Tree plantings in Iowa are often slow getting established because of a host of problems including intense weed competition, slow initial growth, and damage from wildlife including voles, mice, rabbits, and especially browsing by deer. Tree shelters may reduce some of the problems associated with hardwood plantings. Tree shelters, used in conjunction with good planting stock, proper planting techniques, and adequate weed control can result in improved survival, better growth and less damage from wildlife.

The story of “tree shelters” began in England when silviculturist Graham Tuley wrapped polyethylene around some nylon mesh tree protectors and created a “greenhouse” type environment around an individual seedling. Trees in the “Tuley Tubes” appeared to survive better, grow faster, and suffer less stress than trees grown outside the tubes. Today, tree shelters are made of light stabilized polypropylene or polyethylene; tubes come in various heights from 2 to 6 feet; the size used is determined by the intended function of the tree shelter; and although they were originally marketed as photo-degradeable in 5-8 years we are seeing tree tubes last far longer and in some cases, removal is needed as to not girdle the tree.

**Benefits and Liabilities of Tree Shelters**

Initial height growth of sheltered trees is usually greater than unsheltered trees. In Wisconsin, the sheltered trees were 90% taller than the control trees after three years. First year growth of red oak seedlings in Ohio averaged 12.3 inches with shelters compared with 5.4 inches without shelters. This early growth acceleration is not maintained once the tree is outside the shelter. **Tree shelters do not alter growth potential of the site.**
Distribution of growth is different in shelters, but total biomass produced is not significantly affected by shelters. While trees are in the shelters, they developed more than twice the amount of stem dry weight and about half of the root dry weight compared to unsheltered trees. As the trees emerged from the shelters, the distribution of material to stems and roots returned to normal. Stem growth in sheltered trees is weak; most trees must be outside the shelters for 2 to 4 years to develop enough stem strength to stand alone. The tree shelter is designed to provide the stem support required; by the time the shelters degrade, the tree should not require additional support.

Several of the studies show improved survival for sheltered trees. Shelters can facilitate locating and follow-up applications of weed control practices in tree plantings. With proper shelter selection and proper installation, shelters are very effective at reducing damage from deer, mice, voles, and rabbits. Field mice will on occasion, chew holes in the shelters and nest in them. In some cases, wildlife might be curious about the shelters and a small proportion of shelters will be destroyed until the animals learn what they are. Shelters provide excellent protection from wind desiccation; this protection enhances survival on exposed sites.

With the old style of unventilated shelters, seedlings had a higher likelihood of suffering fall dieback to the root collar or complete mortality. This was attributed to insufficient “hardening-off” of the seedling as the shelters were acting like a greenhouse and were keeping the seedlings actively growing well into the fall. Today, tree tube manufacturers have changed their designs and most, if not all, shelters above a 4 ft in height come with ventilation built into the shelter. This allows the shelter to stay in close contact with the ground while allowing the seedling to harden off naturally as the temperature in the shelter more closely matches the ambient air temperature.

The new ventilated tree shelters only marginally affect the microclimate surrounding the seedling by slightly increasing the temperature, lowering the light level, and increasing the humidity when the tree has leaves. Shelters now come in a variety of proprietary colors with tan and blue being the most common.

Tree leaves and branches will often become deformed because of the restricted growing space in the shelter. Once the seedling outgrows the shelter and the shelter degrades, the trees will either self-prune the lower branches naturally or active pruning by the landowner can achieve a clear stem. Some trees will suffer stem abrasion at the point they emerge from the shelter in windy areas; this is minimal if lateral branches are formed near the top of the shelter. Most manufactures have made design modifications to minimize this damage with the top of the shelters being flared out to form a rounded lip.
Netting to Exclude Birds

Birds, especially blue birds, are attracted to tree shelters and are often trapped, unable to fly or climb out. The use of a bird mesh cap will prevent birds from entering the tree shelter but will need to be removed when the tree’s terminal bud nears the top of the tree tube. If mesh caps are not removed the terminal leader can be deformed causing a loss of vertical growth and stem quality. Because of the loss of birds and an increase in mouse damage in some plantings, folks have experimented with cutting a section of the shelter from the bottom which appears to have multiple benefits in those mouse and bird prone areas. First, birds are no longer trapped if they accidentally fall into the shelter as they have a direct means of escape, and secondly, mice will no longer find it suitable to build a nest in the bottom of the shelter if it is exposed to the elements and to predators.

Economics of Shelters

The feasibility of using tree shelters will vary from planting to planting. For some plantings, the increased growth and survival cannot economically justify the cost of using of tree shelters, while in others instances, animal damage is so extensive that the only way to establish the trees is with fencing or the use of tree shelters. When using three shelters in woodlands or plantations, use a minimal number. Most practices would restrict the number of shelters to less than 50 per acre spaced evenly apart, about 1 every 28ft. When using mixed plantings, use shelters on high value species, species which are difficult to establish, or species adding to the overall diversity of the planting. Costs of the shelters and the appropriate sized stake will vary by size but a 4 – 5 ft shelter and stake will run anywhere from $5-8 per unit.

Weed Control

Tree shelters can facilitate locating tree seedlings if weeds have overgrown the area and will provide a moderate level of protection to seedlings when herbicides are used. Caution should still be used and a directed spray is advised for all ventilated shelters as chemical drift is still possible into the ventilated shelters.
Installation

The shelter should be supported by a naturally durable or treated 1 inch square stake for at least two thirds of its length. Bamboo, Fiberglass rods, and electrical conduit all can be used and vary in cost and durability. The stake should penetrate the ground to a depth of at least 12 inches and project above the top tie and remain below the upper rim of the shelter. Good installation will minimized maintenance but a yearly check of all shelters is still recommend as a small percentage of shelters will have been knocked down or tipped over. Dead leaves and other debris can accumulate in the bottom of the shelter leading to disease, pest problems and increase mouse nesting activities, and should be removed annually. Shelters should remain straight until the support is no longer needed.

Some growers have experimented with removing and reusing shelters. Most shelters are designed to be installed and remain intact until they degrade because of the support they provide the tree. For non-biodegradable products like fiberglass rods and metal conduit or T-posts it is imperative that you remove the material before the tree grows too large. If left in place, the tree can actually grow around the post potentially damaging or staining the wood.

Source of Tree Shelters

Tree shelters can be purchased from a variety of outlets, including nurseries, Resource Conservation and Development Offices, Forestry contractors, and Forestry Equipment Suppliers. Currently there are several different types of tree shelters available. Blue X, Plantra, Protex, Tree Pro, and Tubex are all tree shelters that can be found online using a simple web search engine. No product endorsement is implied.

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Jesse Randall

IOWA STATE UNIVERSITY
Forestry Extension
Ames, Iowa