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Silvopasture with Christmas Trees

British Columbia has a long history of both livestock husbandry and Christmas tree cultivation. Integrating these two practices into silvopastoral systems provide options to diversify, enhance productivity and for environmental services. In native-stand Christmas tree silvopasture systems, interior Douglas-fir (*Pseudotsuga menziesii*) are grown by stump culture. With this method, a new main stem is grown from a lower branch remaining after the harvest of a previous tree. This creates the means to extend production from the same root system and has been practiced for over 70 years in BC. The density and growth form of managed Christmas trees in these systems provide large areas for concurrent forage production and with fertilization around the trees, can double the understory production relative to unmanaged stands. Grazing of this additional forage benefits livestock production and controls the potential negative impacts of the added biomass around the trees. Increased forage availability also benefits

wild ungulate species.

Stump Culturing Trees

Stump culture is a sustainable production system that involves leaving the bottom 2 or 3 branches (45 - 75-cm above the ground) when a tree is harvested. A new shoot may grow from near the cut, or the uppermost of these remaining branches may turn up to form a new treetop. Fertilizing and shearing lateral branch tips improve the look and marketability of the trees.

Because stump cultured trees have fully established root systems they can take advantage of nutrients applied at all stages of production. Fertilizer therefore benefits the trees and can also increase understory growth. Unmanaged, this added herbaceous growth can pose production problems through increased competition, tangling the lower branches (i.e. the future crop trees), and creating cover for small mammals that can damage crop trees.



Photo courtesy of Charlie Willis

Shearing of the lateral branch tips promotes a full, bushy growth form on the trees. Pruning can also be used to manage disease and remove deformed or damaged parts.

In recent years, disease outbreaks have challenged the industry in the southern interior. The fungi, Rhabdocline Blight (*Rhabdocline psuedotsugae*), causes browning of Douglas-fir foliage and ultimately needle loss. Similarly, Swiss Needle Cast (*Phaeocryptopus gaeumanni*) causes needles to drop from the trees leaving unsightly gaps in these ornamentals. It can take 3 to 4 years of new growth with fertilization and reshaping to recover a marketable tree. Fungicides can be effective but may be uneconomical. Tree orientation, pruning to leave a 45 – 75-cm gap between the bottom-most branch and the ground, and maintaining a low-statured understory through grazing, can all improve air-flow under the tree and thereby minimize humidity in the stand. This, in turn, can reduce the spread of fungal diseases.

It takes between 6 - 8 years to produce a marketable Douglas-fir Christmas tree. Silvopasture generates annual returns from livestock production while waiting for a mature tree crop. Boughs pruned from the trees can also be used to create wreaths, swags and garlands for additional income.



Photo courtesy of George Powell

Silvopasture Basics

Silvopasture systems combine trees with forage and livestock production. In this regard, silvopasture is different from other types of agroforestry because it requires management of three-way interactions. Management of trees, forage and livestock benefit each other in well-designed silvopasture systems. It takes good management to ensure livestock enhance tree growth, without damaging young trees. Success depends on understanding livestock behaviour, although some level of incidental damage is unavoidable. Extensive damage is generally preventable and indicative of poor management. Livestock can damage trees through browsing, trampling and rubbing.

Browsing damage. Livestock preferences are predictable. Cattle generally avoid browsing

conifers unless other forage options are very limited. Sheep and goats, however, may prefer Douglas-fir and require closer monitoring. Wild ungulate browsing can cause considerable damage and can only be effectively controlled with suitable fencing to exclude them from the stand. Although cattle generally choose forage over conifers, tree foliage can be attractive when trees are flushing in the spring. This is also a period when vegetation control can be very effective, so it is important to closely monitor spring grazing.

Trampling damage. Livestock stepping on trees can be a significant cause of seedling death, can deform and weaken tree stems, and may provide an entry point for insect pests and disease. Trees < 40 cm tall are most susceptible, thus trampling is not generally a factor in established tree stands.

PLAN

- How and where you will market the Christmas trees and livestock?
- Do you have access to a suitable area to grow the trees and forage?
- Do you have the time, tools and resources for tree pruning, maintenance and harvest?
- Do you have the time and resources for livestock care and management? Or, can you arrange a partnership with a livestock producer for joint management?

SELECT



*Photo courtesy of
George Powell*

Consider:

- Travel time from your home base.
- Access: physical and legal.
- Tree form and health.
- Overstory-understory structure.
- Water availability and distribution.
- Slope and topography impacts on livestock movement.

MANAGE AND PROTECT

Prune and fertilize to:

- Shape the trees and create a full, bushy appearance.
- Remove damaged or diseased foliage.
- Enhance both tree and forage growth.
- Improve airflow through the stand.
- Improve livestock access and movement.

Protect young trees from damage.

- Early tree growth and survival depend on effective control.
- Browsing relates to livestock preferences.
- Minor rubbing damage is expected in most stands.
- Wildlife damage can only be eliminated with suitable fencing.

Control livestock use.

- Understand grazing preferences.
- Maintain moderate stocking levels.
- Use salt placement, watering locations and herding to maintain adequate animal distribution.
- Time grazing to minimize damage risk and maximize tree growth benefits.

Rubbing Damage. Larger trees can provide a convenient rubbing post for animals. Rubbing can remove branches and bark or break the main stem. This type of damage is difficult to eliminate, but thankfully usually restricted to a small portion of the plantation unless animals are poorly distributed. Wild ungulate damage through antler rubbing is also common but generally isolated.

Grazing should be timed for after the initial spring flush of new tree growth, but soon enough to mitigate competition on the crop trees. Moderate stocking rates with good animal distribution over the entire silvopasture are key to a healthy forage stand and minimizing negative impacts on the trees.

Consider site factors (e.g. slope, topography, water distribution) and salt placement to determine herding frequency.

For More Information

BC Agroforestry Industry Development Initiative

www.woodlot.bc.ca/agroforestry/

InfoBasket

Your link to agri-food information including a dedicated agroforestry portal.

www.infobasket.gov.bc.ca

A Guide to Agroforestry in BC. 2001. Small Woodlands Program of BC, published by Forest Renewal BC, Victoria, 319 pp.

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