SITE PREPARATION IN RENOVATING SHELTERBELTS

David F. Van Haverbeke, Associate Silviculturist
Rocky Mountain Forest and Range Experiment Station [1]
Forest Service, USDA
Fort Collins, Colo.

The effectiveness of many shelterbelts, especially those planted throughout the Great Plains during the 1930's and early 1940's, has been seriously reduced by grazing, sod encroachment, and loss of trees from drought, disease, insects, crowding, and suppression. Their effectiveness, however, can be restored or greatly improved by silviculture. Also, the changing concepts of shelterbelt design, improved farming practices, and increased land values have created a need for reducing the widths of some older plantings.

This article describes a method and the equipment used to renovate a 23-year-old shelterbelt. Since few shelterbelts have been renovated, this information may help land-owners who are planning similar work. It may also stimulate the development of more efficient methods and more suitable equipment for this much needed work in Plains forestry.

In summer 1963, cultural treatments for establishing several conifer species were tested on an old shelterbelt site. The shelterbelt was located on a silty-clay-loam soil derived from loess in eastern Nebraska. It had been grazed intermittently by livestock for nearly 25 years; the soil was compacted; a distinct browse line was present; and the conifer row had been nearly eliminated early in the life of the shelterbelt (fig. 1). Four rows of trees were removed from this damaged 10-row shelterbelt from south to north as follows: Russian-olive, eastern redcedar, and two rows of green ash.

One row of trees at a time was cut at ground level with a chain saw and felled with the aid of a pike pole in uniform windrows on the outside of the shelterbelt (fig. 2). To prevent sprouting, the stumps were killed by spraying with 2,4,5-T and fuel oil. This method was fast--as many as 1,000 feet of row was easily felled and sprayed by a two-man crew in a working day. In some places, however, allowing the stumps to sprout would be advantageous, thus providing increased lower story density in the shelterbelt until the replacement trees provided density.

The trees were dragged out of the shelterbelt in whole-tree lengths with a tractor and log chains, in groups of three to eight trees at a time, depending upon size (fig. 3). The trees had to be felled uniformly at an angle to make it easy to hook onto a group of tree stems simultaneously and drag them out of the shelterbelt in a direct line.

Probably the trees could have been removed more rapidly with a bulldozer. The cost of bulldozing trees, however, might be too great for many owners. Although perhaps somewhat slower, the method used is one that an owner can use during slack seasons with ordinary farm equipment and a minimum of help.

As the owner of the shelterbelt did not want to cut the trees into posts or convert them into firewood, they were piled in an adjacent field and burned in the fall. By continually pushing the burning trees into compact piles with a tractor and blade, the yetgreen trees burned readily.

The compacted soil inside the shelterbelt was broken up by pulling a two-bottom plow between the rows of stumps (fig. 4). The plow was set at a depth of 6 to 8 inches, and as it advanced many roots were severed and broken. Since the rows of stumps were 10 feet apart, two passes were easily made between each two rows without snagging the stumps themselves. The plowed strips were left bare over the winter of 1963-64 to collect as much snow and moisture in the furrows as possible.

Before planting in spring 1964, a tractor-mounted York-type rock rake was dragged

1 Central headquarters maintained at Fort Collins in cooperation with Colorado State University; author is assigned to project at Lincoln. Nebr., in cooperation with the College of Agriculture. University of Nebraska.

Figure 1.--A 23-year-old shelterbelt planted in 1940 by the Prairie States Forestry Project. Note browse line, grass cover, and absence of a conifer row in the center as a result of continued grazing. Soil is heavily compacted. Right to left, species are Russian-olive, remnants of eastern redcedar, and green ash.

over each plowed strip (fig. 5). This leveled the planting strips and removed most of the roots, which had been severed and turned up by plowing. A two-section harrow or an 8-foot disk would probably also be satisfactory for this smoothing operation. Having the implements mounted on a hydraulic lift greatly facilitates both maneuvering the tractor between the rows of stumps and turning around in confined areas next to uncut trees.

A conventional tree planter was used to replant trees between the rows of stumps (fig. 6). The planter did not have a cutting wheel (coulter) attachment, so there was a problem of entanglement in the severed, but still buried, roots. Consequently, the planter had to be raised periodically and cleared of cut roots. If a large coulter had been attached in front of the furrowing point, it would probably have eliminated most of the interference.

Although not tested in this study, similar procedures could probably be used between rows of uncut trees within a shelterbelt when interplanting or planting for replacement or reinforcement. Deep plowing, however, could be very destructive to the root systems of the existing trees. A tractor-drawn rototiller

Figure 2.--Trees were cut at ground line with a chain saw and felled with a pike pole in windrows to make removal easier.

Figure 3.--Whole-length trees were removed from shelterbelt in groups of three to eight with tractor and log chains.

Figure 4.--Two-bottom plow used to break compacted soil between rows of stumps. Two passes between 10-foot rows were possible without snagging stumps.

Figure 5.--Tractor-drawn rake used to level planting strips before planting in spring. Note broken roots cleared from planting strips.

Figure 6.--Conventional tree planter used to plant seedlings in prepared strips. Addition of a coulter (cutting disk) would reduce entanglement in remaining broken and disrupted roots.

or disk should break the compacted soil surface and destroy the vegetation cover sufficiently in a grazed shelterbelt. A tree planter with a coulter could then be used between the rows. Some pruning of low interior branches and perhaps the removal of one or more trees at turnaround points would be necessary to permit using mechanized equipment within a shelterbelt.