Alternative Approaches to Leader Control

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Shaping Christmas trees with shearing knives and hand pruners has become the standard practice for the vast majority of tree farms in North America. However, shearing knives are not the only way to shape trees and control growth. Over the years growers and researchers have trialed numerous techniques to shape trees. Here are a few methods that we've seen over the years that may inspire additional innovation.

Mechanical pruners

Shearing Christmas trees with knives has become a standard technique for many growers because it is highly effective and yields excellent results. However shearing with knives is also labor intensive and subjects workers to potential repetitive motion injuries. Some growers include mechanical shearing tools as part of their shaping program to reduce the workload on themselves and/or their shearing crews. Two principle types of mechanical shearers are trimmers with reciprocating blades, similar to mechanical hedge trimmers, and rotary trimmers. For reciprocating trimmers, some growers use off-the-shelf gas-powered hedge trimmers (Fig. 1). Other growers use trimmers with tree-length blades such as the SAJE trimming machine (Fig. 2). One of the most common rotary-type pruners is the Beneke system, which is available off-the-shelf as either a gas-powered or electric-powered system (Fig.3).

The principle advantage of mechanical shearing is labor and time savings. Manufacturers of mechanical systems claim up to an 80% savings in shearing time. On the other side, mechanical pruners will also increase the time needed for maintenance and the potential for down-time due to equipment problems. Using equipment with moving blades on uneven ground can increase safety concerns and gas-powered trimmers will require additional PPE for hearing protection. Lastly, growers may still feel a need for fine-tuning and touch-up pruning by hand.

Stilts

Although not a shearing technique per se, stilts can be useful when working with tall trees. At the International Christmas Tree Research and Extension Conference in Austria, we visited a farm where the workers regularly used stilts to access the tops of tall trees for pruning and other top work. The stilts are similar to those used by drywall installers, and, with practice, workers

Fig. 1 – *A worker trims balsam fir in Nova Scotia with a gas-powered hedge trimmer.* Photo: Bert Cregg.

Fig. 2 – *Trimming with a SAJE reciprocating trimmer.* Photo: Mississippi State University Extension.

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can become remarkably adept at navigating uneven terrain in them (Fig. 4). The farm operator reported that workers on stilts were faster for top-work than using ladders or extension pruners. Stilts may also be a useful option for accessing the tops of trees for picking cones and other tasks as well.

Top-stop nipper

The top-stop nipper is a growth control strategy that was developed in Europe, where consumers prefer relatively open trees that have not been heavily sheared. The nipper has recessed blades that are used to partially girdle the main leader of the tree (Fig. 5). The cuts made by nipper blades interrupt the flow of photosynthates to the terminal shoot and reduce shoot extension (Fig. 6). Growers in Europe that use the nipper become quite skilled and can often produce leaders with the desired length without pruning by adjusting the number nips they make with the nipper.

Chemical growth control

Shoot growth of conifers is controlled by the internal movement and balance of hormones within the tree. Over the years, horticulturists have developed an array of plant growth regulators (PGR's) that control plant growth by inhibiting the production of growth-stimulating hormones within plants. One of the most widely used group of PGR's used to control plant growth in horticultural production are gibberellic acid (GA) inhibitors. Over the past several years, we have investigated GA inhibitors as a means of reducing cone formation in Fraser fir. The products are effective in reducing coning by about 50% (more on this in a future edition of the Great Lakes Journal) but they are also effective in reducing shoot growth. In our trials we found that application of paclobutrazol can reduce shoot growth by 20% (Fig. 7). When applied to the soil, paclobutrazol can reduce shoot growth for up to three years following application. Paclobutrazol is labeled for use on trees and is regularly applied by arborists in urban and landscape tree care. The product is sold under various trade names including Cambistat, Shortstop, and Profile.

Another approach to using chemical growth control for Christmas trees is the application of S-Abscisic Acid (S-ABA)

Fig. 3 – *Trimming with a gas-powered Beneke rotary trimmer.* Photo: Hollow Creek Tree Farm.

Fig. 4 – *Stilts can increase the efficiency of working on the tops of tall trees.* Photo: Jill O'Donnell.

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Fig. 5 – *Making incisions on a leader with the Top-Stop nipper.* Photo: Bert Cregg.

Fig. 6 – *Recovery of wounds made with the Top-Stop nipper.* Photo: Bert Cregg.

to expanding terminals. S-ABA has a range of effects in plants including improving drought tolerance of bedding plants and promoting color development in table grapes. In conifers, S-ABA acts to stop extension growth of terminal leaders. Growers in Europe apply S-ABA to terminal leaders using an EZ-roller to produce terminals with desired shoot lengths. Recently, Chal Landgren, Christmas Tree Extension Specialist at Oregon State University, has led a group of researchers in exploring the utility of S-ABA for controlling growth in Christmas tree production in the US (Fig. 8). Trialing in Oregon has shown that the product is effective in stopping shoot growth in noble fir and Turkish fir. The product is currently registered for use in Oregon and Washington state under the

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tradename ConShape. One challenge in using S-ABA application to control growth is timing – not all leaders in a field reach the desired length at the same time – so growers would likely need to make multiple passes through a field to ultimately get uniform leaders. Another challenge is phytotoxicity. The effectiveness of growth control with S-ABA increases with dose, but so does needle and shoot damage. Research conducted so far suggests that researchers can identify rates that will control growth without damaging shoots but that this rate will vary by species. We found variable results with S-ABA applications on Fraser fir and Korean fir in preliminary trials in Michigan.

Fig. 7 – *MSU research assistant Elle Brandt applies paclobutrazol (Cambistat) in a research trial on coning and leader control.* *Photo: Bert Cregg.*

Fig. 8 – *Oregon State University researcher Judy Kowalski applies ConShape with an EZ-roller.*
Photo: Chal Landgren, Oregon State University Extension.