill the total removal costs to you or levy the costs against your taxes.

To be eligible for a subsidy of 100% of the cost of removal you must, within three (3) days of receipt of this notice, turn the tree(s) over to the City for removal by their contractor. At that time all costs of removal shall be paid by the City.

Costs of removal by any person other than the city contractor shall be paid by the tree owner with no subsidy from the City. Disposal of the tree(s) shall conform to the above mentioned specifications.

The following tree(s) on your property have been marked for removal:

Tree Number

Tree Diameter

If you desire to have the City Contractor remove your tree(s), please sign the release paragraph below and either mail the signed form to the City Forester at the City Hall or drop the signed form off at the City Hall. The signed portion of the notification letter will be our record for your 100% subsidy.

Minor damage is to be expected. The City Contractor is responsible for accidental damage to structures, fences, ornamental plantings and shrubs. If you experience any damage to these features, please advise your City Forester or the tree contractor within fourteen (14) days of removal.

In order to speed removal, a phone call to (612) 693-3673 or (612) 693-7201 regarding your decision will be greatly appreciated.

If you have any questions, please feel free to contact the City Forester or his agent at their office at the City Garage (along 4th St. NW), or at City Hall, Litchfield, Minnesota 55355 (1-693-3673 or 1-693-7201).

----- TEAR HERE -----

TREES NUMBERED: _____

I hereby grant the City of Litchfield the right to enter upon my property and remove _____ diseased tree(s). I understand that I will not be billed or assessed for the costs of such removal. I further understand that the diseased tree(s) become the property of the City of Litchfield.

Date: _____

Signature

Address

CERTIFICATION OF TREE REMOVAL OPERATORS

The following requirements are set forth by the City of Litchfield, Minnesota:

1. The Operator will inform property owners of the types and amounts of insurance coverage for any damage that may result. A copy of same shall be provided the City before certification is approved.
2. The Operator must claim full responsibility for all damage to private and public property during removal operations.
3. The Operator must provide an official receipt for payment for his work, and any payment in any form cannot be shared or returned to the property owner. A sample copy shall be submitted to the City before approval for certification is given.
4. The Operator shall be required to follow the City's policies and rules relative to tree removal:
 - a. All elm tree material removed shall be deposited at the City's disposal site.
 - b. The Litchfield Utilities, Litchfield Northwestern Bell Telephone Company, Litchfield Cable T.V., shall be contacted when removal is near overhead lines.
5. The Operator must have a business whose livelihood is tree removal. Ample information must be submitted to the City to verify same before certification is approved.

I hereby apply to the City of Litchfield, Minnesota, and agree to meet all the above requirements for the year 19 ____.

Signed by: _____

Title: _____

Company: _____

Date: _____

CITY USE

Approved by: _____

Title: _____

Date: _____

OFFICERS

VISA HENDRICKSON, MAYOR
 WAYNE CARLSON, ADMINISTRATOR
 BETTY ANDERSON, CLERK-TREASURER
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 McCOMBS-KNUTSON ASSOC., ENGINEERS

City of Litchfield

126 MARSHALL AVENUE NORTH
 LITCHFIELD, MINNESOTA 55355
 612-693-6334

COUNCIL

RONALD JOHNSON, PRESIDENT
 PAUL JOHNSON
 DONALD KONIETZKO
 DAVID KELLER
 WILLARD NYSTROM
 KENNETH AGREH

Re: Root Graft Barrier Installation

Dear

Since Dutch elm disease can be spread from elm tree to adjacent elm tree through common root grafts, it is recommended that we install a root graft barrier, by machine or chemical, for the abatement of Dutch elm disease. Due to some expected damage of sod or terrain, restoration will be made to your property by the City.

Sincerely,

Steven J. Cook
 City Forester

SJC:gn

I do hereby allow the City of Litchfield the right to enter my property for the installation of a root graft barrier for Dutch elm disease abatement. I understand any damage to my property will be restored by the City.

Name: _____

Date: _____

OFFICERS

VIDA HENDRICKSON, MAYOR
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 DONALD KONIETZKO
 DAVID KELLER
 WILLARD NYSTROM
 KENNETH AGREN

Re: Pruning of Elm for Dutch Elm Disease Abatement

Dear

Your elm tree has begun to show early signs of Dutch elm disease. When found in these early stages, the disease can be pruned out of the tree and the life of the tree can be prolonged.

The City of Litchfield will attempt to prune the disease out of your tree at no charge to you. This pruning in no way guarantees that the tree will not die of Dutch elm disease. The pruning is an attempt to prolong the life of your tree and, if successful, can rid your tree of Dutch elm disease for the present.

Sincerely,

Steven J. Cook
 City Forester

SJC:gn

I do hereby allow the City of Litchfield the right to enter my property for the purpose of attempting a Dutch elm disease therapeutic pruning of my elm. I understand this pruning in no way guarantees that my tree will not become infected by Dutch elm disease at a future date.

NAME: _____

DATE: _____

ADDRESS: _____

28 February 1981

City Council
Granite Falls, Minnesota

Dear Councilmembers:

As a prerequisite to purchasing firewood or logs from the City of Granite Falls today, I understand that I must relieve the City of Granite Falls and the Department of Natural Resources of all liability for myself or others that assist me in the cutting and/or removal of this material from the site of sale.

Therefore, upon my purchase of any one or more piles of this material, I assume responsibility for myself and others assisting me. Further, I understand that upon the purchase of this wood or logs, I will pay for my purchase immediately and will be responsible for the security of this material.

Name _____

Signature _____

Address _____

Bidding No. _____

*Release form signed by people who bought
firewood or logs from the City-DNR, Dutch elm disease
program utilization site.*

PART II

Summary Accomplishment Report - 1978-82

Federal Dutch Elm Disease Demonstration
Utilization Project

Information and Educational
Program

University of Minnesota
Agricultural Extension Service

Dr. William J. Phillipsen
Program Coordinator
Department of Entomology
University of Minnesota
St. Paul, Minnesota 55108

SYNOPSIS

This report presents a review of the federally funded Dutch Elm Disease Demonstration and Utilization Project. Methods used and information packages developed for educational programs are summarized here. Public awareness and public involvement is important in creating and maintaining effective local leadership. Trained local people are important and they can operate successful shade tree (DED) management programs when given adequate financial and educational support. Since few citizens have a concept of "tree value" and it is not easy to promote, the cost of removal may be the best "stick" to develop this concept. Clearly the Minnesota Demonstration towns have shown the value of a comprehensive shade tree (DED) management program.

The focus has been Dutch elm disease management, and Minnesota has had one of the most extensive and successful DED programs in the nation. Many communities have been able to "catch up" with the disease (In 1980 and 81 about 111,000 elms and oaks were lost in each of those years, whereas about 250,000 were lost in 1977.) and to plant replacement trees. Due to funding cuts replacement planting declined from 149,083 trees in 1980 to 91,817 trees in 1981 (437 Minnesota communities reporting). In 1982 funding cuts have eliminated the Minnesota Department of Agriculture's program and reduced MDNR and University staffs.

Although funding is down and disease pressure is up due to a three fold increase of the native elm bark beetle population, Minnesota communities are not without resources. Developed technology is available through the University's Extension Service and MDNR via publications, slide sets, staff etc. The future, however, rests heavily on local governments and homeowners. All communities have to deal with their trees in some manner. Let's hope that it's through an organized Shade Tree Management Program.

INTRODUCTION

The mission of the Agricultural Extension Service in the Federal Dutch Elm Disease Demonstration and Utilization Project is to educate the citizens and municipal staff of the participating communities and to develop local leadership in shade tree management. Specifically, Agricultural Extension Specialists plan to inform local community leaders and citizens about Dutch Elm Disease and Shade Tree Management Programs with the goal that local resources and established organizations in the six demonstration communities effectively manage the shade trees. This goal is not easy to achieve in a short period and may only be accomplished in part over several years, yet some of the benefits of Dutch Elm Disease/ Shade Tree Management are being seen in all six demonstration communities.

Extension staff have a responsibility to provide shade tree information to the entire state in addition to the demonstration communities. For more maximum effectiveness, news releases, T.V. and radio spots were distributed to media throughout the state for purposes of general public information and awareness of shade trees. Media in the demonstration communities also received these materials.

The goals of the Minnesota Agricultural Extension Shade Tree program are:

- 1) To consult with communities in a team effort on disease identification, management, sanitation, orderly removal, tree planting and general shade tree management.
- 2) To work with public agencies in training tree inspectors.
- 3) To provide educational services for individuals and firms relating to disease and shade tree management.
- 4) To disseminate technical information.
- 5) To assist the general public concerned with shade tree management.
- 6) To conduct applied research on shade tree problems.
- 7) To continue to curtail elm losses.
- 8) To take the lessons learned in the demonstration cities to all Minnesota communities as well as to other states.

The Federal Dutch Elm Disease Management Demonstration objectives are:

- 1) to assist selected communities with educational and technical aspects of disease curtailment and 2) that those cities demonstrate (state and national) educational needs and community approaches necessary for success in managing Dutch elm disease. Past experience with other towns in Minnesota and verified by observations in the demonstration towns revealed the absolute need of sustained, direct and active public involvement in community Dutch

elm disease management programs that succeed. This requires public education on all aspects of the disease (biology, management methods, traditional and new) and publicizing local results.

Increased public awareness and education has been a goal of the Minnesota Agricultural Extension Service. Increased awareness of Dutch elm disease also brought about a dramatic change in public attitude toward trees in general. Many more Minnesotans are aware of trees, recognize their importance, and are interested in tree care than ever before, and the number of "concerned citizens" increases as the number of urban elms decrease. The need for public education and information concerning all aspects of urban forestry and shade tree health has increased as a result of Dutch elm disease.

SITUATION

Technical training of responsible personnel is essential for the success of any shade tree management program. The personnel in the demonstration towns and other Minnesota communities are usually new and untrained each year. Complete training can ensure proper decision making in marking trees for removal, applying therapeutic pruning, installation of root graft barriers, proper injection of trees, timely dead elm wood disposal, elm bark beetle control, and utilization. Training was offered by specialists in multiple locations throughout the state. Tree inspectors from towns participating in the state shade tree program, (500 communities), county extension agents, organized tree inspector groups, professional societies, and civic organizations were people who attended and benefitted from these training sessions.

Educational efforts were targeted towards all Minnesota communities. The demonstration cities had priority in personnel training, public awareness and direct consultation, while the rest of the state was serviced through the "Tree Inspectors Training Workshop," news releases and radio programs. The effect of Agricultural Extension Service activities on Dutch elm disease status, state-wide cannot be evaluated directly but Dutch elm disease incidence is declining. From 1978 to 1982 specialists with the shade tree program reached approximately 10,000 persons through meetings, workshops, clinics, and one-to-one consultation. Publications were promptly prepared and widely disseminated. The need for technical information is expected to increase in the future.

Extension will continue to utilize the assistance of county offices in arranging public meetings or clinics on shade tree management. We will continue to respond to individual inquiries on tree health management by direct contact or through laboratory examination of tree samples. We will continue to disseminate information by radio, television, news releases and other agency news letters, regularly. We will continue to "reach out" enhancing local shade tree management efforts. Additional slide sets and publications will be produced to cover needs as they develop.

ACCOMPLISHMENTS

Extension Objectives were met through various approaches:

A) Meetings

- 1) General public meetings organized by county agents were very successful. These meetings included both lectures and demonstrations of techniques relating to shade tree management. At times, neighborhood associations requested meetings with the shade tree specialists to discuss local concerns on tree health and to receive specific recommendations.
- 2) Service Club meetings have been particularly successful in the demonstration communities. Extension specialists have participated in a few of these meetings. They have prepared material for local city foresters. The local city forester is encouraged to use this material and localize it to his program, updating the town people on the cities progress in Dutch elm disease management.
- 3) High school and grade school meetings. Presentations to junior high and senior high school biology classes reached teenagers with information on the importance of the urban forest and Dutch elm disease management efforts. The Colorado movie, "Dutch Elm Disease/Catalyst for Urban Forestry" and the Wisconsin film, "The Singing Tree" were used to introduce the presentations.

B) Consulting

- 1) Telephone calls. Considerable time was spent answering telephone calls by county agents, the general public, nursery operators, tree companies, tree inspectors, and other tree professionals. The majority of the calls were on specific tree problems with Dutch elm disease and oak wilt being on the top of the list, but not the only subjects. Extension publications were usually mailed to those making telephone contacts.
- 2) House calls. Visits to specific sites were occasionally required in order to provide proper recommendations for shade tree disease management. Selected cities were visited when the local tree inspector or the home owner requested such service. Laboratory examination and culturing often is required to adequately diagnose tree diseases. The six demonstration cities were often visited by specialists to provide technical advice on Dutch elm disease management.
- 3) Clinics. County agents organized clinics for the general public. The clinics were highly successful as was indicated by the large numbers of diseased tree samples that were brought in for diagnosis. Audio-visual displays and handouts on tree diseases were also made available.

C) Mass Media

- 1) The general public and shade tree professionals were updated, alerted and instructed in shade tree management by Extension specialists. News releases were distributed state-wide to daily and weekly newspapers including farm papers, local radio and television stations and the extension offices and other shade tree professionals. These news releases were in the form of 1) Tree Watch, 2) Plant Pest Control Newsletter, 3) The Demonstration Six, 4) Yard and Garden Fact Sheets, 5) The Overstory, 6) Knotty Knews. The subjects addressed in the above news releases included: 1) DED arrives early this year, 2) Injection is not for all elm trees, 3) Higher dosages of DED fungicide is now legal, 4) Storm damage elms should be pruned, 5) Not all elm wilt is Dutch elm disease, 6) To inject or not to inject?, 7) Oak wilt fungus mats, 8) Dutch elm disease, 9) Dutch elm disease treatment, 10) Elm leaf miners, cankerworms, 11) Elm bark beetles aphids, 12) Dutch elm disease; symptom appearance, 13) Dutch elm disease; injection, 14) Special local needs label granted for Arbotect in Minnesota, 15) Elm bark beetles pruning, 16) Tips for curing DED beetle infections, 17) 'TP': an effective therapeutic treatment for Dutch elm disease, 18) Native elm bark beetles, 19) Removal of wilting red oaks, 20) Elm bark beetles, 21) Salt injury on elms, 22) Black elm leaf spot, 23) Native elm bark beetle control, 24) Elm fire wood, 25) This is Arbor Month, 26) Proper fall planting techniques will increase your success rate, 27) Don't credit Jack Frost alone for beautiful fall colors, 28) Winter is a good time for tree trimming, 29) Winter and pruning; a good combination, 30) Sample control zone for dust boring piles.

- 2) Radio broadcasts prepared by the Department of Information and Agricultural Journalism were released by a toll-free telephone system available to the radio broadcasters throughout the state, (an average of 20-25 stations used these stories each day). The stations in or near demonstration communities had access to this service. Examples of radio news releases were as follows:
 - Mild winter could mean an increase in DED.
 - Injecting elm trees.
 - Oak wilt disease worse.
 - DED transmitting beetles survive winter in large numbers.
 - DED arrives early this year.
 - Injecting elm trees. The cost of injecting trees.
 - Repairing storm damaged trees.
 - Controlling elm bark beetles.
 - Falling needles don't mean dying evergreens.
 - Protecting evergreens with spreading branches from winter snow.

D) Training

- 1) Two day field workshops were offered for tree inspectors in the six demonstration communities. These workshops offered a "hands-on" experience in field and laboratory disease identification and in application of all available DED management methods (therapeutic pruning, root graft barrier installation, chemical injection, beetle identification, and native bark beetle spraying).
- 2) Municipal tree inspectors' workshops were held in St. Paul, Rochester, Marshall, Mankato, St. Cloud, Detroit Lakes, Grand Rapids, Thief River Falls, Crookston, Alexandria, Hibbing, Chaska, Fergus Falls and White Bear Lake. New tree inspectors became familiar with Dutch elm disease and oak wilt and along with certified colleagues were taught an integrated approach to DED management involving a combination of measures. Over 4,000 tree inspectors were trained from 1978-82.
- 3) A workshop on oak wilt was organized jointly by Extension and regional DNR pest managers. It was offered to professionals and the general public at Anoka, Minnesota. Twenty-five people attended and learned about oak wilt management, as well as other oak diseases and insect problems. A field demonstration of available oak wilt management methods was well received and generated much interest as indicated by numerous questions and subsequent phone calls.
- 4) The Olmsted County Extension Office sponsored a workshop on tree care in Rochester, Minnesota. Sixty professionals, vocational school students, and the general public were instructed on "how to recognize shade tree diseases and insects." The lectures were accompanied by a laboratory session with actual tree disease and insect samples which provided a "hands-on" experience.
- 5) County Agents were trained in how to set up and maintain a Shade Tree Management Program. About one-third of the county agents participated.
- 6) The Shade Tree short course, offered as part of the Horticultural Industries Conference, attracted approximately 1,200 tree professionals from 1978-82 who were updated on proper shade tree management techniques. This conference will continue in future years to serve the needs of shade tree management professionals.

E) Industry Events

Workshops organized by the manufacturers of tree care products were conducted. For example, a workshop was held in St. Paul to inform professionals, county agents, and the general public about the best injection method and the Minnesota chemical rates. Extension

specialists made presentations on tree injections, elm diseases other than DED and insecticide spraying for the control of native elm bark beetles.

F) Tour of Demonstration Towns

A tour of two DED demonstration towns was conducted by DNR and Extension specialists for representatives from Minnesota, neighboring states, and Canada. Minnesota's approach to DED management was demonstrated and discussed with participants.

G) Utilization - Demonstration Cities

A major deterrent to greater utilization of disease killed elm is a requirement that roundwood be debarked for long term storage. A wide range of equipment has been investigated in the search for a practical solution to this problem. A hand held chain saw attachment for debarking was located and purchased as part of this project. The unit was demonstrated on several locations in Hutchinson and Little Falls and latter used on a limited basis in Hutchinson. Elm bark can be removed with this unit but the equipment's high cost and unavailability in this country makes widespread use unlikely. The proposal to add firewood production at the demonstration cities was approved and much time has been spent in consulting on equipment purchases and operational procedures. The interest in elmwood utilization is high and specialists have served as resource people and have regularly provided information about markets, industry practices and manufacturing processes to cooperators in the demonstration projects.

H) Research

The demonstration towns demonstrated some gaps in research information relation to elm bark beetles. The following applied research projects shed new light and offered new strategies for DED management.

- 1) We correlated H. rufipes densities with Dutch elm disease incidence and developed a simple but reliable sampling scheme for H. rufipes. City foresters can use our correlations and sampling system to determine whether the application of chlorpyrifos to control overwintering adult populations of H. rufipes is warranted.
- 2) We have expanded upon Dr. Gardiner's earlier research on the use of chlorpyrifos trunk sprays for the control of adult H. rufipes. We tested other insecticides for controlling overwintering adults of H. rufipes and we investigated the effect of the time of application on beetle control. We have data on the impact that community-wide elm trunk treatments have on the population densities of H. rufipes and incidences of DED. A national label for this control measure has been granted.

- 3) We have done studies and have others under way on the dispersal of H. rufipes. They are of value in assessing: 1) the impact unmanaged areas have upon adjacent control areas; and 2) whether treatment of the trunk of an individual elm with chlorpyrifos will protect that tree from inoculation by overwintered adult H. rufipes.
- 4) We have published results (J. Economic Entomology) on the attraction of H. rufipes to elm pruning wounds and the value of using wound dressings during the growing season.
- 5) Our life history studies of H. rufipes show that the life cycle of this beetle is different in Minnesota from those reported for Ontario, New York and Connecticut. This has a significant effect on the type and timing of control measures.
- 6) The potential use of insecticides for the storage of felled elm was investigated. A Minnesota state Special Local Needs Label was granted in September 1981 for the use of chlorpyrifos by municipal governments for storing elm with intact bark.
- 7) We examined factors which affect the suitability of elm for native elm bark beetle breeding. Communities with limited resources should be able to utilize our information to develop priority removal schemes for infected elms which will maximize the impact of their limited sanitation efforts.

Demonstration towns helped the research efforts by providing men, equipment, and space. A spirit of cooperation, community pride and increased motivation toward Shade Tree Management was evident from the towns' participation in these research projects.

1) Regional Outreach Program

We took the information, demonstrated and collected in the six demonstration towns, to the rest of Minnesota and the near-by states. Leadership training was conducted in North Dakota, South Dakota, and Kansas. Minnesota with its strong shade tree program was in an excellent position to benefit from the information and experience gained in the six demonstration towns. Vehicles for information dissemination exist and will continue to exist in the future.

A major objective was to demonstrate to other communities state and nationwide what can be done. A tour of two Minnesota demonstration communities organized by Minnesota agencies demonstrated to staff from Minnesota, other states, and Canada the proper disease management techniques including all available methods, new developments and the impressive results. The informational and educational activities of the Minnesota Agricultural Extension Service

pointed-out that basic information is necessary for people who are just starting to recognize tree problems, while advanced information and encouragement is needed in decision making by the public and community administrators. Successful programs require early commitment of authority and dollars.

University of Minnesota

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Cooperating Communities

APPENDICESTable of Contents

- 1) Applied Research Success Story
- 2) Shade Tree Resources
- 3) News Releases and Press Examples
- 4) Shade Tree Workshop Evaluation Sample
- 5) Shade Tree Certification Examination Sample
- 6) Regional Outreach Program Sample

UNIVERSITY OF MINNESOTA AGRICULTURAL EXTENSION SERVICE

Overwintering Native Elm Bark Beetle Control
by Chlorpyrifos Application
to the Bases of Healthy Elms

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The following information contains recommendations that you will need to use in controlling native elm bark beetles in Minnesota. Chlorpyrifos (Dursban) for control of overwintering native elm bark beetles may be used as an augment to Dutch elm disease sanitation efforts. The native elm bark beetle in Minnesota mainly overwinters as an adult at the bases of healthy elms thereby eluding late summer sanitation efforts. This beetle is the major and in many instances, the exclusive carrier of DED in the northern two-thirds of Minnesota and an important carrier along with the smaller European elm bark beetle in the southern one-third.

The native elm bark beetle's overwintering behavior provides a "weak-link" in the life cycle that can be readily exploited by the application of an appropriate insecticide. Dursban^R 2E and 4E formulations are registered for use on elm trunks to control overwintering native elm bark beetles. Application of Dursban is not a technique to be used on a single tree to reduce that tree's chance of becoming infected with Dutch elm disease. Therefore, it is not recommended for individual homeowner use. Control must be handled on a community-wide basis to effectively reduce the beetle population.

Application is made to the bases of healthy elms with a 0.5 percent spray in mid-September before the beetles have started their search for overwintering sites in late September. The trunk should be wetted thoroughly but not to the point of run off. Extra care should be taken to apply the aqueous spray to the basal 6 inches including the root flares since the beetles tend to concentrate in these areas. Clean leaves and grass from the root flares before application. Although the insecticide is effective in killing beetles whether applied in September, October or the following April, a September spray is recommended because the beetles can transmit Dutch elm disease as they make their overwintering tunnels. Young elms up to eight inches in diameter and thin barked elms are especially susceptible to overwintering beetle transmission. Applications conducted after September in the fall or the following April are effective in preventing the overwintering beetles from emerging, feeding on healthy elms, and spreading Dutch elm disease in the spring.

The smaller European elm bark beetle is not affected by this method since it overwinters as a larva in dead and dying elm wood. Sanitation efforts control all elm bark beetles overwintering in the larval stage. Spraying cannot be substituted for prompt removal and proper disposal of diseased elms. It is recommended as a supplement to sanitation because of the native beetle's overwintering habits.

Although the native elm bark beetle has statewide distribution, sampling techniques should be employed to determine this beetle's presence in any area before spraying is initiated. As a general rule in the southern one-third of Minnesota the native elm bark beetle tends to be found in wooded areas such as parks, river bottoms, or wood lots; therefore, the person sampling should concentrate in those areas first. In the northern two-thirds of Minnesota the beetle may be found either in wooded areas or on boulevard trees.

Sampling a control zone for beetles consists of counting the number of dust boring piles that the overwintering beetles make as they chew and penetrate the bark of healthy elms in the fall from late September through October. Dust boring counts may also be taken in the spring from mid to late-April. The beetles make these dust piles before they emerge. The wood dust produced and pushed out of the hole is fine grained and red-brown. The following sampling guidelines indicate the advisability of spraying.

Four different areas for every square mile of control zone should be sampled. In each area selected, dust boring counts should be made on twenty trees. Often the beetles overwinter very low on the tree trunk and if insecticide application is indicated, spraying up to six feet may not be necessary. For this reason the sampler should count the number of dust boring piles in the lowest one foot. If dust piles are found at the one foot level, the sampler should then continue to count up to the six foot level.

The sampler then averages the dust boring piles per tree in the area sampled in the control zone. If the average number of dust boring piles is greater than ten per tree and the previous year's disease incidence was greater than five percent, application of chlorpyrifos is recommended. If the previous year's disease incidence is less than five percent and the average number of dust boring piles is greater than 20 per tree, trunk spraying is recommended. Remember, the height to which the insecticide is applied may vary between control zones according to where on the trunk the beetles were found. For example, if you sample up to six feet, spray to six feet. If you sample up to one foot, spray to one foot.

We do not recommend broadcast spraying of entire elms via aerial application or other means. The site is defined as the basal areas of the elm trunk. Application can be made with either a back pack mist blower or a hydraulic pressure sprayer.

Research data shows the effectiveness of chlorpyrifos for controlling native elm bark beetles (about 97 percent control for fall applications and 94 percent control for spring applications), and the impact that community-wide elm trunk treatments have on disease incidence.

Method, site, and time of application greatly minimize environmental dangers to man and wildlife. In addition, time of application does not conflict with most of the ongoing sanitation projects.

SHADE TREE RESOURCES
from the
Agricultural Extension Service
University of Minnesota
1981

PUBLICATIONS

Available at local county Extension offices or contact:

Bulletin Room
3 Coffey Hall
1420 Eckles Avenue
University of Minnesota
St. Paul, Minnesota 55108
Telephone: (612) 373-1615

Tree Disease Detection and Control

Tree Line 4. "Root Graft Spread of Dutch Elm Disease and Its Control" by John Mizicko and Ward C. Stienstra. (1977) Includes description of root grafts, how Dutch elm disease spreads through roots, controlling root graft spread through soil trenching, soil fumigation, and other methods. Illustrated with drawings and photos. (2 pages)

Tree Line 5. "Dutch Elm Disease—Community Experiences" by Ward C. Stienstra. (1977) Includes brief historical information on the disease, statistics on cities with and without disease control programs, descriptions of sanitation efforts and their effects. (2 pages)

Tree Line 6. "Dutch Elm Disease Detection" by John Mizicko and Ward C. Stienstra. (1977) Gives rationale for detection efforts, describes ground survey and aerial survey techniques and the advantages and disadvantages of each, combination surveys, and the importance of sanitation programs. (2 pages)

Tree Line 22. "Noninfectious Diseases of Trees" by Ward C. Stienstra. (Revised 1978) Describes different kinds of diseases, including those related to high temperatures, low temperatures, water, mechanical injury, and chemical damage. Useful for people who are involved in replanting efforts. (2 pages)

Tree Line 24. "The Bronze Birch Borer" by Mark E. Ascerno. (1979) Discusses the bronze birch borer and its effect on birch trees. Explains borer life cycle and how it causes damage to trees. Includes suggestions for damage prevention as well as photos of the borer and typical borer damage to trees. (2 pages)

Tree Line 25. "Identifying Elm Firewood" by William J. Phillipsen and Harlan Petersen. (1979) Discusses the significance of elm firewood piles in the spread of Dutch elm disease. Gives characteristics of elm wood so people can identify it easily. Photos illustrate characteristics. (2 pages)

Tree Line 27. "Native Elm Bark Beetle Control" by William J. Phillipsen and Mark E. Ascerno. (1980) Describes method for trunk spraying elm trees with insecticide to control overwintering native elm bark beetles; explains sampling techniques to determine if spraying is advisable. (2 pages)

Extension Bulletin 415. "The Dutch Elm Disease" by David W. French, Mark E. Ascerno, and Ward C. Stienstra. (Revised 1980) Explains how Dutch elm disease is spread, including a description of the life cycle of the elm bark beetle. Describes disease symptoms and methods used to manage the disease. In-

cludes a brief history of the disease, prospects for the future, and a list of suggested replacement trees. (16 pages)

Extension Bulletin 456. "An Integrated Approach to Dutch Elm Disease Management" by William J. Phillipsen and Asimina Gkinis. (1981) Describes in detail the various methods used to manage Dutch elm disease, shows how they are related, and explains how they can be combined to provide an effective management program. Emphasizes the need for leadership, cooperation, and technical know-how in setting up a management program. (20 pages)

Extension Folder 310. "Oak Wilt" by D.W. French and Ward C. Stienstra. (Revised 1980) Gives background on oak wilt, symptoms and causes, with color photos to illustrate. Describes how the disease is spread, and how it can be detected and controlled. (6 pages)

Extension Folder 401. "How's Your DED/ST I.Q.?" (1978) Contains a quiz on ten basic points about Dutch elm disease and shade trees with answers. An eye-catching, basic informational piece. (flyer)

Extension Folder 488. "Leaf Spot Diseases of Deciduous Trees" by Asimina Gkinis. (1979) Describes conditions under which leaf spots develop and general characteristics of leaf spot diseases. An extensive chart gives information about leaf spot diseases of various trees, including cause of infections and control measures. (6 pages)

Extension Folder 504. "How to Inject Elms With Systemic Fungicides" by Asimina Gkinis and Mark Stennes. (Revised 1980) A practical guide to injecting elm trees. For the general public. Discusses how to select a tree to inject, when to inject, equipment and chemical needed, and step-by-step injection instructions. Many illustrations. (To be used in conjunction with slide set No.333 "Elm Tree Injection") (6 pages)

Plant Pathology Fact Sheet 23. "Verticillium Wilt of Trees and Shrubs" by Ward C. Stienstra. (Revised 1980) Describes cause and symptoms of verticillium wilt and gives recommendations for saving infected trees. A list of susceptible trees is provided as well as a list of safe replacement trees. (2 pages)

Tree Selection

Tree Line 2. "Shade Trees for East Central Minnesota" by Jane McKinnon. (Revised 1979) Discusses tree species most appropriate for replanting in the East Central District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Tree Line 7. "Shade Tree for Southeastern Minnesota" by Jane McKinnon. (1977) Discusses tree species most appropriate for replanting in the Southeastern District of Minnesota. Includes detailed description of each species mentioned. (2 pages)

Tree Line 12. "Shade Trees for Southwestern Minnesota" by Jane McKinnon. (1978) Discusses tree species most appropriate for replanting in the Southwestern District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Tree Line 13. "Shade Trees for West Central Minnesota" by Jane McKinnon. (1978) Discusses tree species most appropriate for replanting in the West Central District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Tree Line 14. "Shade Trees for Northeast Minnesota" by Jane McKinnon. (1978) Discusses tree species most appropriate for replanting in the Northeast District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Tree Line 16. "Shade Trees for North Central Minnesota" by Jane McKinnon. (1978) Discusses tree species most appropriate for replanting in the North Central District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Tree Line 18. "Shade Trees for Northwestern Minnesota" by Jane McKinnon. (1978) Discusses tree species most appropriate for replanting in the Northwest District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Tree Line 23. "Shade Trees for South Central Minnesota" by Jane McKinnon. (1978) Discusses tree species most appropriate for replanting in the South Central District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Tree Line 26. "Shade Trees for Central Minnesota" by Jane McKinnon and Richard Rideout. (1980) Discusses tree species most appropriate for landscape plantings in the Central District of Minnesota. Includes detailed descriptions of each species mentioned. (2 pages)

Horticulture Fact Sheet 22. "Street Trees for Minnesota" by M.C. Eisel. (1977) Discusses important considerations in selecting trees for street plantings, tips on care of plantings, and gives lists of trees suitable and not suitable for street plantings. Includes map of tree hardiness zones. (2 pages)

Extension Folder 298. "Fitting Trees and Shrubs into the Landscape" by Mervin Eisel. (Revised 1979) Discusses trees commonly used in landscape plantings. Includes detailed lists of trees with color and height indicated to facilitate planning. (6 pages)

Extension Folder 445. "Shade Tree Evaluation" by Patrick J. Weicherding. (Revised 1980) Tells how to assess the economic value of various shade trees. Discussion is supplemented with step-by-step examples. Includes tables to help make calculations. Intended for professionals and not the general public. (4 pages)

Tree Planting and Care

Tree Line 3. "How to Plant a Tree" by Harold Scholten. (1977) Step-by-step planting procedures are described and illustrated with drawings. (2 pages)

Tree Line 15. "Fertilizing Shade Trees" by Richard Rideout. (Revised 1978) Discusses the importance of fertilizing, what fertilizer to apply, when to fertilize, and several fertilizing techniques. (2 pages)

Tree Line 17. "Protecting Trees and Shrubs Against Winter Damage" by Richard Rideout. (1978) Describes types of winter damage and symptoms, including sun scald, browning of evergreens, die back, root injury, heaving, and rodent damage. Gives details on how to protect trees. Diagrams illustrate. (2 pages)

Tree Line 19. "Minimizing Salt Injury to Shade Trees" by Patrick J. Weicherding. (1978) Describes how salt injures shade trees, symptoms of such injury and ways to minimize damage. Includes a chart showing the relative salt tolerance of various shade and ornamental trees. (2 pages)

Tree Line 20. "Trees for Modifying Home Energy Consumption" by Patrick J. Weicherding. (1978) Discusses how to plant trees around the home for maximum temperature control throughout the year. Includes description of the home heat exchange process, role of trees in heat exchange, and planting hints for homeowners for year-round energy conservation. (2 pages)

Tree Line 21. "Protecting Shade Trees from Construction Damage" by Patrick J. Weicherding. (1978) Describes the damage that typically occurs to trees near areas where construction is underway. Tells how to diagnose construction damage and gives tips on preventing damage, such as controlling traffic, caring for tree roots, watering, and pruning. Detailed diagrams. (2 pages)

Extension Bulletin 196. "Planting Trees for Farmstead Shelter" by Marvin Smith and Harold Scholten. (Revised 1980) Explains how to locate and plan a shelterbelt, how to prepare the land, what to plant, planting techniques, and care after planting. Also tells how to renew old groves. (16 pages)

Extension Folder 317. "Pruning Trees and Shrubs" by Mervin Eisel. (Revised 1980) Explains reasons for pruning, tells when to prune, and describes correct tools and techniques. Illustrations. (6 pages)

Extension Folder 402. "Planting Landscape Trees" by Richard Rideout. (1978) A detailed discussion of the techniques for planting small shade trees. Describes ways trees are sold, and care of trees after planting. Line drawings illustrate techniques described. (6 pages)

Extension Folder 511. "Tree Management in Minnesota Communities: A Guide for Developing a Community Forestry Program" by Patrick J. Weicherding. (1980) Gives an overview of the components of a good community tree management program. Outlines procedures for establishing such a program and lists assistance sources. (4 pages)

Using Diseased Wood

Tree Line 9. "Drying Elm Lumber" by Thomas Milton. (1977) Makes the point that wood from diseased elm trees can be a useful resource. Describes elm wood characteristics and uses, seasoning elm lumber by air drying and by kiln drying. Illustrated with drawings and photos. (2 pages)

Tree Line 10. "The Portable Bandmill for Sawing Diseased Elm and Oak" by Dennis Dark. (1977) Discusses use of portable bandmill in tree sanitation programs, sawing wood into lumber or ties. Talks about conventional sawmills and their disadvantages, how the portable bandmill works, its advantages and disadvantages. Includes price tables for hardwood lumber and ties. (2 pages)

Tree Line 11. "Basic Specifications for Elm Sawlogs" by Lewis T. Hendricks. (1977) Includes description of sawlogs, hardwood log-use classes, and practices in Minnesota. Includes tables of standard grades and information on sanitation measures. (2 pages)

Extension Bulletin 412. "Utilizing Diseased Elm in Minnesota" by Dennis M. Dark. (1978) Discusses the ways in which diseased elm wood may be used in different wood products. Describes basic elm wood characteristics, log specifications, solid wood, veneer, roundwood and fuelwood products. Describes deterrents to marketing and potential solutions. Appendix lists sawmills in Minnesota that use elm logs. (20 pages)

FILMS

Films and slide programs may be borrowed by contacting:

Visual Aids
1 Coffey Hall
1420 Eckles Avenue
University of Minnesota
St. Paul, Minnesota 55108

Rental price for non-Extension groups is listed at the end of descriptions below.

No. 3111. "Dutch Elm Disease" (10 min., color, Sly Fox Films, 1976) Using a series of still images, this film outlines the origin and spread of Dutch elm disease. It discusses actions to be taken to help curb the spread of the disease. General in its approach, the film is useful for opening community discussions. (\$4.50 rental for non-Extension)

No. 3577. "Time for Decision" (30 min., color, Iowa State University, 1967) This film shows three steps in the control of Dutch elm disease: sanitation, preventing root graft transmission, and chemical treatment. Explains each step as well as the life history of the beetle which carries the fungus causing the disease. Focus is on experiences of communities in Iowa. Excellent for community groups. (\$7.50 rental for non-Extension)

No. 3059. "The Urban Forest" (15 min., color, Kansas State University, 1976) Explains the need for proper forest management in urban areas. Stresses development of permanent urban community forestry programs in cooperation with state and extension forestry departments. Looks at some successful community programs. For adolescent or adult audience. (\$4.50 rental for non-Extension)

No. 3422. "Dutch Elm Disease—Catalyst to Community Forestry" (21 min., color, Colorado State University) The first part of this film examines the history of Dutch elm disease and the measures needed to control the disease. The film then explains how community forestry programs can be organized to help prevent similar catastrophes in the future. (\$7.50 rental for non-Extension)

SLIDE SETS

No. 120. "Dutch Elm Disease in Minnesota" (John R. Mizicko, assistant specialist, pesticide training; Ward Stienstra, extension plant pathologist; and Mark Ascerno, extension entomologist, University of Minnesota, Revised 1978, 63 slides, color, cassette tape—automatic, inaudible 1000 Hz pulses, 19 min.) Covers the development of Dutch elm disease in the United States, and particularly in Minnesota. Includes its causes, symptoms, spread, and control. Describes the life cycle of the fungus and elm bark beetles, and explains their interaction with one another in the disease complex. Discusses all phases of disease control which are commonly practiced. For use with the general public, but has enough detail to be useful in training tree inspectors and others involved in Dutch elm disease detection and control. (\$3.00 rental for non-Extension)

No. 333. "Elm Tree Injection" (Asimina Gkinis, assistant extension plant pathologist and Mark Stennes, graduate assistant, Plant Pathology, University of Minnesota, 1981, 68 slides, color, cassette tape—automatic, inaudible 1000 Hz pulses, about 20 min.) Gives detailed information on how to inject elms with systemic fungicides to protect them against Dutch elm disease. Goes through the injection process step-by-step. Describes equipment needed, explains how to calculate the solution, and shows how to set up and use the injection apparatus. Also discusses how to select appropriate trees for injection. For the general public. (Folder 504. "How to Inject Elms With Systemic Fungicides" must be used with this slide set.) (\$3.00 rental for non-Extension)

No. 479. "Wood Boring Insect Pests of Shade and Evergreen Trees" (William J. Phillipsen, assistant extension entomologist, and Mark E. Ascerno, extension entomologist, University of Minnesota, 1980, 39 slides, color, cassette tape—automatic, inaudible 1000 Hz pulses, 12½ min.) Shows how to identify some of the more important wood boring insect pests of shade and evergreen trees in Minnesota—insects that bore or tunnel adjacent to or into the woody portion of the plant. Includes prevention and control techniques such as cultural, chemical, and mechanical practices. (\$3.00 rental for non-Extension)

No. 133. "Shade Trees for Southern Minnesota" (Jane McKinnon, extension horticulturist, University of Minnesota, 1977, 44 slides, color, cassette tape—automatic, inaudible 1000 Hz pulses, 22½ min.) Suggests a variety of shade trees to plant to replace lost elms most suited to the southern part of Minnesota. Includes information on care of trees and gives hints on landscaping. (\$3.00 rental for non-Extension)

No. 223. "Shade Trees for Minnesota" (Jane McKinnon, extension horticulturist, University of Minnesota, 1977, 80 slides, script) Discusses trees which may be suitable for replacing lost elms. Gives examples of large, medium, and small trees and discusses whether they are appropriate for home landscaping purposes or better suited to parks, boulevards, or other public locations. Includes details on how trees are sold, care, and placement of new trees. Designed so set may be used in its entirety or in sections. (\$3.00 rental for non-Extension)

No. 342. "Identification of Common Trees in the Upper North Central States" (Marvin E. Smith, extension forester, University of Minnesota, 1961, 89 slides, color, script) Shows 33 native trees, including a full view of the tree and a shot of the bark and leaves. Explains the characteristics needed to identify

common trees, but does not give information on growth habits or economic value.

No. 355. "The Reasons for Fertilizing Urban Trees and Shrubs" (National Arborist Assn., 1976, 79 slides, color, cassette tape—both audible tones and automatic 1000 Hz pulses, 15 min.) Explains the reasons and needs for fertilizing trees and shrubs in the landscape. Includes some discussion on nutrient deficiencies. For professional arborists and the general public. (\$3.00 rental for non-Extension)

No. 356. "The Tools and Techniques of Fertilizing Urban Trees and Shrubs" (National Arborist Assn., 1977, 79 slides color, cassette tape—both audible tones and automatic 1000 Hz pulses, 15 min.) An introduction to the methods of applying fertilizer to trees and shrubs for the professional arborist. Includes surface, drilling, and leaf application; and soil and trunk injection. For professional arborists only. (\$3.00 rental for non-Extension)

No. 350. "The Reasons for Pruning" (National Arborists Assn. 1976, 79 slides, color, cassette tape—both audible tones and automatic 1000 Hz pulses, 15 min.) An introduction to the reasons and needs for pruning trees and shrubs in the landscape. Oriented toward the professional arborist but educational for the general public as well. (\$3.00 rental for non-Extension)

No. 349. "The Tools and Techniques of Pruning" (National Arborist Assn., 1976, 79 slides, color, cassette tape—both audible tones and automatic 1000 Hz pulses, 15 min.) An introduction to pruning that shows the tools required and how to use them. Covers techniques such as cutting back, drop crotching, and jump cuts. Should be used in conjunction with field training. For professional arborists only.

DISPLAYS

To reserve a display contact:

Visual Aids
1 Coffey Hall
1420 Eckles Avenue
University of Minnesota
St. Paul, Minnesota 55108
Telephone: (612) 373-1254

Dutch Elm Disease Displays. These are portable, table-top displays on Dutch elm disease. Color photographs illustrate disease symptoms, spread of the disease and proper sanitation techniques. They are accompanied by Dutch elm disease "I.Q. Test" flyers for public distribution. Ideal for placement in public places such as banks, libraries, and at county fairs. They are easily assembled and transported. (48" high, 90" wide, and 10" deep when assembled; folds to 48" x 48" x 5"; weight, approx. 70 lb.)

Tree Identification Signs. A collection of signs is available for people interested in conducting "tree tours" of various kinds. Twenty-six species are included. The sturdy, wooden signs measure 1' by 2' and are mounted on 18" wooden stakes so signs can be placed in the ground. Black lettering on bright yellow background makes signs easy to read from a distance of up to 75 feet away. Two copies of some signs, three copies of others, are available. May be borrowed for up to two weeks. A complete listing is available.

March 1981
Extension Miscellaneous 105

Shade Tree Resource Notebook. A three-ring looseleaf binder containing all materials published by the University of Minnesota, Agricultural Extension Service, related to Dutch elm disease and shade trees. Also includes information provided by the Minnesota Department of Agriculture and the Minnesota Department of Natural Resources on administration of shade tree programs. Notebook is for use by county extension agents and interested municipalities. Available early 1982.

Trees, Shrubs, and Vines for Minnesota Landscapes. Extension Bulletin 463. Merv Eisel. Detailed descriptions of trees, shrubs, and vines for use in landscaping. Advantages or problems of specific plants are explained. Includes cold-hardiness zones. 28 pages. Available early 1982.

Cankerworms. Extension Folder 625. Mark E. Ascerno. Describes life cycles of fall and spring cankerworms. Describes cankerworm damage and explains control methods. Table of insecticides is included. 4 pages. Available January, 1982.

Insecticide Suggestions to Control Tree and Shrub Insects in 1982. Extension Folder 414 (Revised). Mark E. Ascerno, D.M. Noetzel, P.K. Harein, and L.K. Cutkomp. Tables of insecticide suggestions listed according to insect pests. 8 pages. Available early 1982.

Tree Inspector Workshops

March — April 1982

Whether you are managing the forest in a small town or a large city, caring for your community's trees demands a wide variety of skills.

The 1982 series of Tree Inspector Workshops, sponsored by the Minnesota Department of Agriculture's Shade Tree Program, addresses the unique needs of the people who care for our communities' trees.

Conference topics range from basic information on Dutch elm disease to aspects of urban forest management.

In addition to covering a range of technical subjects, conference sessions

will also address a problem facing every community this year: less money. Funding alternatives, use of volunteers, ways to increase community support, and the changing focus of the state Shade Tree Program will be explored.

Certified inspectors and administrators will also receive the new notebook, "Community Forestry". Designed as a resource for local programs, this 200 page guidebook outlines urban forest management, tree maintenance, pest control, tree planting, wood utilization, community relations and administration.

Bill Of Fare

Section A

Shade Tree Program Introduction
Dutch Elm Disease
Oak Wilt
Trees: Rules, Regulations and Laws
Dealing With The Public
Tree And Wood Identification
Other Tree Diseases and Problems
Tree Inspector Test

Section B

Shade Tree Program Update
Managing Forestry Programs With
Less Money
Problem Solving
Upcoming Tree Problems
Reducing Tree Mortality
Buying Contractor Services
Trees And The Law
Dutch Elm Disease/Oak Wilt Refresher
Improving Community Relations
Preparing For Arbor Month
Preparing A Tree Inventory
Master Planting Plans
What's New In Chemicals?



When And Where

Each workshop begins at 8 a.m. and ends at 4 p.m.

March 2	Marshall, Southwest State University
March 5	Eden Prairie, South Hennepin Technical Center
March 9	Hibbing Community College
March 11	Thief River Falls, Northland Community College
March 12	Fergus Falls Community College
March 23	White Bear Lake, Lakewood Community College
March 25	Rochester Community College
April 3	St. Paul, University of Minnesota

Which Section Is For Me?

Section A is for individuals who want to gain certification for the first time as a tree inspector. After attending all sessions, participants may take the Minnesota tree inspector certification examination.

If you are already certified, Section B is for you. Topics in this section are designed for persons who are city foresters, tree inspectors, community leaders, mayors, city clerks and persons who administer tree or parks programs.

The 1982 series of Tree Inspector Workshops is the only continuing education program offered this year to meet the tree inspector recertification requirement of Minnesota law. (Even if municipalities do not receive grants from the state Shade Tree Program, tree inspector certification is required by law of all communities operating local programs under Minnesota Statutes 18.023.)

Certified tree inspectors who are also licensed pesticide applicators may attend the session, "What's New In Chemicals?" and renew their license, (trees and ornamentals only).

Registration

Registration is \$15 per person and covers all workshop sessions, handout materials, tests, and lunch. **PRE-REGISTRATION IS REQUIRED.**

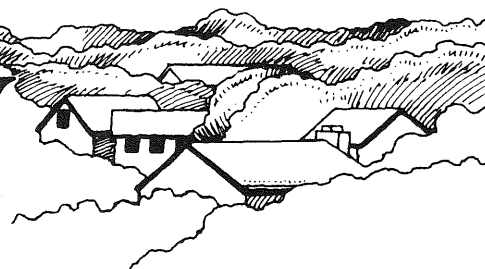
Individuals who register early for Section A will receive study packets in advance of the workshop.

To register, fill out the form on the back and mail the form and a check for \$15 to the address listed on the form. Make the check payable to "Tree Inspector Workshop".

Registration forms and fees must be received by February 10 for the March 2, 5, 9, 11 and 12 workshops. Registration forms and fees for the March 23 and 25, and April 3 workshops must be received by March 1.

OVERSTORY

Minnesota's Urban Forestry Newsletter



Volume 2, Number 1

September 1981

New Use For Dursban Approved

University research has led to a state label for an insecticide that may now be used in a new manner to help control both native and European elm bark beetles in cut elm logs with bark intact.

University of Minnesota scientists William Phillipsen, Val Landwehr and Mark Ascerno have been studying ways of rendering wood utilization methods compatible with disease management programs through a grant from the Minnesota Department of Agriculture Shade Tree Program. Until now the approved methods included promptly chipping the elm wood or debarking it.

Now, should chipping or debarking operations fall behind schedule or prove unfeasible, a back up system using the insecticide Dursban[®] 2E is available. This product is to be used only at waste wood utilization-disposal facilities operated by municipal personnel conducting a shade tree disease management program. Application of the insecticide is to be made under the supervision of personnel who have successfully completed pesticide applicator training workshops offered jointly by the Agriculture Extension Service and the Minnesota Department of Agriculture. This method is **not** to be used by individual homeowners.

Elm logs should be treated with a coarse low-pressure spray to the entire bark surface. To prepare the spray, thoroughly mix 2 2/3 fluid ounces of Dursban 2E with water to make up a total of 1 gallon of mixture (equivalent to 2.1 gallons in 100 gallons of water). Spray should be applied thoroughly and uniformly to the point of runoff. (One gallon of mixed spray will cover a 32 inch diameter log, 20 feet long.) A single application will provide season long control of elm bark beetles in the bark of stored logs. The special local needs label must be in possession of the user at the time of pesticide application. This method is approved for use in Minnesota only.

—William Phillipsen
University of Minnesota



State Fair Exhibit

Plant health specialist Tom Maier answers questions at the Shade Tree Program's exhibit at the 1981 Minnesota State Fair. The exhibit pointed out the practical and aesthetic reasons for planting trees near homes, offices and throughout the community. Municipalities that participate in the Shade Tree Program may borrow this exhibit by contacting Lynn Schwartz, Shade Tree Program, at 612/296-0339.

Dutch Elm Disease Rising After Years of Decline

After several years of decline, Dutch elm disease appears to be on the increase throughout the state.

After Shade Tree Program staff observed an apparent increase in the disease incidence while on inspection tours, a telephone survey was conducted by the Shade Tree Program, Minnesota Department of Agriculture.

In mid-July 20 communities were asked to compare the number of trees lost this year as compared to the number lost by the same date last year. According to the survey, only four of the 20 communities did not show an increase in disease incidence over 1980.

Increased losses ranged from three to 200 percent, with the average increase in Dutch elm disease between 25 and 30 percent. Some communities had already exceeded their total losses for 1980 by mid-July of 1981.

In addition, a few Minnesota communities—Ada, Warren, Thief River Falls,

Pelican Rapids and Gary—reported their first case of Dutch elm disease. Red Lake County also confirmed its first case of the disease in the county.

Entomologists from the University of Minnesota indicate a major cause for the increase this year is the rise in the elm bark beetle population. Studies over the past few years indicate that the beetle population has risen by a factor of three as a result of two consecutive mild winters, according to William Phillipsen, extension entomologist.

Final data from Shade Tree Program participating communities will not be available until January. Communities are required to report their total 1981 losses by December 1. This information is compiled in the Shade Tree Program's Report to the Legislature issued in January.

—Richard Haskett
Shade Tree Program

Autumn Planting Requires Planning

Autumn is becoming increasingly popular as a second planting season for shrubs and trees. There are several good reasons to consider fall planting. Sometimes it is the first planting opportunity after a summer construction project. For some cities it is easier to schedule planting for the fall rather than the spring. There may also be an opportunity to reallocate funds from other uncompleted projects to autumn planting before the next fiscal year.

Whatever your reason, fall planting requires careful planning because timing is critical. When planting in the fall, you are working with a deadline imposed by winter. In order to meet that deadline, the earlier you can order your stock the better. If the stock you are planting is in containers, you can plant in early fall and have the rest of this ideal season for the plants to reestablish themselves.

If your project involves bare root nursery stock, then you will have to wait until after the plants go dormant and can be safely dug. Either way, make your arrangements early. In fact, autumn is also the best time to order your planting stock for next spring.

What type of nursery stock you decide to use will be important in determining what species you can plant in the fall. All container grown stock is suitable for fall planting. There are also few problems encountered with balled and burlapped deciduous planting stock.

However, particular caution is advised when fall planting balled and burlapped evergreens and bare root deciduous trees. The evergreens should be planted as early in the fall as possible so they have the remainder of the season to reestablish themselves. Because planting has to be done later with bare root deciduous trees, there are some varieties that should not be fall planted. The following varieties are **not** recommended for bare root fall planting.

Silver maple
Norway maple and varieties

Red maple and varieties
Birch varieties
Sunburst honeylocust
Russian olive
Poplars and cottonwood
Hackberry
Plum and cherries
Apple varieties
Pear varieties
Swamp white oak
Red oak
Pin oak
Willow varieties
European mountain ash

After your stock is ordered, there are several things you can do to prepare for planting. First, make sure you have your planting sites located. Schedule the necessary equipment and labor, and make arrangements for bark chips, stakes and water. Keep in contact with your contractor or tree supplier and let the company know you want to get your trees planted as quickly as possible. This can help you

avoid being the last project done or receiving the last nursery stock shipment before winter.

If buying nursery stock from a larger wholesaler, it often helps speed things along if you pick up the stock yourself. To do this, tell the nursery when placing your order that you wish to be notified when your order is ready. Be sure to take hay or other packing material as well as a tarp on the truck.

If all your planning and prodding fail to get the job done, or winter comes early, you can still plant past normal freeze-up by heavily mulching your planting sites with hay or barkchips. If you are planting past freeze-up, you ought to think seriously about postponing delivery of the stock until spring.

Some planting practices take on particular importance during fall planting. A wood chip mulch around the base of the tree insulates the soil and promotes root growth.

Continued on Page 3

Special Levy Authority Modified By Legislature

Local government's authority to special levy beyond mill levy limits has enabled many Minnesota communities to conduct shade tree disease control and reforestation programs. However, the authority was repeatedly modified during the 1981 session of the Legislature.

Some confusion exists concerning how 1981 legislative action affects special levy authority available to finance local shade tree programs for 1982.

There are three important considerations that affect a city's calendar year 1982 shade tree levy.

1. Any amount up to an eight percent increase over the 1981 levy that a city levies

to finance its shade tree program must now be considered a general levy. Even if the 1981 levy was a special levy, it must now be considered a general levy for 1982 and is therefore subject to the eight percent increase limit.

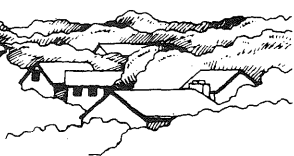
2. If a city wishes to increase its program costs more than eight percent it may do so. In this case, the amount above the eight percent increase is considered a special levy and is not subject to levy limitations.

3. Any amount that a city levies beyond 108 percent of its 1981 total levy (shade tree and most other levies combined) is not eligible for homestead credit.

Local shade tree program managers received a letter in July from Shade Tree Program Director Richard Haskett outlining some of the implications of 1981 legislative action on levy limits. "Levies and levy limits are extremely complex matters. I encourage program managers and tree inspectors to discuss local needs with their city clerks," said Haskett. "In addition, staff from Shade Tree Program and the Minnesota Department of Revenue can also answer questions." For more information call Richard Haskett at the Shade Tree Program at 612/296-8580 or the Local Government Aids Division of the Minnesota Department of Revenue at 612/296-2246.

OVERSTORY

Minnesota's Urban Forestry Newsletter



Published jointly by the Shade Tree Program, Minnesota Department of Agriculture; Division of Forestry, Minnesota Department of Natural Resources; and the Agricultural Extension Service, University of Minnesota.

Address inquiries to Lynn Schwartz, editor, Shade Tree Program, Minnesota Department of Agriculture, 90 West Plato Blvd., St. Paul, MN 55107. Telephone: 612/296-0339.

OF INTEREST



More than 100 male gypsy moths were trapped during the 1981 season, compared to 27 moths in 1980, according to the Plant Industry Division of the Minnesota Department of Agriculture. As in 1980, most of the moths were located in the Twin Cities area. Although data is still being collected and analyzed, this pest is not considered to be established in Minnesota at this time. The trapping program is a cooperative effort of the Minnesota and U.S. Departments of Agriculture. In 1981, the gypsy moth defoliated a record 10 million acres of trees in the eastern United States.

Whether walking, bicycling or riding in a city truck, **tree inspectors are versatile when it comes to transportation** for Dutch elm disease detection. Reggie Redetzke, tree inspector in Osakis, conducted many inspections this year on yet another mode of transportation—the horse. Redetzke's other city duties weren't leaving time for tree inspection during regular work hours. His solution was a horseback ride through town during the early evening hours. "It's worked out beautifully," he said. "It's a good way to exercise our horses and provides good exposure for the Dutch elm disease program. People really take notice when you're on horseback. It draws attention to the program and it makes the job fun."

The **Minnesota Society of Arboriculture** will hold its annual meeting on October 19 in the Holiday Inn South in Rochester. The program topics include: trees and distribution lines, municipal nurseries, pruning the new city forest, laws on trees, and leasing vs. purchasing equipment. For more information, call Jim Herman at 612/822-2126.

A **Symposium and Workshop on Dutch Elm Disease** will be held October 5 - 8 in Winnipeg. The program is sponsored by Environment Canada and the Province of Manitoba. Topics include Dutch elm disease identification, elm bark beetle monitoring, tree injection, biological actions to control DED, and elm utilization. For more information phone 1-204/477-4619 and ask for a registration kit.

At last, a portable debarker? Perhaps. In July the City of Minnetrista was awarded an experimental grant from the Shade Tree Program to develop a portable debarker. This innovative wood utilization machine could be transported to residential sites for "on site" processing of downed elm trees. Specifications call for a machine that:

1. has the capacity to debark and split 6" to 32" diameter logs,
2. is easily and legally transportable as an integral trailered high speed unit,
3. takes no more than two people to operate, and
4. is cost effective.

Minnetrista has until June 30, 1982 to complete the project.

After September 1 the Minnesota Department of Natural Resources, Division of Forestry, accepts **orders for tree seedlings**. Order early since some varieties are in short supply. For more information call 612/296-4479.

Many Minneapolis citizens and organizations **donated funds to the Minneapolis Parks Foundation** to restore greenery to the city after a tornado touched down in June. Three groups made special contributions. The Men's Garden Club of Minneapolis provided assistance to restore the plant collections surrounding the Lake Harriet Rose Gardens. WAYL radio, in conjunction with Fotomat stores, promoted a Green Tree project with contributions going to Minneapolis, St. Paul and Roseville—all hit by the tornado. In addition, the group Twist and Shout which plays at the Lake Harriet Bandstand donated concert proceeds to the Parks Foundation.

Sunscald Protective Measures Evaluated

Large and rapid temperature fluctuations can cause considerable sunscald injury on thin barked tree species.

Through a grant from the Minnesota Department of Agriculture Shade Tree Program, Dr. Margaret Litzow and Dr. Harold Pellet of the University of Minnesota are testing a number of protective materials to determine which measures best prevent rapid temperature fluctuations in cambial tissue.

Of the eight materials tested, preliminary data indicate that white paint and common commercial tree wrap did not significantly reduce the rate of temperature fluctuation over that of an unprotected tree. These materials may not be the most effective protective measures.

Reflective materials such as aluminum foil demonstrated the slowest rate of temperature change. Foil, such as Foylon I, may be the best wrap to use. Foylon I is a shiny silver-colored fabric-like material. Currently it is not sold as a tree wrap, but is used in greenhouses to reduce heat loss at night.

Research is still underway and Drs. Pellet and Litzow will continue monitoring tree wraps throughout the coming winter to determine if evidence continues to point to foil as the best material available to prevent sunscald.

For more information, contact Dr. Pellet or Dr. Litzow at the University of Minnesota Landscape Arboretum at 612/443-2460.

Autumn Planting

Continued From Page 2

reestablishment as well as retains moisture. Adequate watering is just as important in the fall as it is during the summer. Letting your plants go into the winter in a water stressed condition invites problems. Finally, if you have the option, avoid fall planting on windy and exposed sites. Save those sites for early spring planting.

— Doug Rau
Minnesota Department of
Natural Resources

Marketing Trees As Sawlogs Can Save Your City Money

Some elms and other trees removed as part of your community's Dutch elm disease sanitation program are potentially valuable. Marketing these trees as sawlogs can save, rather than cost, your city money.

While not all trees removed can be sawed into lumber, it is possible, with adequate planning, to use many trees as logs. What is necessary is an understanding of what type of logs a sawmill will buy and the ability of your crews or tree removal contractors to recognize potentially valuable trees.

The first step is to locate a sawmill, preferably close by, that is willing to buy your sawlogs. Don't assume that the nearest sawmill is two hundred miles away. There are mills located throughout the state. Many of these mills saw woodland elm as a matter of course, but rarely work with trees grown in the city.

City trees have a justifiably poor reputation with many sawmills. Nobody is going to risk a thousand dollar saw blade if he thinks there is a chance of nails, lag bolt or concrete in the logs. You may have to convince the sawmiller that your logs are of high quality and that they are usually metal free. Fortunately, there are usually a number of visual indications if there is a problem with a particular log. Sometimes the form or location of the whole tree will

suggest that you should not send it to a mill. Hand-held metal detectors have also proved useful. As a general rule, if in doubt about a particular log, reject it rather than risk losing a buyer for your logs.

When you find a mill willing to buy your logs, it is important that you learn what sizes, lengths and quantity the mill wants. You should also find out what the mill is willing to pay for elm logs. Generally, elm brings anywhere from \$40 to \$80 per thousand board feet at the mill with "risky" city trees usually on the lower end of the scale.

Be sure you understand what does and does not qualify as a sawlog. The following table will give you some indication of the minimum requirements for length, form and condition of a sawlog. Be sure the removal crew is familiar with specifications for valuable logs and that there is a procedure for saving valuable logs when trees are removed. Special markings for trees you wish to save might be helpful.

What It Takes To Make A Sawlog

1. Smallest end diameter inside bark is 10" or larger.
2. Generally 8'-8" or 16'-8" long (check with mill about desired lengths).
3. Free of crotches, large branches, frost cracks.

4. Minimal internal rot (this is important in smaller diameter logs).
5. Free of metal, concrete, etc. (be particularly careful in the vicinity of main crotches).
6. Free of ring shake (separation between annual rings).

In addition to selling your logs, another option is to hire a mill to custom saw them and the city keeps the lumber. It is a rather inexpensive way to get hardwood lumber for everything from park benches to bangboards for city trucks. If you have your elm cut for city use, you should take particular care when drying it. Careful drying can overcome elm's natural tendency to warp and check. Properly dried, elm is a very tough, durable and beautiful wood, with many uses.

If you need help in locating sawmills in your area and organizing a log sale, contact your local Minnesota Department of Natural Resources (DNR) forester or county extension personnel.

If you produce only a few logs at a time and want to accumulate enough to sell in truckload quantities, see the article on page 1 about a new use for Dursban[®] 2E.

— Doug Rau
Minnesota Department of
Natural Resources



c/o Shade Tree Program
Minnesota Department of Agriculture
90 West Plato Blvd.
St. Paul, MN 55107

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SUMMARY OF ALL EVALUATION FORMS FOR OVERSTORYAre there topics in Overstory that you would like discussed?

"Employment opportunities

"New fungus outbreaks."

"Diseases of flowering crabs."

"Aspects of urban forestry - inventory, research on sanitation."

"Dates other certificates are needed (i.e., burning permits, landfills)."

"Job listings."

"What's happening in other areas of the country."

"Jobs available."

"Dangers in handling trees (i.e., cutting and loading)."

"More on nursery plantings."

"Anything of general interest to the public - I use some of your articles in news releases."

If you rated Overstory as the best or better than average publication, what do you like about it that should be continued?

"Concise."

"Relevant issues."

"Informative."

"Pertinent articles."

"Short, concise, meaningful articles."

"Timely articles."

"Keeps me informed."

"The length is good."

"Articles are very specific to the needs of municipalities."

"It keeps you up-to-date on meetings and deadlines."

"Just enough to keep reader's interest."

"It's good and its present form - I like new policies, events, and deadline reminders."

If you rated Overstory as the best or better than average publication, what do you like about it that should be continued? (Cont.)

"Excellent layout of front page - color of stock compliments the typeface."

"No advertising."

"It deals with Minnesota."

"The level of language used - its variety."

"Very comprehensive - you can read what interests you."

"Continuous update."

"Current information."

"Up-to-date information on dealing with tree problems."

"Updates and reminders of coming events - reports, workshops, etc."

"I feel an adequate number of items are addressed - it's thorough enough to be informative yet not verbose."

"The new information given in it."

"Very good localized information."

"I like it as it is."

"Reports on how tree programs are progressing."

"New information."

"Pertains to city problems and Shade Tree happenings."

"Keeps you up-to-date."

"Keeps you current on changes, disease control methods, tree pruning, etc."

General Comments.

"Keeps us updated with current information that's pertinent to program and problems. Overstory reports are a good source of public interest news."

"We need more personal contact like it was with the state representatives coming around."

"Expand Overstory. If not, publish it every month. Also, more in-depth articles and updates on managing an urban forest. Overstory provides excellent summaries of current information in Dutch elm disease control."

"It's a job well done - keep up the good work."

General Comments. (Cont.)

"It does a good job of keeping you informed about what's going on in the Shade Tree Program."

"It should go out more and contact just what's available by better communication."

"Keep up the good work."

"Very good."

"Keep up the good work."

"Just continue it."

"We need more oral input to local government and rural control. I like the newsletter. It lets me know what's going on in the world of urban agriculture."

"I like the articles because they give the main overview without getting boring and if I want more information, I can always get more."

"Use a different name."

"I would be interested in more information about various trees and pests."

"Use more tried and failed or tried and succeeded projects - say what's happening in the state."

"Expand reforestation publicity."

"Add equipment advertisements, project grants being reviewed."

"Discuss evaluations of plant materials in urban situations (i.e., salt spray, air pollution, street writing, soil compaction)."

"I'd like to see a short article where an experienced forester relates a valuable tip on how he improved his inspections, relations with people, dealings with contractors, etc."

"I'm in a small city where everything is my responsibility, so much of my reading is skimming unless I find something I think I need to read carefully."

"I feel Overstory and other pamphlets along the way is a little cheaper plus reaches more people. I'm sure us tree inspectors can help to alert the natives to read any news on the Dutch elm disease program."

"Make color prints of examples."

"The program with the least noise or problems gets the least attention."

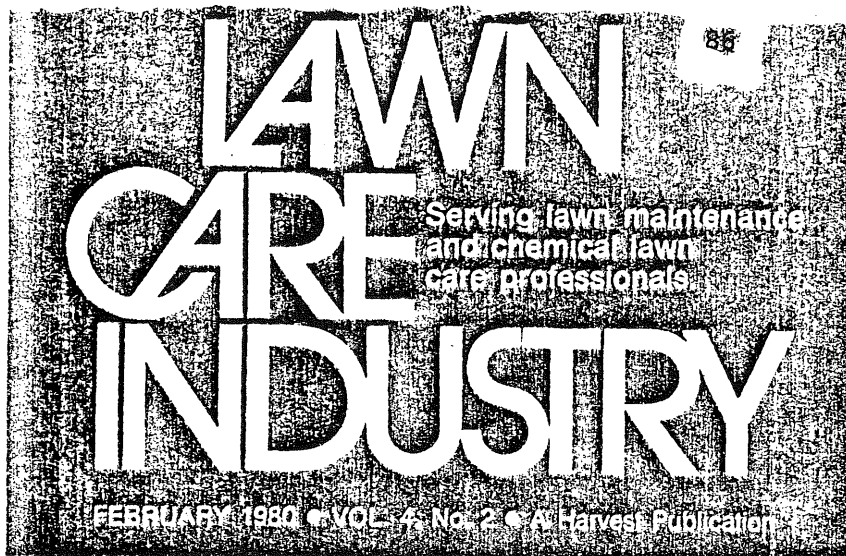
"Do not do more in-depth articles."

General Comments. (Cont.)

I rated Overstory average because I compared it to an excellent publication."

"I see tremendous potential for the programs continuation with the information you provide - you create an enthusiastic feeling for me."

"Good publication."



HORTICULTURE

Fighting elm disease with insecticides in Minnesota

A recent Special Local Need label has cleared the way for treatment of healthy elm trees in Minnesota to control native elm bark beetles, the primary insect vectors of Dutch elm disease there. The beetle control program, using Dursban insecticide is viewed as a potentially significant "second step" to sanitation programs in slowing the spread of Dutch elm disease fungus, *Ceratocystis ulmi*.

"A good sanitation program, including debarking of all elm firelogs, is still the top priority,"



Sanitation programs are the key to limiting elm bark beetle reproduction. In addition to cutting down and removing diseased and dying trees, debarking of elm logs and firewood is essential.

Bill Phillipsen, extension entomologist at the University of Minnesota, said. "We're reaching the point, though, where cost and logistics in epidemic areas are making it very difficult to keep up with diseased tree removal and downed log disposal.

"In the Minneapolis-St. Paul-Bloomington area alone, es-

timates on diseased elms in 1979 range up around 77,000 trees. With present costs for labor and equipment, the price tag for removal and disposal will run in the neighborhood of \$30 million. We find we're in the same "catch-up" situation with Dutch elm disease that other communities faced in the lower Midwest and East about 10 to 20 years ago."

Research on Dursban insecticide has been conducted in several communities during the past several months by Phillipsen and associates Mark Ascerno and Val Landwehr, under funding from the Minnesota Department of Agriculture Shade Tree Program. The product earlier was registered and has been used successfully in native elm bark beetle control programs in Canada. A U.S. federal label is pending, reports Dow Chemical, manufacturers of the insecticide.

Dutch elm disease was first reported in Minnesota in 1961. As is typical of many infestations around the country, the disease had relatively little impact on elm populations for 12-14 years. Then the disease multiplied rapidly.

"In the last five years, we've lost more than 20 times the number of elms killed in the first 14 years. The rate will continue to escalate unless comprehensive management programs are implemented," Phillipsen said.

"Costs for tree removal are essentially unavoidable. If communities do nothing to slow down the spread of Dutch elm disease, they will still have to remove dead and dying trees to keep them from falling across power lines, into houses, over traffic routes and so forth. We're looking at practical ways to disperse

these removal costs over several years."

From a total elm population of about five million trees, the Twin Cities seven-county metropolitan area still have 4.5 million that are disease-free, according to Phillipsen. If the disease is allowed to progress at its normal logarithmic rate, virtually all elms in that area will be destroyed over the next ten years.

With today's cost of tree removal averaging nearly \$400 each, the expense would add up to a staggering \$1.8 billion. This does not take into account the aesthetic impact on communities, depreciation in home values due to loss of the majestic shade tree, or damage losses attributed to falling limbs and trees.

Two insects serve as elm fungus disease carriers the smaller European and the native elm bark beetle. Both reproduce during the summer months in downed elm logs or diseased trees, which points up the impor-

tance of sanitation programs to deprive both insects of egg-laying sites, as well as to reduce the natural reservoir of disease fungus.

In some parts of the country, European elm bark beetles are the prevalent species. In Minnesota, however, native beetles far outnumber the European.

Destroy Elm Wood Before July 15

Efforts to remove and dispose of dead and dying elm wood between now and July 15 can have a significant impact on the spread of Dutch elm disease this summer, says extension entomologist William Phillipsen of the University of Minnesota. Communities have the opportunity now to substantially reduce the numbers of elm bark beetles available to transmit the Dutch elm disease fungus from infected to healthy elms.

Elm bark beetles breed beneath the bark of elms that are dead or dying from any cause. When the brood wood has been infected with Dutch elm disease, the new generation of beetles that emerges will carry the fungus to the healthy trees where they go to feed. If the breeding sites are destroyed before the new beetles come out, then healthy trees are less likely to become infected.

Phillipsen urges communities to step up their wood removal efforts before July 15 because that is about the time a second generation of elm bark beetles will appear. "The first generation of adults started moving around during the first part of June," he commented. "Since then, some have had time to reproduce themselves, and it is these new adults that we are concerned with now. Other new beetle populations will be produced later in the summer, and we'll need to be concerned about them as well. However, in the next few weeks we have the chance to get rid of a large number of the beetles."

Homeowners can help by looking for and helping to destroy all potential breeding sites, such as standing elms that are diseased or dying, elm fire wood piles, dead branches in elms and elm stumps with the bark intact.

If people want to keep their elm wood for any reason, they must debark it so it will be unsuitable for beetle reproduction. However, debarking elm is difficult, and such efforts will have to be started immediately if they are to be completed by July 15.

TREE WATCH



Local programs aim to banish elm beetle, replenish shade trees

by Carol Iammatteo
Staff writer

Trees may very well be one of man's most important resources, they provide shade and protection, and can provide a gentle background for everyday activities.

Dutch elm disease, however, can destroy that lovely tree in the front yard that has been almost like a member of the family for years and years.

During the 1960s, Dutch elm disease began to claim one of Minnesota's most popular shade trees. The state began to retaliate with a Dutch elm disease control program and a shade tree program to replace the lost trees.

Locally, City Tree Inspector Sid Stender is gearing up for another season. Although the disease control program continues throughout the year, most of the activity begins in the spring and runs through the fall.

The Dutch elm beetle, a flying insect,

one inch in diameter and look for telltale brown streaking. A healthy tree sample should be white and damp. There may also be signs of beetle tracks, he said.

"Once a tree has Dutch elm, it's just a matter of time before it will have to be cut down," Stender said. Keeping a diseased tree will lead to other trees in the area also becoming infected, he added.

Property owners with healthy trees may be able to keep them that way by spraying them, he said. Anyone interested in spraying their elm trees can call Stender at the city garage and he can recommend a spray treatment. "It's expensive," he said, "but so is losing a tree."

"A guy can't go on someone's property, put a red mark on the diseased tree, hightail it back into the truck and take off."

Al Quie's budget cuts may affect how much of the cost will be reimbursed this year, however. Last year, a homeowner was reimbursed about \$2.50 per inch for half of the tree. "That figure will be upped this year because of inflation, but I don't know by how much," Stender said.

The cost for cutting a tree ran anywhere from \$75 to \$200 last year, he said.

Here's a rundown on the number of trees found to have Dutch elm disease and that were removed during the last few years: 44 trees were removed in 1980, 47 trees were cut down during 1979, and 16 trees were felled during 1978. The Dutch elm disease prevention program was started in Waconia in 1974, according to Stender.

AN EFFORT is being made to replace at least part of the lost trees in communities. Last

year, Stender said the city received roughly 70 trees from the state. They were, in turn, given to interested residents who lost a tree to Dutch elm disease free of charge and planted by them. Most of the trees planted last fall were ash and hackberry.

This fall, property owners who have had an elm tree removed will be sent a letter letting them know they can apply for a free new shade tree.

Stender said the disease prevention program is working in Waconia. "It may not appear that way, but I think our loss of trees is slowing down." He credits the city's removal and sanitation methods for the slowdown.

"Our loss of trees is small compared to some other towns in the state." I think we're starting to get somewhere."

FEB 1 1982

MATTISON Co Rec.

Strong feelings prompt survey



Barb Haynes

Text and photo by Mary Donnelly

"I want to save the program! Of course I'm concerned about losing my position, but I'm more concerned with the affect reducing the elm program will have on the city."

It was this concern that brought Little Falls City Forester, Barb Haynes, to the Record office last week and led to the publishing of a survey in this issue seeking city homeowners' input on the Dutch Elm Control Program.

"People have to realize what a devastating affect dropping this program will have," said Haynes as she reflected on the city's tentative plans to reduce the elm program drastically. "If I could take people into the future 2-5 years they would see a town practically void of shade trees because, like most cities, Little Falls is predomi-

nantly elm (4,800 elms now survive in Little Falls). If the disease goes unchecked we will lose all our elms. It (the disease) will spread like wild-fire."

Coincidentally, explained Haynes, when the program was originated in Little Falls in 1977 it was speculated that it might already be too late to curb the spread of Dutch Elm Disease. The disease, however, was held in check and has remained under a ten percent loss ratio since.

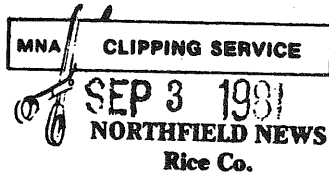
"We never promised to eliminate the disease -- it's more like we're buying time," explained Barb. "The trees are going to die no matter what. The question is do we want to pay hundreds of thousands of dollars for dead tree removal in the next couple years or stretch that out over 20-50 years."

Haynes commended the city on past "enthusiasm" in the Dutch Elm Program, which has earned it the honor of being named as a Tree City, USA. "Boulevard trees, when planted in an orderly fashion, especially the older trees, give an air of stability to a town," said Barb. "I think it's important when talking about attracting new business to make the town look established and aesthetically pleasing."

"It's important that people respond to the survey because the fate of the program will affect everyone," said Barb. "A lot of people say the program should be dropped because everything else is being cut, but what most people don't realize is whether the program is dropped or not, the trees will

have to be removed, either by the property owners themselves or by the city. Most property owners can't afford to have trees removed at up to \$300 a tree, but once they die and become hazards, they'll have to go. It's actually more economical to continue the program than to spend all that money -- especially now when we can't afford it."

Barb urged everyone to complete the survey as quickly as possible so that their voice may be heard in the decision making process. In addition, anyone interested is invited to the city council meeting on Monday evening to voice their opinion.



108 Tree replacement program commences this week

The City of Northfield is ready to start the 1980 Shade Tree Replacement Program this week.

A number of Norway maple, Sugar maple, Golden maple, Marshall ash, White ash, Hackberry, and Prunus Newport trees have been ordered for planting on the boulevards within the city. These trees will be delivered and planted towards the end of October by the city's Street and Parks Department.

Under this program, a property owner will pay from \$7 to \$15 for each tree planted on his boulevard. Payment must be made at the time the order is placed.

The tree height will be approximately eight to ten feet, and the trunk diameter will be approximately 1 to 1½ inches. The city crews will dig the holes for the trees with an auger after the location of the tree is marked by the city park department. If the hole cannot be dug with the auger, the property owner must dig the hole.

After the trees are planted, the property will assume the responsibility

of caring for and watering the trees as necessary to give them a good start. Some trees may require wrapping and all should be staked.

A list of guidelines to determine if a tree can be planted on a boulevard follows: Trees must be at least 30 feet from any existing tree; trees must be no closer than 40 feet to a corner intersection; trees must be at least six feet from any driveway or approach sidewalk. trees should be approximately 15 feet from any power pole or utility shut off. Overhead power lines should be considered when determining the location of a tree. Also, if an adjacent lot has no trees on the boulevard, new trees should be planted approximately 15 feet from the property line. It is also suggested that a variety of trees be maintained in an arera.

To obtain a tree, contact Sandy Bremer at 645-8832. She will answer any questions and take orders on a first-request basis. There is information on the trees available in the Building and Planning Office.

AUG 12 1981

Homeowners given break in DED control

by Margie Zebell

There is new hope for city homeowners who are afraid of losing their beautiful elms to the dreaded Dutch elm disease (DED)

This summer, with a cutback in federal funding, the city forestry department has been forced to slow down its ongoing DED control program in trees on city property. This current slowdown is allowing the department to expand its services to homeowners concerned with saving their trees, according to city forester Mark Schnobrich.

For the past three weeks, Schnobrich says the department has been renting out the equipment necessary for homeowners to inject their trees with Arbotect 20-S, a therapeutic and preventative fungicide that combats the symptoms of DED for up to three years.

The injection process involves digging out the dirt around the tree roots to expose the root flares. Holes are then drilled in the root flares, with about two holes drilled for every inch of tree diameter. "T's", which are connected to a tube from the tank of fungicide, are then placed in the holes. The injection treatment takes about two hours, depending upon the size of the tree and the weather conditions.

A \$35 fee charged to the homeowner covers the rental of the equipment and also

the technical assistance the city will provide in administering the fungicide to the tree. The homeowner is responsible for tree preparation, exposing the roots to allow the fungicide to be applied, and the chemical cost, averaging at about \$200 a tree, according to Schnobrich.

Since the procedure is expensive, Schnobrich says it should only be considered for elms of "high value," for example, those which provide much of the shade for a home. He adds that the best candidates for injection are the trees that are "isolated," or located at least 50 feet from other elms, and those that presently show no signs of infection.

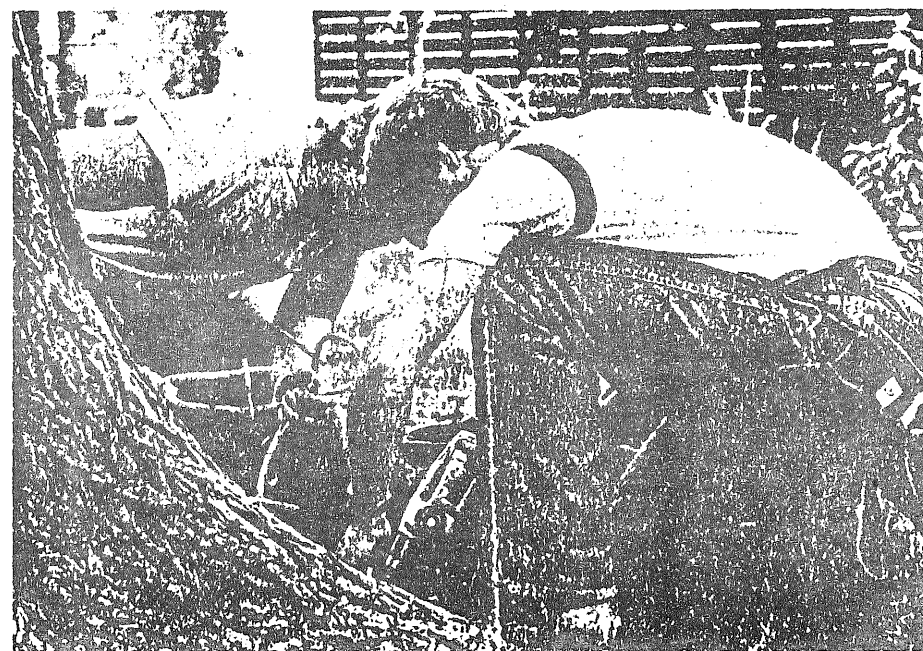
According to William Phillipsen, University of Minnesota extension entomologist, homeowners should periodically check their trees for the symptoms of DED which include wilting and yellowing near the top of the tree and brown or gray-to-blue streaks on the wood beneath the bark.

Although it is possible to inject a tree that already shows signs of DED, Schnobrich says that the chances of tree survival "decrease rapidly" once the symptoms are present. He recommends injection only if the symptoms appeared after July 1 (meaning the disease is not too well established yet), and wilt is present in less than 5 to 10 percent of the tree crown.

He adds that any tree a homeowner con-

siders for injection first will be assessed by a member of the forestry department to

make sure the injection is a worthwhile procedure in the attempt to save the tree.



Tree inspectors Dave Flink, left and Don Mueller, right, make a homeowner's elm ready for an injection of Arbotect 20-S, a chemical used to protect against Dutch elm disease (DED) for up to three years, by drilling holes into the tree's root flares and inserting a string of small T's. The T's are connected to a tube through which the chemical flows from a nearby tank.



Tree City USA. Granite Falls again earned designation as a Tree City USA. The city is one of only 16 in Minnesota to have earned the honor. Department of Natural Resources representative Meg Hanisch and Mayor Merlin Buchholz unfurl the flag that the city may fly in honor of its achievement.

108 City Celebrates Arbor Day

Mayor Merlin Buchholz reaffirmed Granite Falls commitment to trees and the Dutch elm disease prevention program at an Arbor Day ceremony April 24. The Mayor was joined by city officials, citizens and a representative from the Department of Natural Resources (DNR).

The Arbor Day celebrants planted three Japanese tree lilacs on the east side landing area of the footbridge. Meg Hanisch, representing the DNR, also presented the city with a "Tree City USA" flag. This is the second year that Granite has earned the right to be called a "Tree City USA." There are 16 cities in Minnesota that claim the honor.

There was also some bad news for the Arbor enthusiasts. Hanisch said that federal funds for the Dutch elm prevention program have been slashed. Last year the city received \$45,000 to perform root grafts, remove diseased trees and implant root barriers. These sanitation techniques are used to prevent the spread of the Dutch elm disease.

City forester Dave Paulson said it appears that the city will receive \$5,000 instead of the \$45,000 this year. The Mayor noted that the city had been anticipating the cut. He added that the city remains committed to controlling Dutch elm.

In his speech the Mayor described trees as both an aesthetic and economic resource. "Tree planting

makes sense," said Buchholz. "By increasing the attractiveness of homes and neighborhoods, trees raise property values."

He also noted the energy benefits of trees. "Shade trees cool buildings an average of eight degrees in summer. When planted as windbreaks they provide winter fuel savings of up to 40 percent. This translates into dollars and cents in each of our pocketbooks."

Trees also play an important role in rural areas, according to the Mayor. "Trees reduce soil loss caused by wind erosion — a problem which costs U.S. farmers over \$1 billion a year."

Buchholz said there is an "urgent" need for tree planting in Minnesota. "Oak wilt and Dutch elm disease are spreading throughout the state, leaving many neighborhoods and communities with stump-lined boulevards and empty yards. All of us here in Granite Falls are well aware of the destruction that Dutch elm disease has brought our trees."

Dutch elm disease claimed 479 trees in Granite Falls last year, according to Buchholz. But he said efforts to control the disease are working. He noted that the city lost 14 percent fewer trees in the central urban area due to those efforts.

Prevention alone is not the answer. Buchholz called upon citizens to plant new trees every year. The city too is doing its part.

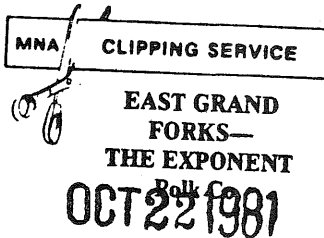
Buchholz said that 377 new trees will be planted in boulevards and other public areas by the end of May. City workers will also plant 2,000 seedlings in the campsite park area.

Private initiative is important. "Private citizens must also show your support by caring for our newly planted trees and planting trees of your own," said the Mayor. "The cost for caring is not that great. For only 30 gallons of water per tree per week for 25 weeks equals only 100 cubic feet per year. At present rates that only comes to \$1.90 per tree per year and little of your time."

The Mayor asked citizens to be on the watch for vandals. Already this year vandals have destroyed four city trees with a replacement cost of \$180.

Buchholz concluded his speech by inviting interested citizens to contact the city forester, Dave Paulson, for any information they may seek on trees. The forester's office is located below the west end of the footbridge. He can be contacted at 564-2550.





Workshop on Dutch Elm tonight

¹⁰⁸
The one-night workshop on "Dutch Elm," postponed earlier this month, will be conducted at 7 tonight (Thursday, Oct. 22) in Senior High Room 107, according to Dale Skyberg.

The free public workshop, designed for homeowners concerned about the spread of the disease, will include instruction by Greg Ustruck, a representative of the Minnesota Shade Tree Program.

Skyberg, East Grand Forks, parks and recreation director, said topics will include the warning signs of Dutch elm disease, methods of treatment, preventive measures and law regarding proper disposal of diseased elms.



NOV 17 1981

Park Board celebrates 100,000 new trees

¹⁰⁸
The Minneapolis Park and Recreation Board recently sponsored a celebration commemorating the planting of over 100,000 trees in the city of Minneapolis. A hackberry tree was planted in Loring Park honoring the occasion, with brief remarks by Minneapolis Mayor Donald Fraser, Park and Recreation Board President Naomi Loper, Parks Superintendent David Fisher and Director of Park Forestry David DeVoto.

Since 1975, 112,107 new trees have been planted in Minneapolis parks, boulevards and golf courses. More trees have been planted publicly within the city than have been victimized by Dutch elm disease or lost to storms and vandalism during the same time period.

The planting took place in the northwest corner of Loring Park, near the "Loring Elm." This elm tree, planted by Charles Loring, the first Minneapolis Parks Superintendent, was the first tree planted by the Park Board in Loring Park.

Workshop Evaluation

Section B

1. Workshop date and location: 1982 Workshop Series
2. You attended as:
170 a certified tree inspector.
25 a city administrator or manager.
8 no special category. (Please specify title or position) Forestry Tech
3. Were the workshop date, location, and time convenient?
174 Yes 10 No - If not, please share your reasons _____

4. Please evaluate the individual workshop presentations. Your criteria may include quality of instruction, topic content, clarity of course objectives, use of teaching/visual aids, opportunity to participate, etc.

	Excellent	Good	Average	Below Average	Rock Bottom	
Shade Tree Program Update	75	102	11			188
Managing Programs With Less Money	30	95	50	11	2	188
Reducing Tree Mortality	54	80	19	2		155
Upcoming Tree Problems	36	69	27	1		133
Small Group Discussion	53½	77½	20	5	4	160
Preparing a Tree Inventory	14	59	34	5		112
Master Planning	17	54	30	10	1	112
What's New In Chemicals	13	51	24	3		91
Improving Community Relations	24	45	6			75
Preparing For Arbor Month	25	28	6			59
Contract Specifications; Trees and the Law	16	47	23	2		88
Dutch Elm Disease/ Oak Wilt Refresher	24	34	7	1		66

5. Were the topic presentations you attended relevant to you as a tree inspector or program administrator?

157 Yes 2 No 1 SOME

6. What topics do you want covered in the future? _____

7. Have you attended Tree Inspector's Workshops in previous years?

157 Yes 6 No

If so, how did this workshop compare to the others?

99 Better than in previous years.

45 About the same.

2 Worse than ever.

3 Neutral; no opinion.

8. Would you attend an optional summer workshop (given at three or four locations) that covered topics such as pruning, planting care, site selection, field discussion of other insect and disease problems, or other possible topics?

115 Yes 26 No

9. Do you think the notebook will be a useful reference tool?

160 Yes 1 No

10. What aspect(s) of this event did you like best? _____

11. What aspect(s) did you like least? _____

12. What would improve this workshop? _____

1982 TREE INSPECTOR WORKSHOP
EVALUATION COMMENTSWhat topics do you want covered in the future?Marshall
3-2

More time for group discussion, a feeling for the problems and answers in other cities.

Have all of it a refresher.

Problem solving.

The same topics.

Very good as it is.

Eden Prairie
3-5

Explore more fully the different levels of government inspectors who are involved, and how they might relate as employees to supervisors and to management.

More specific training in judging the quality of nursery stock and planting.

Public Relations.

Other tree problems.

Savings, tree preventive maintenance, the trees we have, and those freshly planted.

Research updates on plant materials, diseases, effectiveness of accepted or new maintenance procedures.

How budget cuts affected the program. What was done to manage with less?

Permits and their uses.

The same.

Solar tents for drying firewood and its effect on beetle breeding in elm wood.

More on inventory and computers--development of urban forestry program (components) vs. strictly tree disease aspects as in the past.

Any new information or research of specific nature of Dutch elm disease.

What topics do you want covered in the future?

Hibbing
3-9

How we can burn elmwood.
Discuss actual letting of contracts and contract specifications.
Working with contractors - proper tree placement in harmony with utility companies to save problems in future.
Trees that will be best suited for colder weather.
More problem solving and a chance to express problems and exchange remedies among various communities and aspects of program.
Pruning, Planting and planning.
A utility point of view, either underground or above that pertain to selection of proper tree specifications that will best live in harmony with those conditions.

Thief River Falls
3-11

Keep pretty close to the same.
Similar.
More disease controls.
More information regarding species that have good shade tree potential.
Identification of fungi for cities with their own labs (positive Dutch elm disease identification).
Proper methods of pruning.
More hand on pruning.
Same as it was here.
Program is now OK.
Same.

Fergus Falls
3-12

Chemicals.
Financing of maintenance and sanitation programs.
Diseases of trees.
Continue with disease and insect updates, more information on what varieties are well adapted to our area.
Chemical treatment to common tree disease.
What we can do now that there is no state money.
More on tree maintenance with visuals (slides).
Wood and tree identification hands on.
Same as you have been using.
How to get city contractor to help you.
Chemical use, managing with less money, legislation.

Lakewood
3-23

Go deeper into the practical experience end. Most administrators and supervisors know less than the workers about the practical application end.
Reforestation.
Elmwood storage alternatives.
Why the state dropped you. Is there anything you could have done to keep your (our) program alive?
Future?

What topics do you want covered in the future?

Rochester
3-25

Oak wilt.
Insects and diseases.
Pruning and planting.
The same.
More on tree mortality and tree maintenance.
Update on new and improved controls.
Public relations and disease control.
About the same.
More update on what is new.
Shade tree problems.
All of it.
Elm sanitation and reforestation.
Diseases.

U of M
4-3

Keep up review.
Same format - perhaps more on reforestation, sources of stock, etc.
How to improve wood utilization.
More on diseases and other problems of shade trees.

What aspect(s) of this event did you like best?

Marshall
3-2

All of it.
Tree inventory.
Trees and the law.
Group discussions.
Togetherness.
Laws and upcoming problems.
Problem solving. Educating the public.
Choices of different areas to attend. I wish I would have been two persons because I wanted to be in two sessions at the same time. I liked all the posters and materials available. A great dinner.
The community forestry guide. An excellent notebook.
Improving community relations.
The notebook.

What aspect(s) of this event did you like best? (Cont.)

Eden Prairie
3-5

The notebook and small group discussion.

The reference materials--the notebook is top flight, absolutely first rate.

Arbor Day information.

Tom Maier and Kris Caulfield presentations.

Handout materials were excellent.

Relevant topics and excellent notebook. I appreciated the problem solving session. However, I felt the problems covered were too large for a quick 15 minute plan of attack.

Reducing tree mortality, upcoming tree problems, what's new in chemicals.

The notebook and its content are excellent--thank you!. The facilities were great! The film was good--provided some fresh ideas.

Knowledgeable speakers, good reference material, notebook is very good.

I thought the notebook was an excellent idea. I also thought Shade Tree Program update was informative.

The facility.

The notebook and overall workshop quality.

The handouts for Contract Specifications, and Trees and the Law were excellent.

Shade Tree Program update and reducing tree mortality.

The group participation and handout materials. The group participation.

The small group discussion.

The location, good atmosphere, and small group discussion.

Participation by those in attendance.

The problem-solving session.

All of the presentations were very helpful and in my opinion well explained by a well qualified group. The notebook will be very helpful.

Preparing for Arbor Month, handout materials, Arbor Day presentation and community relations.

What aspect(s) of this event did you like best?

Hibbing

3 2

Small group discussion.

Variety of material covered, good discussion groups.

The workshop was good this year.

Notebook.

The morning sessions.

Having Elena de La Rosa (reporter for the Minneapolis Tribune) interview our table during lunch. Also, I like the notebook.

Reducing tree mortality.

Colored card noon interaction.

Excellent notebook this year.

Group discussion.

Introduction.

Thief River Falls

3-11

The workshop covered or touched the entire area, it was a well planned age First workshop in two years that I enjoyed.

Everything is good.

Hate to see the program dropped.

Tree inventory and problem solving.

Chemicals, Dutch elm disease, and oak wilt refresher course.

Problem solving, update, refresher.

Shade tree problems.

Meeting with other tree inspectors and discussing similar problems and how handle them.

Managing program with less money.

The group problems.

The personal touch expressed by most of the speakers. We were spoken to--no above.

Very nice notebook. I feel that should of had this before, but I am very glad and appreciate the notebook now. The group discussion and the cards.

Updates.

Coffee and lunch.

Discussion after lunch.

Everything was excellent.

The questions we answered on the worksheet while eating lunch.

Excellent notebook.

Small group discussion.

Kris.

Kris and lunch.

Shade tree update.

Small group.

Presentations.

The problems on cards.

The choice of topics that were offered. You could attend the ones that would help you the most.

The variety of subjects.

Option to attend sessions of interest.

What aspect(s) did you like the least? (Cont.)

Eden Prairie
3-5

Contract specifications. I expected more than was given regarding how to protect myself with contractors and contracts or bids.

The picture of all the kinds of trees and diseases, and the planting of trees.

Master planning.

Inventory systems.

Redundancy (some topics were covered at the Horticulture Industries Conference, such as shade tree problems and reducing tree mortality) and irrelevancy (good ideas but not applicable to tree inspectors' jobs because decisions are made at a higher level).

Lack of outline on presentations that were not covered in the notebook.

Preparing a tree inventory.

The masterplan.

The problem solving project.

What's new in chemicals.

The use of our lunch time so rigidly.

Hibbing
3-9

None.

Minnesota statutes and Shade Tree Program--it could have gone into more detail.

Conflicts of classes falling at same time.

Chemicals.

No dessert for lunch.

Should have more films about how to inspect, prune, plant, etc.

Lunch was too small.

Utility involvement, in addition to any other related industry, could be better examined i.e. pruning techniques, herbicide use, and growth inhibitors.

Thief River Falls
3-11

Laws.

Managing programs with less money.

None.

No new equipment ideas.

The heat in Room A-16.

Managing programs with less money.

Fergus Falls
3-12

Problem solving.

All day session for people who are not on the public payroll (their own time).

?

I don't know.

Some speakers were hard to follow but did have excellent information offered.

Small group discussion.

Managing with less money.

Tom Maier was hard to follow when he spoke but the information presented was excellent.

Tree inventory.

Reducing tree mortality.

Problem solving was too long for the actual good sense accomplished.

Straight lecture.

All.

I have no quarrel with any of them. All were of interest.

Lakewood
3-23

All OK.

Noon lunch (good but not enough).

Lunch.

Managing with less money.

Class on legal aspects, so damn crowded - could not sit down.

Tree inventory presentation - should have shown examples of systems that Minnesota communities are using. Reference list was good.

The problem solving session was a waste of time and effort.

Lunch.

Rochester
3-25

None.

That this may possibly be the last one.

Group discussion.

The test.

Managing programs.

None. All was very good.

Nothing.

One speaker did not project well. Presentation of material was in tune but personal expression short.

None.

Managing shade tree program with less money. Every town has to work it out the best way for them.

U of M
4-3

Running behind schedule.

Parking at University of Minnesota and walking to Green Hall.

What would improve this workshop?

Marshall
3-2

Less hours. People think it is too long.

Keep up the good work.

Don't cover so many subjects.

I think it would be better to pass out the workshop evaluation before the class starts. That way we could evaluate each segment directly after the presentation is over.

The directions in the letter said to go to parking lot B, where is B? Never found it. Maybe a little diagram for location of parking and location of building.

More group discussions.

Eden Prairie
3-5

The problems and discussions are good. I think grouping and feedback could be enhanced by forming groups by area, i.e., southwest metro, northcentral, southeastern, etc., after lunch. Answers could be more from the people who actually tried the solution. The system integrity will hold while being compared with others of different levels. Discussion of differences and similarities between inspectors in areas that may attend other workshops.

Time.

Discuss recent research concerning shade trees. Small lab workshops on disease and problem identification would be helpful.

More positive reinforcement of correct attitudes and approaches to caring and developing attitudes.

Provide outlines of presentations.

Less redundancy with the Horticulture Industries Conference.

I'm not sure. The master planning session should have a handout.

This workshop could become a half-day session. It would be better received and most likely better retained.

Shorten to half-day session.

Longer group discussion time.

More time.

Being this was my ninth annual meeting, I feel the program is in good hands. Therefore, it should be left with those people.

Session on tree diseases and insects from minor to major problems.

What would improve this workshop?

Hibbing
3-9

No.
Nothing I feel a lot of has been applicable.
I sincerely enjoy the visual aids when used as examples for diseases and insects.
Do it in summer and actually have on the site inspection of disease, planting, removal, etc.
Trimming and removal rotation schedules.
More public relations (even though today's was well presented).

Thief River Falls
3-11

Excellent.
Maybe could spend more time on each subject.
Show us examples of a complete tree inventory and a complete master tree plan.
Shorter time on it.
Give public officials the option to attend.
I think that extension folder 445 "Shade Tree Evaluation" should be handed out with the discussion of tree inventory.
Give more information on shade trees that are good replacements for elms.

Fergus Falls
3-12

Have on Saturday - hard to give up day of work for workshop.
In small groups, discussion of local concerns rather than those handed out would be better.
?
More pretty women.
More emphasis on state statutes, procedures, legalities.
The topic questions used in the discussion groups all depicted towns of small status, thus, the answers took the viewpoint of a small town person. A larger population number might get some different maybe more complex answers that may help more people - if the questions are of both large and small. More visual slides.
More group discussion to see what other communities are doing to solve the problems of tree diseases.
Start later for parties that have to travel long distance.
Shorten the hours.
?? don't know.
Have it back in Fergus Falls again.

Lakewood
3-23

Have it again next year.
Too bad there won't be one - I think the summer optional workshops would be very beneficial.
Improve lunch.
Money from the state to continue Shade Tree Program next year, more lunch.
Smaller classes, more group involvement.
Outside speakers (other than Minnesota employees).
More slides.
"Thank you all." The State of Minnesota and cities will suffer with the (cut-off) of your excellent staff and programs.
Have soft drinks instead of just coffee.

What would improve this workshop?

Rochester
3-25

After last week, money.

Knowing what the future holds for this program, a special thanks to Dick and staff. You have been a great source of help. Best of luck in the future. I hope our paths cross many times in the future.

More on tree maintenance.

I would like to thank each one of you that have worked with the state of Minnesota with the Shade Tree Program. Sorry to see you go. Good luck in your new ventures.

Just continue it.

Do not have anything to offer for improvement. One of the best workshops that I have had the opportunity to attend in my job with agriculture extension, zoning, sanitation, and feedlot, etc.

Nothing. I have come to all the workshops except one since the program started. This was the best.

More money.

Half days.

It is excellently programmed, just create funds so it can be continued. Some could use a public address system.

Let Kris talk more.

More funding of tree programs.

U of M
4-3

The weather.

Nothing except No. 6 above.

More small group interaction.

Introduction to ecological principals succession, pesticide residual, etc.

Maybe give more examples of things mentioned.

More problem solving and group discussions to present a mix of ideas.

Miscellaneous comments.

Eden Prairie
3-5

I would like to attend a summer workshop but it is our busy season and a demanding time. It would be hard to get away.

I would like a workshop in St. Cloud.

I don't have time to attend a summer workshop.

I wish you would consider a workshop in St. Cloud again.

One located in the southcentral part of state would be better.

I'm too busy in summer to come to a workshop.

It seemed that common problems and the way in which different communities deal with them should provide a suggested means and errors which were met.

1982 TREE INSPECTOR CERTIFICATION EXAMINATION

1. The Dutch elm disease causal agent is called:
 - a. Ceratocystis ulmi.
 - b. Verticillium albo-atrum.
 - c. Cytospora chrysosperma.
 - d. Dothiorella ulmi.
2. The primary emphasis in any successful Dutch elm disease control program should be:
 - a. Reforestation.
 - b. Arbotect injection.
 - c. A sanitation program.
 - d. Dursban treatment of all trees.
3. Oak wilt is caused by:
 - a. A bacteria.
 - b. Nitidulid beetles.
 - c. A virus.
 - d. A fungus.
4. Overland transmission of oak wilt takes place by means of:
 - a. Root grafts.
 - b. Nitidulid beetles.
 - c. Wind-blown spores.
 - d. Rain-splashed spores.
5. An insecticide that may be used to control the population of the native elm bark beetle is:
 - a. Arbotect.
 - b. Ferbam.
 - c. Dursban.
 - d. Lignasan.
6. Bark-intact elm wood can be rendered pest-risk free by:
 - a. Chipping, debarking, burning, or burying.
 - b. Stockpiling them at the nearest approved utilization site.
 - c. Spraying each homeowner's woodpile with Dursban.
 - d. All of the above.

7. It is necessary to either grind out or debark all stumps resulting from removal of diseased elm trees because:
 - a. It eliminates the possibility of root graft transmission.
 - b. It destroys elm bark beetle breeding sites.
 - c. It prevents spore mat formation.
 - d. It facilitates reforestation.
8. Late season Dutch elm disease can result from:
 - a. Root graft infection.
 - b. Second generation adult elm bark beetles.
 - c. Adult beetles emerging from elm logs in nearby woodpiles.
 - d. All of the above.
9. An insecticide sprayed on homeowner stored bark-intact elm wood to render this wood pest-risk free is:
 - a. Vapam.
 - b. Dursban.
 - c. Methoxychlor.
 - d. None of the above.
10. Which of the following oak species is least susceptible to oak wilt?
 - a. Red oak.
 - b. Northern pin oak.
 - c. White oak.
 - d. None. All are equally susceptible.
11. The most common way that oak wilt spreads in an infection center is by:
 - a. The disease moving through root grafts.
 - b. The activity of sap-feeding beetles.
 - c. Wind-blown spores following the production of spore mats and pressure pads.
 - d. The presence of man and his activities.
12. The chemical used in the curative or preventive injection of elm trees:
 - a. Dursban.
 - b. Arbotect.
 - c. Vapam.
 - d. Methoxychlor.
 - e. Pentachlorophenol.

13. Dutch elm disease is primarily transmitted by:
- The elm leaf beetle, which is a leaf feeder.
 - The elm bark aphid, which is a sap-sucking insect.
 - The elm bark beetle, which is a bark boring insect.
 - All of the above insects.
14. Dutch elm disease symptoms detectable in early spring are most likely:
- Nothing more than normal winterkill in elms.
 - Defoliation caused by the cankerworm.
 - Carry-over infection from the previous year.
 - None of the above, since the bark beetle is not active until June.
15. Elm bark beetles breed in:
- Healthy elm trees.
 - In recently dead or dying elm trees which are still standing.
 - In bark-intact elm wood (limbs, branches, and remaining stump).
 - In any elm wood regardless of how long the tree has been dead or diseased.
 - b and c.
16. Pressure pads on infected, dying red oak trees:
- Rupture the bark to expose the spore mass.
 - Produce a fragrance that attracts the picnic beetles.
 - Form only when the wood moisture content is still high enough.
 - a and c.
 - a, b, and c.
17. In the most susceptible oak species, the earliest and most obvious symptoms in a tree infected with oak wilt are:
- The wilting of uppermost leaves followed by the rapid wilting of the entire crown.
 - The gradual browning of leaves from leaf tip toward leaf base.
 - The appearance of spore mats.
 - a and b.
 - a and c.
18. When using Vapam to disrupt root grafts, how long after installation of the barrier must you wait to remove the tree:
- Immediately, it is not necessary to wait.
 - One day.
 - One week.
 - Two weeks.
 - It is not necessary to remove the tree if Vapam is used.

19. Mechanical trenching is used to disrupt root grafts. This type of trench should be:
 - a. 12 inches to 18 inches deep.
 - b. 24 inches to 36 inches deep.
 - c. 48 inches to 60 inches deep.
 - d. At least 8 feet deep.

20. Early symptoms of Dutch elm disease are:
 - a. Wilting of leaves usually accompanied by staining of wood.
 - b. Staining of wood only.
 - c. Bark staining and root grafting.
 - d. Wilting of leaves and prominent staining of bark.

21. Which elm species is/are susceptible to Dutch elm disease?
 - I. American.
 - II. Siberian.
 - III. Slippery (red).
 - IV. Rock.
 - a. I only.
 - b. I, II, and IV.
 - c. II, III, and IV.
 - d. I, II, III, and IV.

22. Pruning of any oak trees should be avoided during May and June because:
 - a. Nitidulid beetles, who carry the spores, are attracted to these fresh wounds.
 - b. Pruning stimulates root grafting.
 - c. Wind-blown spores could land on these fresh wounds.
 - d. Pruning diseased elm wood is a higher priority.

23. A red oak that dies of oak wilt in June will usually produce spore masses under the bark in:
 - a. July.
 - b. September of the same year.
 - c. April of the following year.
 - d. June of the following year.

24. Dutch elm disease can be spread by insects and:
 - a. Wind-blown spores.
 - b. The movement of the disease organism through root grafts.
 - c. Spores moving from woodpiles through the soil to infect healthy roots.
 - d. The action of driving rains during spring and summer storms.

25. Proper sanitation procedures for an infected red oak near (approximately 20 feet) healthy red oak trees include:
- a. Immediate and radical (extensive) therapeutic pruning to save the tree.
 - b. Root graft disruption, tree removal, and stump debarking.
 - c. Tree removal and stump debarking.
 - d. Immediate tree removal to stop the spread of the disease.
26. The first generation of European elm bark beetles usually emerge each year in:
- a. April.
 - b. June.
 - c. August.
 - d. September.
27. Generally, elm trees infected through root grafts initially show symptoms of the disease:
- a. Low on the trunk first and progressing up the tree.
 - b. Throughout the entire crown simultaneously.
 - c. High in the crown and progressing down the tree.
 - d. No differently than trees infected by bark beetles.
28. Therapeutic pruning of a Dutch elm diseased tree may be successful if:
- a. The disease did not enter the trees vascular system through a root graft.
 - b. The wilting branches are taken out and disposed of.
 - c. The flagging branch, if it accounts for less than five percent of the total crown, is eliminated along with eight to ten feet of stain-free wood below the visible staining.
 - d. Done only in the late fall or winter to prevent excessive sap flow from the wound.
 - e. a and c.
29. The pressure pads and spore ⁺mass of the oak wilt disease form on:
- a. Red oak (or the red oak family).
 - b. White oak (or the white oak family).
 - c. The formations occur on red oak, on bur oak, and on white oak in equal proportion.
 - d. Any hardwood if the wood moisture content is right, but are most apt to form on red oak.

30. Spraying Dursban on the lower portion of healthy elms in September is meant to:
- Offer late season protection against secondary infection.
 - Kill the European elm bark beetle as it seeks a breeding site beneath the bark.
 - Kill the native elm bark beetle as it burrows into the bark to overwinter.
 - Protect the tree from infection for one year.
31. All effective Dutch elm disease management programs must include four essential strategies. These are: detection, _____, removal, and disposal.
- Injecting fungicides.
 - Spraying insecticides.
 - Root graft disruption.
 - Replanting.
32. Proper sanitation procedures for an infected white oak within 20 feet of other healthy white oak trees include:
- Root graft disruption, and tree removal if it poses a safety hazard.
 - No special sanitation practices.
 - Root graft disruption, immediate tree removal, and stump debarking.
 - Tree removal and stump debarking.
33. By April 1 of each year, a municipal tree inspector must have:
- Inspected all public and private properties for stockpiled bark-intact elm wood.
 - Verified the removal of any remaining low risk elm trees.
 - Verified the removal of previously infected red oak trees.
 - All of the above.
 - a and b.
34. A municipality cannot adopt an ordinance that is more stringent than the Rules and Regulations of the Minnesota Department of Agriculture.
- True.
 - False.
35. The Minnesota Department of Agriculture need not approve a Dutch elm disease control area.
- True.
 - False.

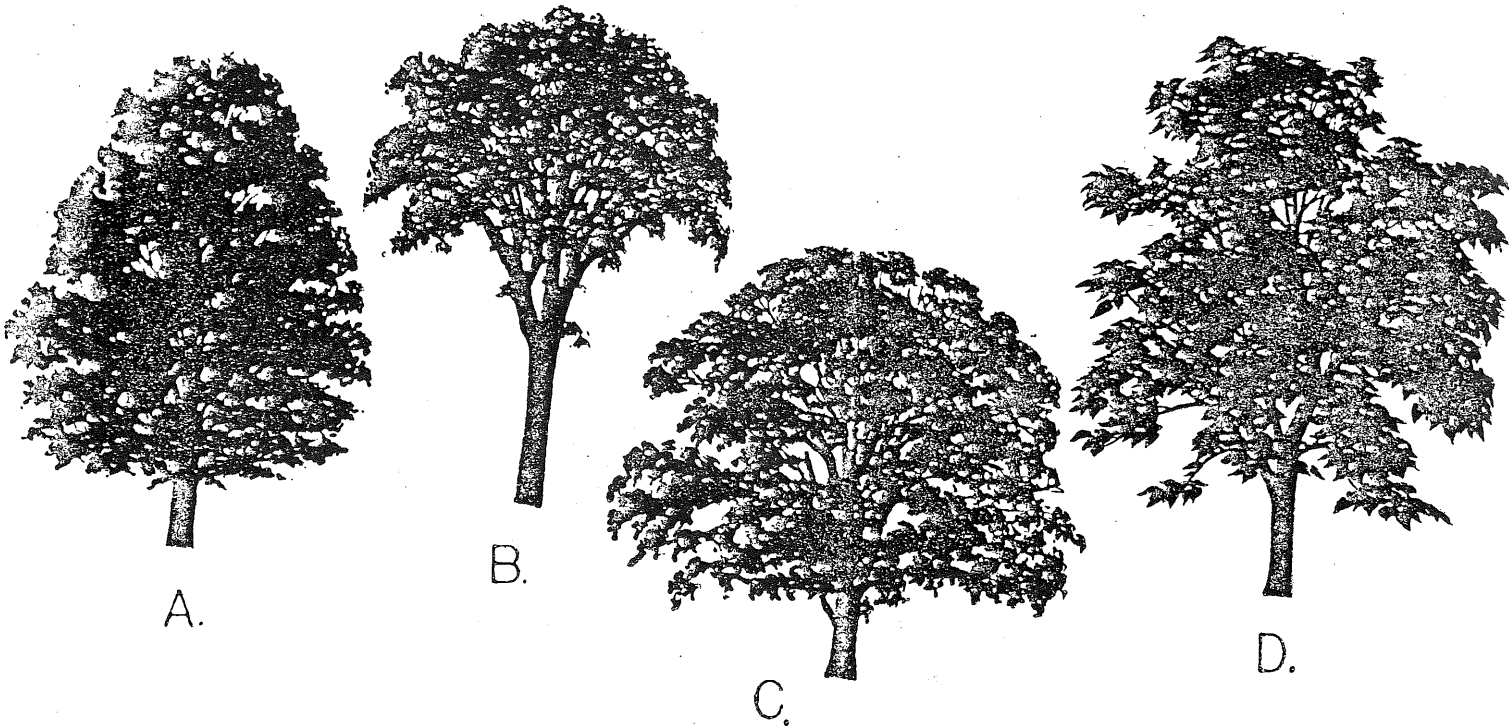
36. A tree inspector does not need to specifically ask for permission to enter private property if public notice has been given.
- True.
 - False.
37. A shade tree, according to the Rules and Regulations, is defined as:
- Any tree located on public property.
 - Maple, elm, oak, and ash trees on public property.
 - Any oak or elm tree within a control area approved by the Commissioner of Agriculture.
 - Any tree on public or private property.
 - Maple, elm, oak, and ash trees within a designated control area.
38. High risk elms are those trees that are recently dead, barren, or have extensive wilt (30 percent or more of crown is wilted or defoliated).
- True.
 - False.
39. According to the Rules and Regulations, the generally accepted field symptoms of Dutch elm disease are:
- Wilting or yellowing of leaves, and staining of wood under bark.
 - Wilting or yellowing of leaves, staining of inner bark, and extensive loss of leaves.
 - Staining of wood under bark, extensive loss of leaves, and loss of bark.
 - Wilting or yellowing of leaves, and staining of outer bark.
40. Bark-intact oak wood from infected red oaks:
- Can never be brought into a disease control area to be used or stored as firewood.
 - Is regulated by a Minnesota Department of Agriculture quarantine.
 - Must be wrapped in a 4 mil plastic from May 1 to July 1 if the wood still harbors the fungus in a reproductive stage.
 - Must be controlled by issuing firewood permits.
41. The Shade Tree Program Rules and Regulations require that all high risk trees be removed within _____ days of notification.
- 5.
 - 7.
 - 20.
 - 30.
 - 60.

42. What is necessary for position confirmation of Dutch elm disease?
- Two or more certified tree inspectors spotting the specific wilted or flagging leaves on an upper branch.
 - Test-positive results from a sample submitted to an approved Dutch elm disease laboratory.
 - Presence of the elm bark beetles in the diseased tree.
 - Presence of the fungi pressure pad beneath the bark.
43. During the growing season all elm trees must be checked for Dutch elm disease symptoms.
- At least once - prior to June 1.
 - At least twice - by June 15 and by September 15.
 - Weekly--by Wednesday for removal by the following Friday.
 - At least three times - by June 15, July 15, and August 15.
 - At least four times - by April 15, June 15, July 15, and August 15.
44. Bark-intact elm wood can be stockpiled:
- In any municipality from September 15 through April 1.
 - Only if a municipal ordinance specifically allows the storage of bark-intact elm wood from September 15 through April 1.
 - Any time at an approved elm wood disposal site.
 - Any time as long as the homeowner obtains a firewood permit from the municipality.
45. In order to mark a tree as diseased, a tree inspector:
- Need only observe generally accepted field symptoms.
 - Must receive a positive report from an approved laboratory.
 - Must wait until 30 percent or more of the crown is wilted.
 - Both a and c.
46. What percentage of the cost of treating or removing diseased shade trees on street terraces or boulevards may be assessed to the abutting property owner:
- None of the cost may be assessed.
 - Up to but not more than 25 percent.
 - Up to but not more than 50 percent.
 - Up to but not more than 75 percent.
 - Up to 100 percent.
47. After certification, which of the following is required of a tree inspector:
- Annual re-examination.
 - Annual attendance in a tree inspector workshop.
 - No requirement, inspectors are automatically recertified.
 - Either a or b.

48. Official positive confirmation of diseased elm and oak trees can be made by the Plant Pathology Disease Clinic at the University of Minnesota.

- a. True.
- b. False.

49. Which of the following silhouettes shown below is the American elm?



50. Which of the following trees can be identified by the alternating layers of light and dark colored bark?

- a. American elm.
- b. Siberian (or Chinese) elm.
- c. Red (or Slippery) elm.
- d. All of the above.
- e. a and b.

51. Elm leaves are what general type of leaf structure?

- a. Pinnately Compound.
- b. Palmately Compound.
- c. Simple.
- d. Twice Compound.

52. Oak leaves are what general type of leaf structure?

- a. Simple.
- b. Palmately Compound.
- c. Pinnately Compound.
- d. Twice Compound.

The next 10 questions refer to the woodpile located in the classroom. You are to identify each piece of wood. If the piece of wood is elm wood, mark "a" on your answer sheet. If the piece of wood is oak, mark "b", and if it is any other species, mark "c" on the answer sheet.

- 53. Log No. 53 B.
- 54. Log No. 54 C.
- 55. Log No. 55 C.
- 56. Log No. 56 C.
- 57. Log No. 57 A.
- 58. Log No. 58 B.
- 59. Log No. 59 C.
- 60. Log No. 60 C.
- 61. Log No. 61 A.
- 62. Log No. 62 C.

The next five questions refer to the tree diagrams labeled "Species A" through "Species E" at the end of the test. For each question, mark the letter to the diagram which correctly identifies the specie listed.

- 63. Which species is Green ash?
- 64. Which species is Red oak?
- 65. Which species is Norway maple?
- 66. Which species is in the White oak family?

67. Species "D" is which of the following trees?

- a. Cottonwood.
- b. Norway maple.
- c. American elm.
- d. Littleleaf linden.
- e. Hackberry.

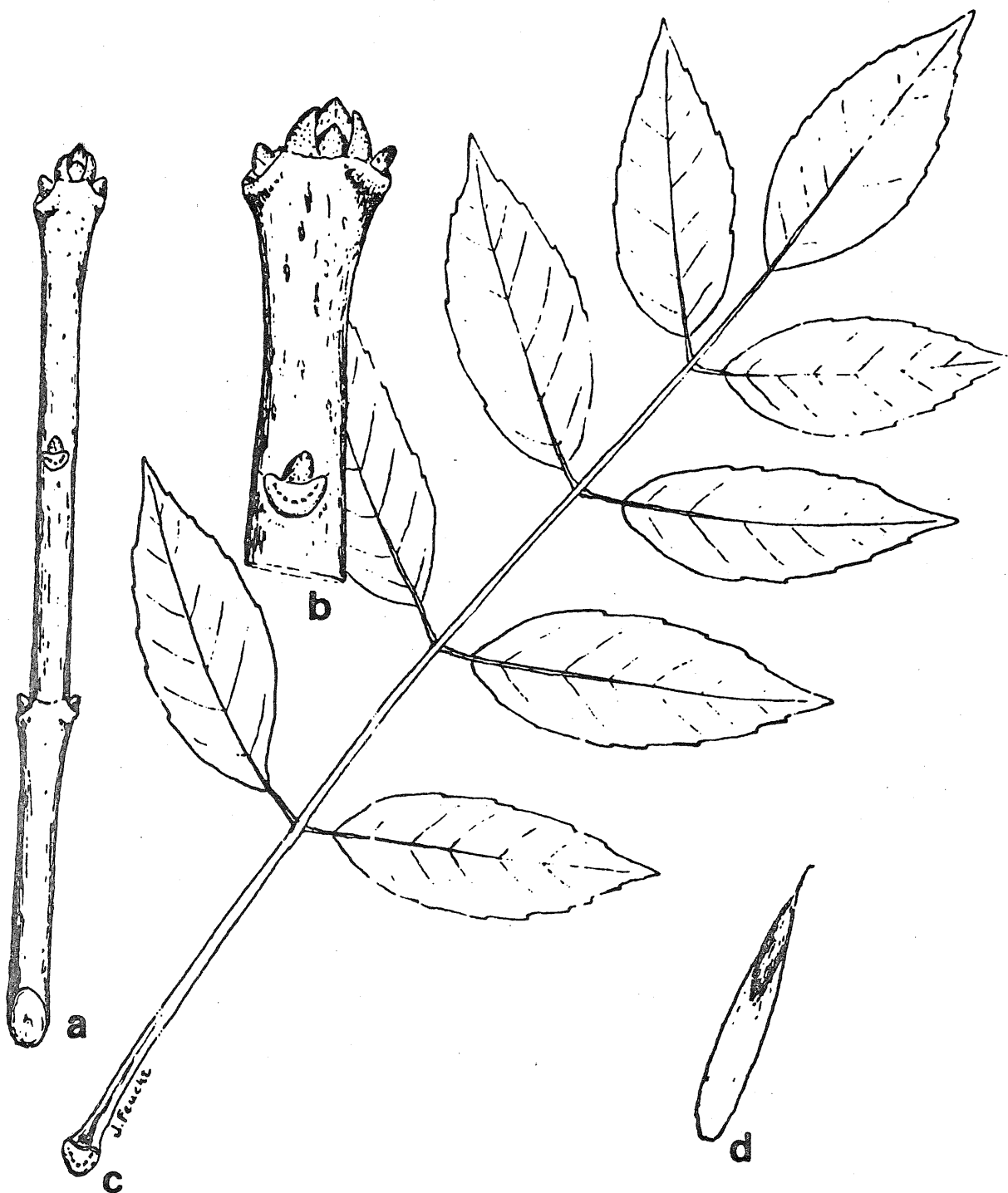
118.
SPECIES A



a — twig in dormant condition (2 x); b — leaf (natural size); c — fruit (Samara) natural size.

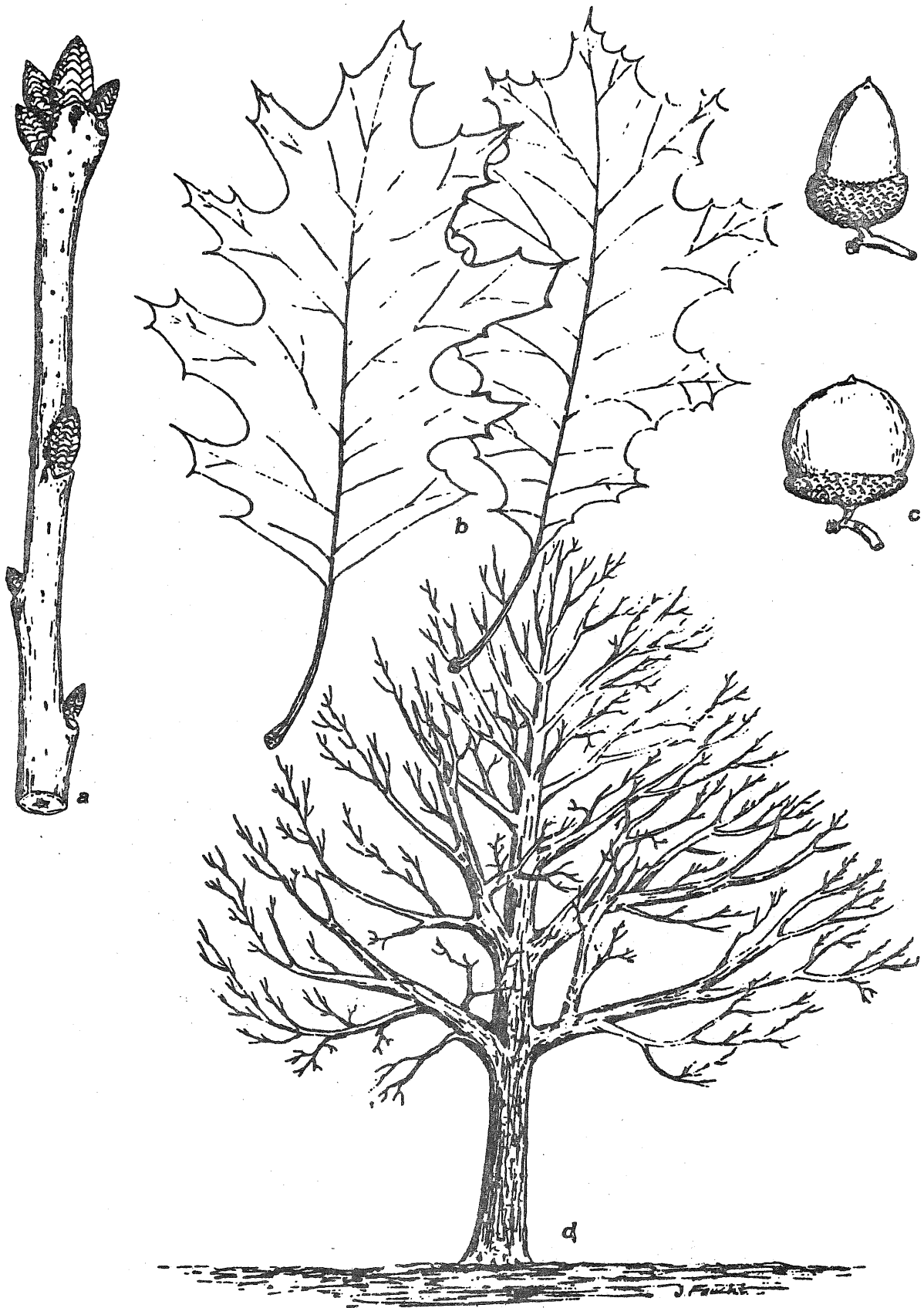
SPECIES B

119



a — terminal portion of winter twig (nat. size); b — terminal and lateral buds (enlarged 3×);
c — pinnately compound leaf; d — fruit, a samara (natural size).

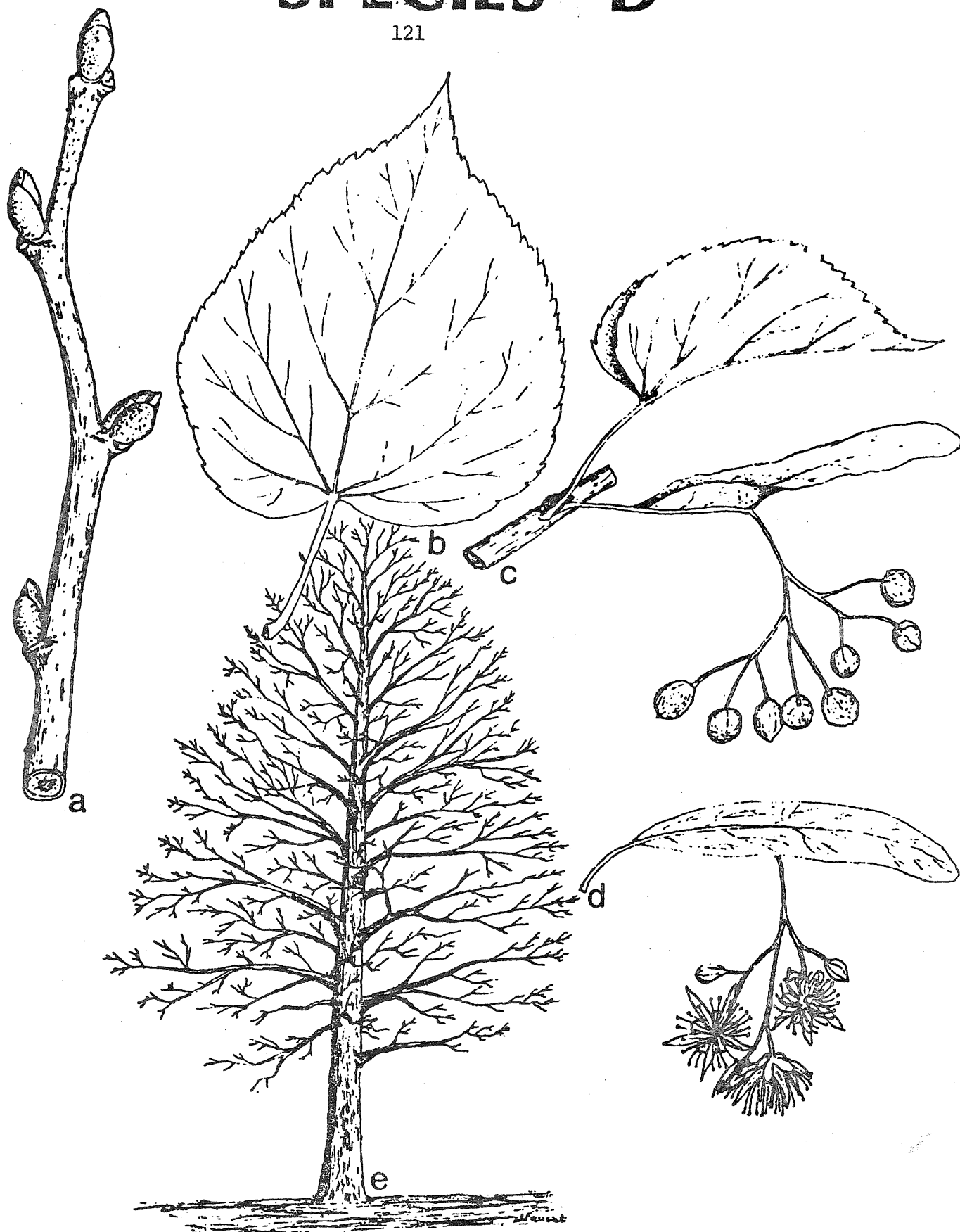
SPECIES C



a — twig in winter condition (enlarged 2 x); b — variations of the leaves (slightly reduced); c — variation in acorns, the lower one usually designated as *Q. borealis maxima* (about natural size); d — 40-year-old tree.

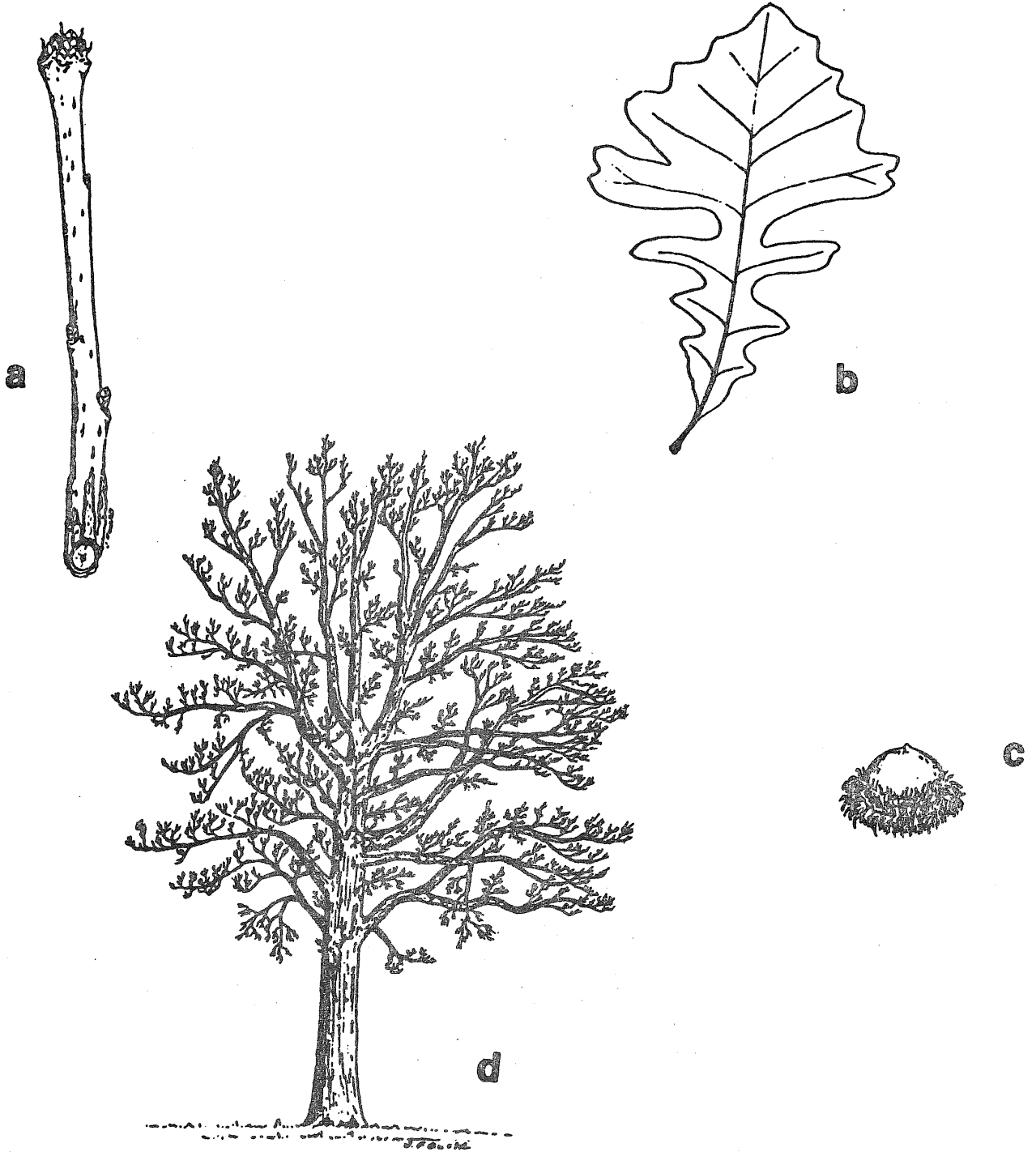
SPECIES D

121



a — twig in winter (2x); b — leaf (natural size); c — fruit on subtending bract (natural size);
d — flowers (natural size); e — growth habit of intermediate-sized tree.

SPECIES E



a — terminal portion of winter twig; b — leaf; c — fruit; d — growth habit.

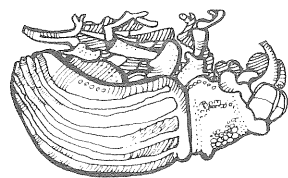
UPSIG

Upper Plains States Innovation Group

LOCAL GOVERNMENT DUTCH ELM DISEASE (DED) CONTROL WORKSHOP

Holiday Inn, Jamestown
June 10, 1981

- | | |
|--------------------|---|
| 9:00 a.m. | Introduction |
| 9:15 - 10:00 a.m. | Involving the community in effective DED control programs (Wayne Fithian, Colorado State University). |
| 10:00 - 10:45 a.m. | Identifying DED, basic control measures, "new" ideas, reforestation (Mike Schomaker, Colorado State Forest Service). |
| 10:45 - 11:00 a.m. | Coffee break |
| 11:00 - 11:45 a.m. | Disease management practices, costs to the community of implementing DED control measures (Meg Hanisch, Minnesota DNR). |
| 11:45 - 12:30 p.m. | More on the cost picture of DED control efforts: what to do <u>after</u> DED (Chuck Kostichka, University of Wisconsin). |
| 12:30 - 1:30 p.m. | Lunch |
| 1:30 - 2:15 p.m. | Elm bark beetle control: "Doing what you can with what you have"; men, money, methods (Bill Phillipsen, University of Minnesota). |
| 2:15 - 3:00 p.m. | Money-making ideas for disposal of diseased elm wood (Laurie Groth, Wisconsin DNR). |
| 3:00 - 3:30 p.m. | Resources available to local government for DED control (Kevin McBride, ND State Forest Service). |
| 3:30 - 4:00 p.m. | Coffee break & film ("Dutch Elm Disease: Catalyst for Urban Forestry") |
| 4:00 - 4:45 p.m. | Break into small groups - discuss and recommend DED control programs for different sized communities with varying levels of DED. |
| 4:45 - 5:00 p.m. | Reconvene - work group reports and discussion. |
| 5:00 p.m. | Adjourn |



The End

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