MANAGEMENT TECHNIQUES FOR UTILITY TREE MAINTENANCE[1]

by Richard A. Johnstone

Abstract. Maintenance of trees growing near electric distribution facilities is one of the highest annual maintenance expenses experienced by utilities. It is also usually the first area to receive budget reductions during lean years. Most utility foresters would say that funds are simply inadequate to properly maintain facilities for service reliability. However, present funds can be stretched if proper management methods are instituted, such as proper scheduling of crews, trimming trees by the lateral method, problem tree removal and/or replacement, and the use of growth regulators.

Utilities have been trimming trees growing near their distribution facilities for over 50 years. During this time, much research has been conducted and funds expended to find better, more efficient equipment to trim trees. The advent of the power saw and hydraulic lift equipment has revolutionized the tree maintenance industry, resulting in work being performed more efficiently and economically. But inflationary times have eroded tree maintenance budgets with corresponding erosion of electric service reliability. Experience has shown that utilities are reluctant to increase maintenance budgets and, during periods of high interest rates and capital expenditure needs, these budgets are often slashed. With these forces working against him, the utility forester often finds his maintenance plan in a hopeless downward spiral. Continuing uncertain economic conditions hold little promise that this situation will change in the near future.

Rather than simply despairing, the utility forester needs to take a closer look at the maintenance practices being used. Areas which need to be scrutinized are: 1) the scheduling of crew work by district personnel, 2) trimming trees by property owner request, 3) shearing trees because that method requires few manhours or training, 4) automatic trimming instead of removing problem trees, 5) the absence of techniques to decrease tree growth.

Crew scheduling. The scheduling of crew work by district personnel involves planning or, as is often the case, the lack of planning. District personnel, whether they be managers, supervisors, or foreman, are usually only concerned with problems of their immediate district. They do not have an overview of the entire system. Thus many of their decisions concerning maintenance are shortsighted. To be effective, right-of-way vegetation maintenance requires central planning where the individual trained in vegetation management can decide where tree crews should be dispatched by using interruption reports, customer density, line voltage and circuit fusing criteria. In this way maintenance is performed according to the needs of the system and not according to the needs of those individuals who complain the loudest.

Owner request. Although public relations is a large part of maintenance trimming, the primary purpose of maintenance is service reliability. Trimming trees at random because of owner request does absolutely nothing for reliability. If all the trees on a circuit are "burning" (contacting the electrical conductors) and only one is trimmed, the line is still unreliable, because any one tree on that circuit can cause the next interruption. Unless trimming is performed circuit by circuit instead of tree by tree, the reliability of the system will never improve and, in fact, it may deteriorate.

To improve the reliability of an electrical system, long range plans must be implemented. These plans begin with the type of trimming being performed. Many managers are only concerned with the speed in which a crew trims a designated area. The primary measurement of crew efficiency has been tree count. But what has a crew accomplished if the thousand trees trimmed this year are again interrupting the circuit next year. When a crew is only concerned with quantity, them quality suffers.

Trimming Methods

Shearing. Quantity often involves the use of shearing and pollarding trimming methods. With

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the shearing method, a previously untrimmed tree (Fig. 1A) is sheared by making saw or pruning cuts on an imaginary plane across the tree resulting in a "rounded over" look (Fig. 1B). This rounding over produces many more problems than it solves. The randomly placed cuts produce stubs on the branches. New growth cannot occur from the stub but instead sprouts below the cut. The sprouts form from adventitious buds on remaining limbs and the stub portion dies back. The sprouts grow rapidly often outgrowing the line clearance achieved through the trimming. Thus in one growing season, the reliability obtained through trimming may be negated.

Shearing also compounds the problem because where one branch had been growing there are now several sucker sprouts in its place (Fig. 1C). Not only are they numerous and rapid growing, they are also weak, being easily whipped by the wind into the conductors. The dead stub resulting from the shearing also adds to future problems by providing an avenue for fungi, insects and disease to enter the plant. The tree is then further weakened, increasing the chances of limb breakage during wind, ice and snow storms. Subsequent trimming cycles multiply the problem because the trimmer usually places his saw for cutting above the stubs of the last trimming since dead stubs are difficult to saw through (Fig. 1D). This in turn produces more stubs, more sprouts, greater chances for plant infection and a further worsening of the system's reliability.

Lateral or natural. A preferred method is one in which a tree is trimmed by making "lateral" cuts. The name "lateral" is derived from the method of cutting branches back to the next limb or lateral growing branch. In the case of a tree growing directly under a distribution line, the terminal leader is removed by "dropcrotching" to the fork of the tree (Fig. 2A). The branches growing laterally from this point are then selected and additional cuts are made farther out on each branch. Subsequent growth does occur, but it is not accompanied by profuse sprouting and the laterals tend to direct the growth away from the conductors (Fig. 2B). Another trimming cycle refines this process and improves on the shape of the tree (Fig. 2C).

This same method may be used when a tree is growing near a distribution line but is offset and not growing directly beneath it. The tree is trimmed by making lateral cuts on only those branches which are threatening the conductors (Fig. 3A). Branches growing above the conductors are directed up and back while those below are directed down and back. The next season's growth is then concentrated in the direction the lateral cuts were placed (Fig. 3B). Future trimming cycles again refine this procedure and improve the shape of the tree (Fig. 3C).

Economics

What is the cost in terms of production? Initially it takes a trimmer longer to trim laterally, because

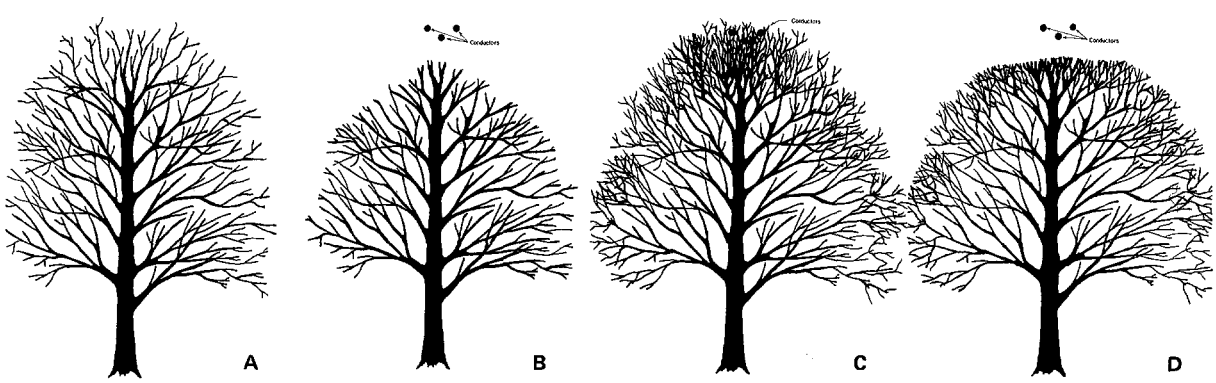

Figure 1

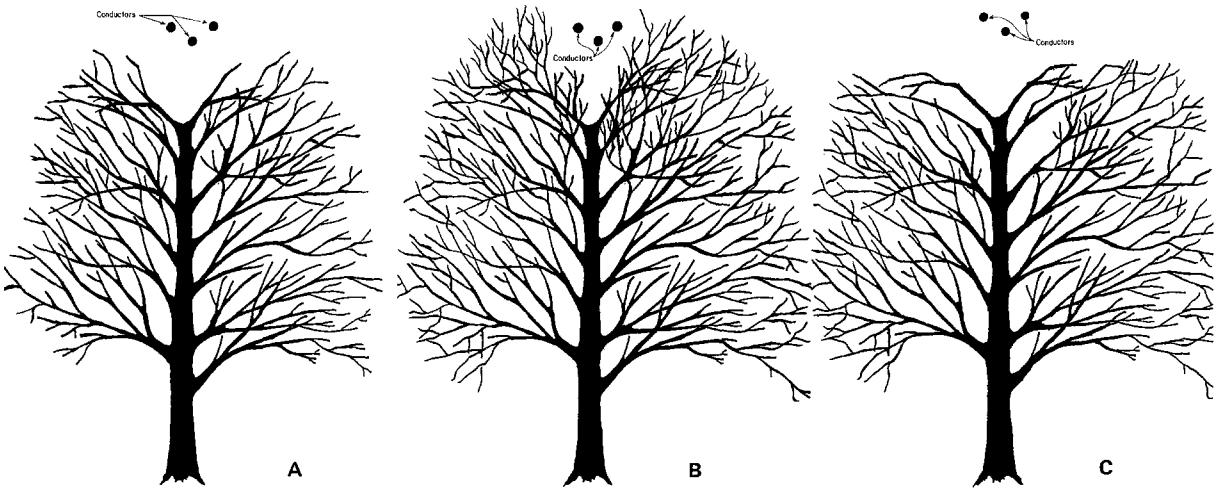

Figure 2

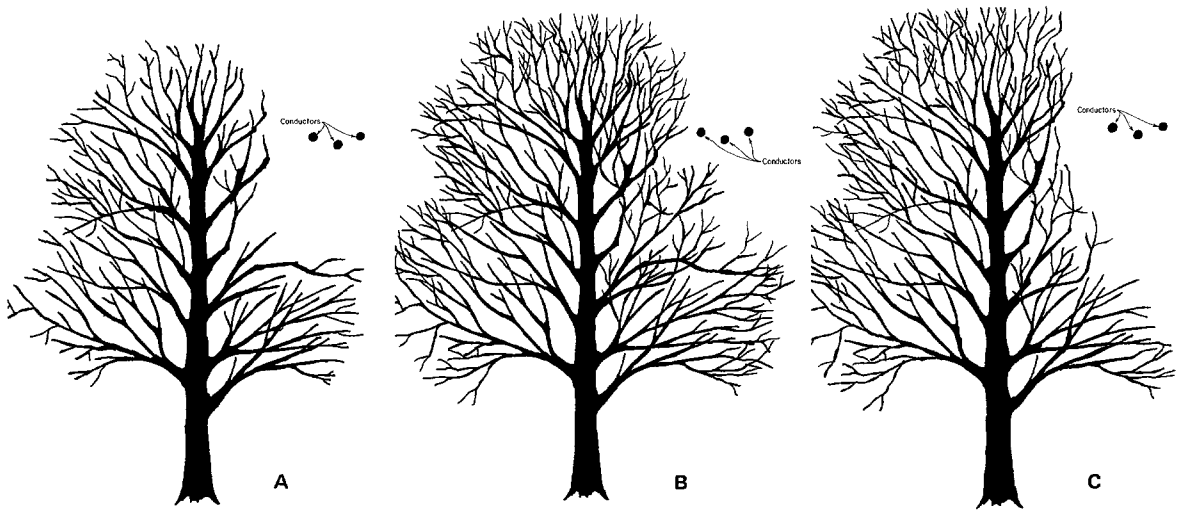

Figure 3

he must think of where to place his saw instead of arbitrarily cutting. In a relatively short period of time, depending on the crew's skill, production approaches or equals that of shearing. The real benefits, however, are realized in subsequent trimming cycles. While shearing may be quick and easy, it increases the amount of wood that needs to be removed each trimming cycle because of the profuse sprouting which this method causes. Lateral trimming, on the other hand, results in the same number or fewer cuts with each cycle, because the problem branches are completely removed back to lateral branches whose growth does not threaten the conductors. Subsequent trimming is simply a refinement of this process.

As time goes on the economic benefits of lateral trimming become more pronounced, because the controlled directional growth of the trees extends the period of time between necessary trimmings. This permits the vegetation manager to expand

regular maintenance trimming to rural, less concentrated areas of his system and to do so on planned maintenance cycles rather than by hot-spotting. In time, the number of interruptions due to trees can be reduced throughout the electrical system.

The natural look achieved through lateral trimming is also more acceptable to the public than shearing or "butchering" of trees, as the latter method is often referred to. The manager will find that the number of refusals for and complaints about trimming are drastically reduced. Good public relations cannot be priced, but it is nonetheless very important.

Tree removal and replacement. Another area that should be addressed and can extend a maintenance cycle and improve public relations is tree removal. A common criterion given to crews to decide whether or not to remove a tree is: "If it takes no more than twice as long to remove the tree as to trim it, remove it, otherwise, trim it:" Why? If a tree is a problem, requires regular trimming and has or may cause an interruption, why trim it? These trees should be targeted for removal, especially if the property owner requests it. Similarly, if a tree is a definite hazard to the electrical facilities and the property owner is not receptive to its removal, tree replacement should be endeavored. The removal of large, over mature and often diseased trees and their replacement with low growing ornamental species not only improves service reliability and lowers maintenance costs, it also improves the aesthetics of the city street and the public image of the utility.

Tree injection. A final area which has received little attention is the implementation of improved technology. While mechanical aids have not advanced much past the power saw, chemical aids have made recent strides forward. Chemical growth regulators can be used to extend trimming cycles on certain species of trees, especially if combined with lateral trimming.

Delmarva Power has experimented with various growth regulators for the past two years, primarily on the American sycamore, *Platanus occidentalis.* The chemical which has shown the most promise so far is dikegulac. Dikegulac is injected into the tree following trimming and when the tree is three-quarter to full leaf. While long-term effects are unknown, short-term effects are very promising and seem to justify the cost of injection, $6 to $12 per tree.

In the past, sycamore trees were trimmed by shearing and required annual maintenance. In 1980, sycamores were trimmed by the lateral method and some were selected for injection with dikegulac. The control trees laterally trimmed will require another trimming in 1983, a three-year maintenance cycle. The trees laterally trimmed and injected appear at the present time that retrimming will not be necessary until sometime in 1984 or 1985, a four to five-year maintenance cycle. The net result is that lateral trimming effectively decreased maintenance expenses for sycamores by 200 percent in terms of extending the trimming cycle and stretching the budget dollars. Lateral trimming coupled with dikegulac injection promises to decrease these same expenses by 300 to 400 percent.

Summary

Trimming trees for reliability of electric distribution systems is a costly maintenance procedure operating under increasing budgetary restraints. To continue to provide reliable service, the utility forester must improve management techniques. Proper scheduling of maintenance crews, the use of lateral trimming, tree removal and replacement, and the use of chemical growth regulators are some of the methods which, if used properly, can extend maintenance cycles and, in effect, increase the value of the maintenance dollar.

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