TREE GUARD TUBES TO REDUCE RABBIT DAMAGE TO SHELTERBELT TREES IN SOUTH DAKOTA

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In certain areas in eastern South Dakota rabbit populations, primarily black tail jackrabbits (*Lepus californicus*), are very dense. In these areas damage to newly planted shelterbelt trees due to clipping or browsing by jackrabbits can be severe. Several tree species such as crab apple (*Malus* sp.), hackberry (*Celtis occidentalis* L.), and bur oak (*Quercus macrocarpa* Michx.) seem to be especially susceptible to browsing by jackrabbits during the winter, while other species such as ponderosa pine (*Pinus ponderosa* Laws.) and eastern redcedar (*Juniperus virginiana* L.) are clipped but generally not eaten. Browsed and clipped trees usually survive although height growth is substantially reduced. In severe cases, trees are browsed to ground level and replanting is necessary.

Protection from rabbit damage is usually classified as either chemical or mechanical. Until recently, the most popular method of protecting against rabbit damage was the use of chemical repellents. However, chemical rabbit repellents now must be registered for operational use (*3*). This requirement, while protecting against untested products, has resulted in a general unavailability of chemical rabbit repellents.

In addition, chemical repellents do not protect seedlings throughout the year and must be applied annually or semiannually to protect new growth (*1*). Public pressure against the use of pesticides has also substantially reduced the use of chemical repellents. Because of these factors an effective, inexpensive, easily installed, mechanical means of rabbit damage protection is needed. This article reports the results of a study using plastic net tubes to protect newly planted shelterbelt trees from rabbit damage in Kingsbury County, S. Dak.

Materials and Methods

The plastic net tubes used in this experiment were Naltex tree guards manufactured by Nalle Plastics, Inc. in Austin, Tex. To facilitate shipping, two sizes—2 5/8" and 2 1/4" inside diameter-were used. These were nested together (one tube packed inside the other) in shipping. The tubes are designed to photodegrade in 3 to 5 years. The tubes—24 inches long—were cut with a tin snip to fit from the ground to approximately 2 to 3 inches above the terminal leader of each tree or shrub. Since some of the trees had already developed side branches, a method of installing the tubes over the branches had to be developed. This was done by wrapping the entire tree in a plastic spiral tree wrap (fig. 1), then sliding the net tube down over the outside of the spiral tree wrap (fig. 2). The

Figure 1.—*Seedling with spiral tree wrap in place.*

Figure 2.—*Seedling with tree guard placed over tree wrap.*

spiral tree wrap was then removed, leaving the plastic net tube in place (fig. 3).

The study site was a 400-foot-long, 9-row-wide shelterbelt oriented north-south. Five of the nine rows were selected for this experiment. The five species were: common lilac (*Syringa vulgaris* L.), crab apple, hackberry, bur oak, and ponderosa pine. Every other live tree was protected in each row except in the lilac row, where every third live plant was protected.

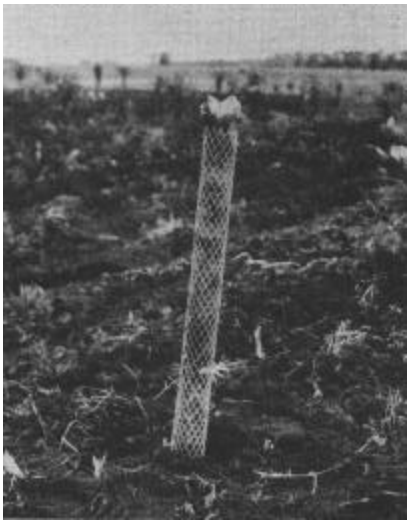

Figure 3.—*Seedling with spiral tree wrap removed, leaving tree guard in place.*

Results and Discussions

The tree guards were placed around the tree as described above and anchored by mounding 2 to 3 inches of soil at the base of the tubes. In other experiments with this type of material, a wire pin or wooden stake was used to anchor the tubes in place (*2, 4*). Table 1 shows the percentage of tubes that remained in place during the winter of 1978-79 when anchored only by soil around the base of the tube.

Table 1.—*Stability of tree guard tubes*

Species	Protectors installed	Remaining after winter
		pct.
Lilac	30	93
Crab apple	33	100
Hackberry	26	27
Bur oak	21	50
Ponderosa pine	20	20

This method of anchoring was adequate for crab apple and lilac. These species were 12 to 18 inches (30 to 45 cm) tall and had either multiple stems or many lateral branches. For smaller trees, 6 to 10 inches (15 to 25 cm), or single stemmed trees with no lateral branches, an alternative method of anchoring must be found.

Table 2 shows, for each of the five species—percent survival, the percentage of seedlings with leaders that were browsed or clipped, and the average height of protected versus unprotected seedlings.

The survival data showed no significant difference in survival after the first winter between protected and unprotected seedlings ($p = .05$). However, the average

Table 2.—*Survival, damage, and height of protected versus unprotected seedlings*

	Protected			Unprotected		
Species	Survival[1]	Damaged	Average	Survival[1]	Damaged	Average
	pct	*pct.*	*cm*	*pct.*	*pct.*	*cm*
Lilac	97a	0	52.8	97a	100	40.7
Crab apple	100a	12[2]	88.1	100a	100	58.6
Hackberry	100a	15[3]	52.5	96a	100	30.4
Bur oak	100a	14[3]	30.6	90a	56	19.3
Ponderosa pine	95a	5[3]	13.8	95a	24	12.2

[1]Means followed by the same letter do not differ significantly at $p = .05$.

[2]Browsed above 60 cm height of protector.

[3]Browsed as a result of failure of protector to stay in place.

height of all five species was decreased by rabbit injury. The decrease in average height of unprotected seedlings ranged from 29.5 cm. in crab apple to only 1.6 cm. in ponderosa pine. It was expected that rabbit damage would be most severe on the crab apple seedlings since they remained partly exposed during the winter and seem to be a favored food. It was also expected that damage would be least severe on the ponderosa pine seedlings since they were completely covered with snow throughout the winter.

Some rabbit damage occurred on protected trees. Four crab apple trees were damaged where they extended over the top of the 60-cm-high tree guards. Some hackberry, bur oak, and ponderosa pine were damaged when the tree guard failed to remain in place. On those trees where the tree guard remained in place throughout the winter, no damage was observed.

Material cost for this experiment amounted to $16.00. On a per tree basis that averaged out to 12.3 cents per tree. The average time required to install the tree guard was about 1 minute. The installation method is relatively simple and with a minimum of training can be done by almost anyone. At a wage rate of $3.00 per hour and an average of 1 minute to install the tree guard, the average cost of installing a tree guard would be 5 cents per tree. This added to the cost of material makes the average cost of using a tree guard about 17 cents per tree.

Conclusions

The use of plastic net tubes as described in this paper to protect newly planted windbreak trees from rabbit damage was effective for multiple stem shrubs and trees that develop lateral branches during the first growing season. The effectiveness of these tubes on slower growing single stemmed trees was diminished because the system used for anchoring the tubes against the strong winds experienced on the Great Plains was not adequate. As soon as an adequate anchoring system is devised, these tubes should work very well on all windbreak species susceptible to rabbit damage.

If planting of windbreaks is considered in areas with known high densities of rabbits, this or some similar mechanical method of protection from rabbit damage should seriously be considered.

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