



Photo 2 – TRICO Pro and Plantskydd were applied with backpack sprayers, covering each tree to a height of 5'.

MSU Research Update: Winter 2022-23 Deer Repellent Trial

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Year in and year out, deer remain one of the most consistent issues for Christmas tree growers in Michigan and the Great Lakes region. In fact, four Great Lakes states: WI, MI, PA, and IN, rank in the top five nationally in deer population density with 28 or more deer per sq. mi. Thinning deer herds by hunting may bring a measure of revenge and keep the freezer full of venison, but hunting rarely makes a sufficient dent in deer populations to make an effective damage control strategy in the long term. Deer fencing is usually the most effective strategy to keep deer out of a crop. For many growers, however, the cost of installation and maintenance of a permanent deer fence is prohibitive.





Photo 1 – Deer candy. The two rows of Turkish fir in this trial block of fir species at Kellogg Forest were heavily browsed by deer.

Deer repellents are often appealing in these situations as they provide lower-cost alternatives that can be directed to areas of a given farm where deer are most problematic. Jeff Owen, Extension Specialist with North Carolina State University, has conducted extensive trials of various deer repellents and has found some success with commercial scent-based deterrents and their component ingredients; particularly dried blood and putrescent egg solids. The main downsides of these products are their odor and the need to re-apply during the winter in order to be effective. More recently, Owen as well as researchers at Cornell University have found high levels of deer damage control with TRICO® Pro Wildlife Repellent. TRICO is a deer repellent that was developed in Europe and is made of rendered sheep fat. Trials in NC and NY indicate that TRICO can significantly reduce deer browsing compared to other repellents. Moreover, one application of TRICO in late fall can persist throughout the winter, when deer are most likely to feed on Christmas trees and other conifers.

What we did

In order to gauge the effectiveness of TRICO under Michigan weather conditions and deer pressure, we conducted a trial at the Michigan State University Tree Research Center in the winter of 2022-23. The trial was conducted in a section of the Collaborative Fir Germplasm Evaluation (CoFirGE) planting of fir trees that consisted primarily of provenances of Turkish fir and Trojan fir, both of which are highly preferred by deer



Photo 3 – Example of a tree in TRICO-treated plot with with 0% of shoots browsed (left) and a tree in untreated control plot with 100% shoots browsed (right).



Photo 4 – Trail cam image of deer activity in deer repellent trial.

(Photo 1). The plots also included Fraser fir, another preferred browse species, as well as some trees not preferred by deer including grand fir and Korean fir. We treated all trees in each plot (60-70 trees) with one of three treatments; TRICO, Plantskydd (repellent made from dried blood), and an untreated control. All treatment plots were replicated four times (i.e., approx. 260 trees per treatment). We applied TRICO and Plantskydd on November 10, 2022 with back-pack sprayers (Photo 2). Trees ranged in height from 2'-8', so trees were treated from ground level up to 5' (typical browse height). For each tree we made a 360-degree pass around the tree with a sprayer and then circled back the opposite direction to ensure good coverage and avoid spray 'shadows'. We placed motion-activated trail cams adjacent to one plot of each treatment in order to document deer activity on the site and record deer behavior in response to the products. We assessed all trees in March 2023. Deer browse was evaluated as the proportion of shoots on each tree that were browsed, based on increments of 20% (Photo 3).

What we found

Based on images from the trail cams, deer were active in the plots throughout the winter (Photo 4). Deer browsing was heavy for all non-treated trees, except for trees that are not preferred browse species. For Nordmann, Fraser, Turkish, and Trojan firs that were not treated (Control), the average proportion of browsed shoots ranged from 38 to 98% (Chart 1). Averaged across all species, 63% of shoots were browsed on trees that were not treated (Chart 2). Both Plantskydd and TRICO significantly reduced deer browse. Plantskydd reduced the proportion browsed to 12%, while TRICO essentially eliminated deer browsing altogether – even for highly preferred species (Chart 2).

Other considerations

Both deer repellents, particularly TRICO Pro, were effective at reducing damage due to deer browse. Weather and other factors could play a role in the effectiveness of the products.

Winter weather was relatively mild in 2022/2023. The coldest temperature recorded during the winter at the MSU Enviroweather station in East Lansing was -4.5 deg. F. In addition, there were extended periods throughout the winter with little or no snow cover. It is possible that, in a more severe winter, deer may be more desperate for browse and less deterred by repellents. Deer population pressure can also affect repellent effectiveness. For example, research at Cornell found that TRICO prevented browse on yews at three out of four sites in northern New York, but TRICO-treated yews were browsed at a fourth site which had very high deer pressure.

Plantskydd is widely available through on-line outlets as well as garden centers. It can be purchased in a ready to use formulation or as a dried product, which must be mixed. The odor of Plantskydd is somewhat off-putting and the scent is similar to dog food. TRICO was developed in Europe and is available in the US through agricultural distributors and at least one on-line distributor. The current price is approximately \$90 per gallon. For new transplants, the manufacturer's literature indicates one gallon can treat 1,000 trees. The current label indicates that the product should be applied undiluted. Despite the fact that TRICO is

manufactured from sheep fat, the product has relatively little odor and the smell is reminiscent of latex paint.

As noted earlier, deer fencing is the most effective long-term solution to deer browsing. For smaller growers that are unable to commit resources to permanent deer fencing, deer repellents may offer a viable solution. Our results were consistent with those of researchers at North Carolina State University and Cornell Extension, which demonstrated that deer repellents, especially TRICO, can offer significant protection from deer. 🌲

ACKNOWLEDGMENT

We thank Adam Palmatier, Helena Agri-Enterprises, Dansville, MI, for providing TRICO for this study.

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Age	Size	100-399	400-1000	Age	Size	100-399	400-1000	Age	Size	100-399	400-1000	Age	Size	100-399	400-1000
Abies balsamea>Balsam Fir				Abies fraseri>Fraser Fir				Picea pungens "Glauc">Colorado Blue Spruce				Pinus strobus>Eastern White Pine			
<i>*limited crop</i>				<i>*limited crop</i>											
2-1/P+1	8-14"	\$1.45	1.35	3-0	6-9"	\$0.85	\$0.55	3-0	9-15"	\$0.95	\$0.75	3-0	6-12"	\$0.95	\$0.75
3-2	10-18"	\$1.95	1.75	3-1/P+1	8-14"	\$1.55	1.35	2-1/P+1	8-14"	\$1.45	\$1.25	2-1	8-14"	\$1.25	\$1.10
Abies balsamea phanerolepis>Canaan Fir				Picea abies>Norway Spruce				Pinus nigra>Austrian Pine				Pseudotsuga menziesii>Douglas Fir			
2-1/P+1	8-14"	\$175.00	145	2-1	10-15"	\$0.85	\$0.60	2-0	8-14"	\$0.95	\$0.75	3-0	9-15"	\$0.95	\$0.75
Abies concolor>Concolor Fir				Picea glauca>White Spruce				Pinus resinosa>Red Pine				Thuja occidentalis>American Arborvitae [Eastern White Cedar]			
<i>*limited crop</i>												<i>*limited crop</i>			
2-0/3-0	12-18"	\$0.95	\$0.75	3-0	9-15"	\$0.85	\$0.60	2-1	8-14"	\$1.25	\$1.10	2-2	15-24"	\$2.25	1.95
3-1/P+1	8-14"	\$2.50	\$1.95	2-1	8-14"	\$1.45	1.25	2-1	8-14"	\$1.25	\$1.10	2-1/3-1	10-18"	\$2.25	\$1.95
Abies koreana>Korean Fir								Husky							
<i>*limited crop</i>															
P+2	6-15"	\$2.75	2.50	2-2	15-24"	\$1.75	1.55								

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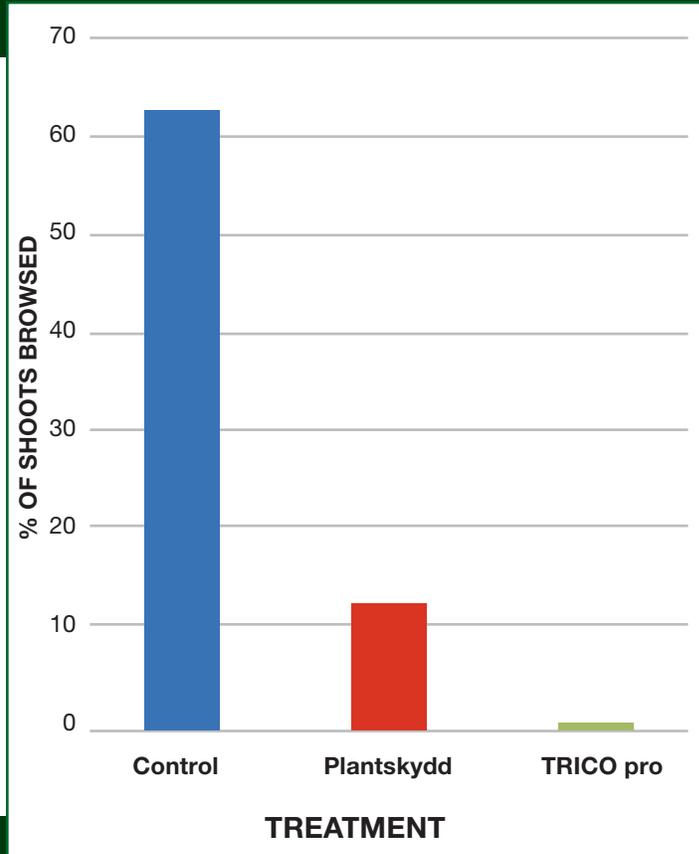
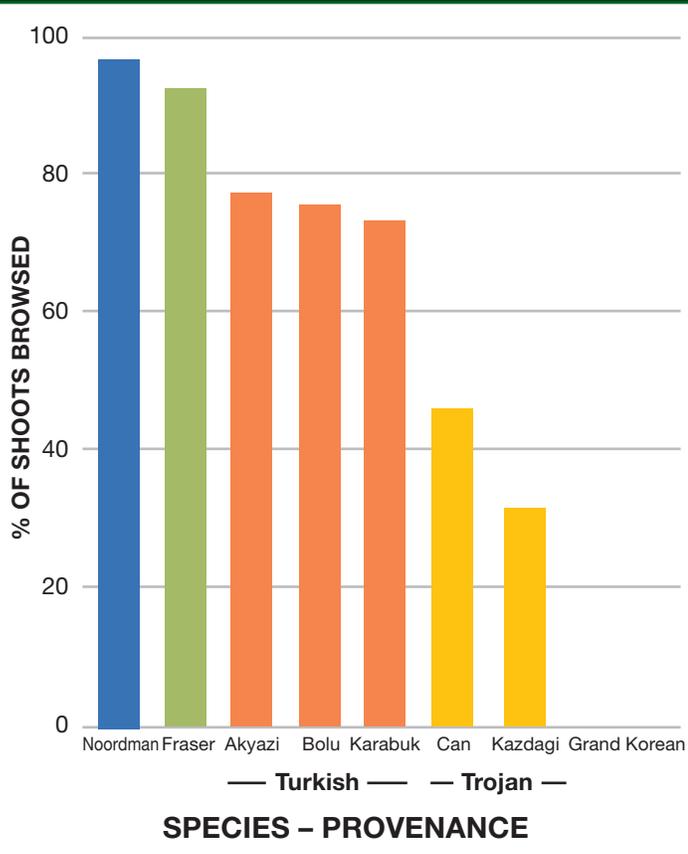


Chart 1 – Average deer browse of fir species and provenances of Turkish and Trojan fir in untreated control plots following winter 2022/23.

Chart 2 – Average deer browse of all fir species treated with Planskydd, TRICO Pro, or left untreated (Control). Trees were scored for deer browse in March 2023, following treatment in November 2022.

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