

# Applying Research in Forestry



Forestry Division

July 1991

Report #1

## The Effects of Tree-shelters on Survival and Growth of Black Walnut: First Year Results

Tree shelters are the round or square tubes that are placed over seedlings or seed to enhance growth and survival. They were first used in Great Britain in 1979, and recently have received widespread attention in the United States. Research indicates that the height of sheltered seedlings can be almost 2 1/2 times that of unsheltered seedlings after 5 years. This growth advantage may dissipate in succeeding years, however. Another advantage seems to be the protection from animals and chemicals. Deer, mice and rabbit damage is reduced, and the shelters allow chemicals to be sprayed around trees with no chance of injury.

The study we have initiated is designed to quantify the advantages of tree shelters when used on black walnut seedlings. We are determining whether growth advantages do exist, whether the seedlings are protected from deer damage (both browsing and antler rubbing) and what problems may be associated with the use of the shelters. One area we are particularly interested in is whether the shelters will help reduce the amount of dieback often seen in newly planted walnuts. Walnuts are notorious for succumbing to transplant shock and either dying

back to the ground or producing little growth the first year.

The test consisted of 120 trees in a replicated experimental design with half of the trees receiving 5 foot Tubex® tree shelters immediately after planting. The trees were planted by hand in April 1990. Weed control consisted of 2 lbs. Princep 80W plus 1 qt. Roundup per acre applied after planting. The seedlings averaged 20-24 inches tall at planting time. In December we measured the total height, new height growth, caliper at 1 inch above the ground. Form, browse damage and dieback were also assessed.

The sheltered seedlings were significantly taller than the unsheltered seedlings averaging over 36 inches compared to 23 inches in height. New growth was also significantly better with sheltered seedlings averaging almost 14 inches of terminal growth compared to 3 inches for the seedlings without shelters. There were no significant differences in form or caliper between the two treatments. Browsing did not occur on any sheltered seedlings while 5 unsheltered seedlings received some damage.

As expected, about 2 1/2 times as many unsheltered seedlings suffered spring dieback as sheltered seedlings (17 vs. 7). Dieback in the spring has been linked to moisture stress of newly planted seedlings. One of the manufacturer's claims is that moisture stress is reduced thus allowing greater growth and survival.

Tree shelters can protect your seedlings from animals and increase growth. However, the onset of dormancy may be delayed in sheltered seedlings.

## Recommendations

Some problems did develop with the sheltered seedlings. During the fall and early winter sheltered seedlings suffered an unacceptable amount of dieback at the onset of freezing temperatures (42 compared to 5 unsheltered seedlings). One of the triggers that gets plants ready for dormancy and cold temperatures is moisture stress. It is common in nurseries and greenhouse situations to deprive moisture from seedlings to harden them off. Apparently, the tubes prevent this from occurring, and the seedlings are still in active growth when cold temperatures hit. It is also likely that sheltered seedlings are buffered from cold temperatures because of the "greenhouse effect" inside the tubes. The seedlings do not build any tolerance to near freezing temperatures because of this. Then, when temperatures drop low enough that the shelters no longer protect them, the seedlings suffer damage.

The area where these trees were planted is somewhat of a frost pocket. Many of the sheltered seedlings were hit by sub-freezing temperatures prior to shedding their leaves causing extensive dieback in many cases. To prevent this from occurring, the shelters should be raised several inches in the fall to allow air to circulate through the tubes. This should allow the seedlings to harden off. It has been reported that once the tops of the seedlings grow out of the tubes, the dieback ceases. These reports add that growth is still better with the tubes even if the tubes are left in place and dieback occurs more than one year. In the one instance in this study in which a seedling grew out of a tube this first year, there was no dieback.

One other problem with the shelters was that weeds that became established in the shelters tended to overwhelm the walnut seedlings. Seedling growth was probably reduced, although we did not measure this. It would be advantageous during the year of establishment to apply preemergent herbicide prior to installing the shelters. This should prevent weeds inside the shelter. In subsequent years, the walnut foliage should prevent weeds from interfering with growth.

Black walnut seedlings in treeshelters had greater total height and new growth, no browsing damage, and greatly reduced spring dieback than seedlings without shelters. The problem with the shelters was the frequency of dieback associated with freezing temperatures in the fall, especially in areas prone to frosts. To prevent this, the shelters should be raised a few inches prior to the onset of cold temperatures. This would correspond to September or October in Missouri. The shelters should be reinserted into the soil before growth starts in the spring to obtain the full benefit of the shelters.

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Mention of trade names is solely to identify materials used and does not imply endorsement by the Missouri Department of Conservation. Discussion of pesticides in this paper is not a recommendation of their use and does not imply that uses discussed here are registered.

Results and recommendations presented in this paper are preliminary but represent our best analysis at the present time. Please use this information with care.