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A Program for Dutch Elm Disease Control on the Iowa State College Campus

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One of the most common shade trees in Iowa, the American Elm, is threatened by the fatal Dutch elm disease.

The first record of this disease in the western world was in Holland in 1918. It has been thought the disease originally came from Asia and became established in Europe from elm logs imported during the First World War. This disease has spread throughout most of western Europe since that date and was introduced into the United States in veneer logs in 1930.

The disease originally appeared in a number of cities from the east coast to Indiana and was traced to elm logs shipped from Europe to local wood industries. Since 1930, Dutch elm disease has covered the northern sections of eastern United States and has appeared in southern Canada. At the present time, its closest known infection to Iowa is in Illinois, 16 miles east of Burlington.

The history of Dutch elm disease in Illinois is most striking. Their first known case was a few miles east of Mattoon in 1950. In the following years the numbers of affected trees increased to 11 in 1951, 25 in 1952, 494 in 1953, at least 2,067 in 1954, and over 5000 in 1955. The pathologists in Illinois now predict, with a considerable degree of confidence, that the disease will move into Iowa in the near future.

The formation of a model control program as a guide for Dutch elm disease control in Iowa seems advisable when the recent spread of the disease is considered. Such a control program, with the campus of Iowa State College taken as the physical area, is the main objective of this paper. It also illustrates the part local biology classes and service organizations can do in an undertaking of this kind.

There are five main activities included in a sound Dutch elm disease control program. These are education, evaluation, maintenance, sanitation, and spraying.

Without an informed community, no problems can be attacked or solved. Local meetings and newspaper discussions are a means of presenting the needed information to the people. Local service or-

[1]In part, this paper presents the results of a laboratory exercise in the author's class in forest pathology, whose members included L. G. Andreas, G. P. Berlyn, D. G. Breon, R. W. Brown, B. D. Clauson, R. J. Conger, F. D. DeVaul, J. W. Edgren, Kathleen Clark Fritch, R. B. Gill, S. D. Herzberg, J. P. Kastelic, R. L. Ketchum, M. E. Lefler, L. A. Lindquist, J. A. McIntyre, Virginia L. McIntyre, M. M. Merriman, R. L. Miles, D. R. Prestemon, M. F. Quaintance, J. J. Rettenmaier, and W. T. Svensen.

ganizations have played an important part in this phase of the program in other states. The present educational campaign by the Illinois State Chamber of Commerce[2] is an example.

When the people have been introduced to the facts concerning the disease, the next logical step is to make an evaluation of the elms in the community. There are two basic methods of making such an evaluation. The first classifies all elm trees into three classes; A, as high value because of location or outstanding beauty or form, B, as average value, and C, as no value and desirable for removal. The diameter of each tree is measured and recorded. With this information, the value of each tree can be calculated by means of shade tree evaluation tables.[3] The results of making this kind of an evaluation of the Iowa State College Campus are presented in Table 1. In the evaluation, the present figures of the

Table 1

An evaluation of the elms susceptible to Dutch elm disease on the Iowa State College Campus, February 1956.

Diameter (Inches)	Class A		Class B		Class C	Total	
	Number	Value $	Number	Value $	Number	Number	Value $
2	0	0	8	160	8	16	160
4	1	53	16	480	11	28	533
6	0	0	36	2,160	17	53	2,160
8	9	1,728	39	4,836	11	59	6,564
10	13	3,939	48	9,936	5	66	13,875
12	17	7,361	50	14,250	10	77	21,611
14	12	7,092	60	22,980	16	88	30,072
16	25	19,275	75	37,350	12	112	56,625
18	37	36,075	85	54,485	17	139	90,560
20	35	42,175	82	65,928	9	126	108,103
22	32	46,560	62	58,342	3	97	104,902
24	26	45,214	46	48,484	2	74	93,698
26	24	48,936	22	24,838	3	49	73,774
28	10	23,650	19	24,225	1	30	47,875
30	9	24,426	16	24,576	1	26	49,002
32	2	5,888	3	5,124	0	5	11,012
34	4	13,348	5	9,515	0	9	22,863
36	4	14,984	5	10,545	2	11	25,529
38	1	4,176	2	4,664	0	3	8,840
40	3	13,875	4	10,092	0	7	23,967
42	0	0	1	2,823	1	2	2,823
44	0	0	1	3,206	0	1	3,206
46	0	0	0	0	0	0	0
48	0	0	1	3,795	0	1	3,795
50	1	7,225	0	0	0	1	7,225
Total	265	365,980	686	442,794	129	1,080	808,774

[2]This includes their sponsorship of a statewide conference in Chicago, November 10, 1955 and the subsequent publication of the transcript of the conference and a brochure on control in April, 1956.

[3]These tables include the revised Spicer-Felt formula and the National Shade Tree Conference basic values in Trees Magazine, July-August, 1953.

revised Spicer-Felt formula have been further revised to include cost of removal of the tree and replacement costs as well as the esthetic and added real estate values. The total figures of 1,080 trees valued at $808,774 are quite striking.

The second basic evaluation technique consists of assigning a set value to all elms. The most common amount used is $500. Under this method, the 1,080 elms on the college campus would be worth $540,000. A modification of this method has been to determine the cost of removal of all elms. This, of course, does not present the value of the trees but gives the expense of destroying the trees if they all should die of the disease. Recent figures for removal have averaged between $100 and $200. Taking $150 as the figure, the 1,080 elms on campus would cost $162,000 to destroy.

The third activity of a sound disease control program consists of tree maintenance. The amount of work done on this activity depends upon the previous evaluation figures and the finacial capabilities of the community. Two parts of maintenance take priority over all others in Dutch elm disease control. These are systematic scouting for the disease and periodic pruning of dead and dying elm branches. Other maintenance work such as feeding and watering during high stress years follow when funds are available.

Systematic scouting for Dutch elm disease in mid-June and mid-August each year is a must. This can be done by previously trained local citizens or disease experts. Suspected trees should be immediately sampled and the specimens showing sapwood discoloration sent to the State Agricultural Experiment Station for culture examination. This is the only method of positive disease identification.

Periodic pruning of all dead and dying elm wood in living trees is done in order to reduce the breding places of the vectors of Dutch elm disease, the small European elm bark beetle and native elm bark beetle. Of the 1,080 elms on the Iowa State College campus, 337 were noted as needing pruning. At an estimated $8.00 per tree, this would cost approximately $2,696.00.

The fourth activity in the control program is sanitation. This activity is related to the pruning mentioned above in that its main objecive is to reduce the beetle vector population by reducing the breeding places of the insect. All dead and dying elm wood in the community should be destroyed before early April each year. This includes dead wood on the ground as well as dead trees. Any such elm wood with tight bark is dangerous. Therefore, fuel wood should be debarked and the bark destroyed. This dead elm wood not only allows the beetles to increase but also allows the disease fungus, *Ceratostomella ulmi,* to do likewise since this organism grows

equally well in dead and living elm wood. This is one reason why these bark beetles are such efficient vectors.

A sanitation program is basic to disease control and is most effective if on a community-wide basis. This can be done by annual, systematic, block-by-block scouting for dead and dying elm wood. Again service organizations can play an important role.

The last activity in a control program, spraying, is recommended when the disease has reached the general area of the community. This activity is directed at the habit of the beetle vector which spreads the disease to healthy elms. During the growing season, these bark beetles feed upon the twig crotches of living elms. If they have come from diseased wood, the potential for disease transmission is present.

Spray recommendations change as new and better sprays become available. The present recommendation for Iowa is an annual dormant treatment of all valued elms with either a hydraulic sprayer applying a 2 percent DDT water emulsion or a mist blower applying 12 percent DDT emulsion to the bark surfaces of the entire tree. The DDT used must contain xylene (xylol) as the solvent. The DDT present on the bark kills the beetles before they feed.

The cost of spraying the 951 valued elms on the college campus would be approximately $1,426.50 if $1.50 was taken as the per tree cost. This cost is low considering their original value.

The preceding paragraphs have presented a Dutch elm disease control program for the Iowa State College campus. With slight modifications to fit local conditions, the same program will work for any Iowa community, large or small.

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