# Young pine respond to aspen-retention treatments in BC's southern interior

*by Bruce Rogers, Mountain Pine Beetle Extensionist*

Researchers predict that in the next 10 years the volume of standing live lodgepole pine in BC will drop from 694 million $m^3$ to 134 million $m^3$ (Eng *et al.* 2006). This amount includes stands of pure pine and stands where pine is only a component. Lodgepole pine tends to thrive and compete well in a niche that usually involves extreme soil properties and soil moisture (Lotan and Critchfield 1990). In many British Columbia situations, lodgepole pine can also be found growing alongside aspen, which favours some similar environmental conditions (Figure 1). Maximizing growth and yield and future site productivity on sites currently dominated by young planted or natural pine is critical to enhancing the timber supply. However, managing for aspen is also important to minimize brushing costs, to increase biodiversity, and, in some locations, to provide another source of marketable timber.

The ability to predict the growth and yield responses of lodgepole pine under natural conditions is challenging. Add to this the variety of treatment scenarios that include conifer/deciduous mixes, and the outcomes can expand exponentially. However, assessing silvicultural treatments to ensure second-growth stands are effectively contributing to our mid-term and long-term timber supply is key to recovering from the impacts of the mountain pine beetle. Adding to our knowledge of how management practices are impacting the growth and yield response of young lodgepole pine, the BC Ministry of Forests and Range, Forest Science Program has released two technical reports by **Teresa Newsome**, **Jean L. Heineman**, and **Amanda F. Linnell Nemec** that report on the response of lodgepole pine and aspen to variable aspen retention treatments in the Dry, Warm Sub-Boreal Spruce, Horsefly Variant (SBSdw1) subzone (Technical Report 032, ***http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr032.htm***), and in

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the Very Dry, Cold Sub-Boreal Pine–Spruce (SBPSxc) subzone (Technical Report 029, ***http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr029.htm***). The two installations highlighted are part of a series of trials established across a variety of biogeoclimatic (BEC) subzones.

These and previous studies determined that the density of aspen greater than or equal to pine height was the best predictor of pine stem-diameter growth, and that this relationship becomes stronger as stands age. So how does retaining different densities of aspen as tall as or taller than the crop pine impact the pine's growth?

Two years following aspen retention treatments of 0, 1,000 and 2,500 stems per hectare on the 13-year-old SBPSxc site, pine stem diameter and diameter increment increased and height/diameter ratio decreased significantly on all treatment sites in comparison to the uncut control (Figure 2). Conversely, four years after treatment in the 15-year-old SBSdw1 site, no significant differences in pine-diameter growth were observed between the uncut control and the aspen retention treatments of 0, 500 to 800, 1,000 to 1,500, and 2,000 to 2,800 stems per hectare, although a decrease in pine vigour was observed in treatments with more than 500 to 800 aspen stems per hectare remaining. Significant decreases in height growth have only been observed on older sites (greater than 15 years) and under very high aspen competition where over 9,000 stems per hectare of aspen were within 1.8 m of a pine (Newsome *et al.* 2003). No differences in height growth between treatments were found in younger stands on the SBSdw1 and SBPSxc installations and on two similar trial sites in the Very Cold, Mild Interior Douglas-fir (IDFxm) and the Dry, Warm Sub-Boreal Spruce, Blackwater Variant (SBSdw2).

Teresa Newsome photo

How did the aspen respond to treatment? Two years after treatment, aspen suckering responses varied by subzone. In the SBSdw1 site, aspen suckering densities ranged from 28,187 stems per hectare in the complete aspen removal area to 344 in the 2,000 to 2,800 stems per hectare treatment site. These suckers were 46 to 62 cm in height. In the SBPSxc site, sucker densities varied from 93,086 to 22,410 stems per hectare in the total aspen removal area compared to the 2,500 stem retention treatment site respectively, but were only 25 to 30 cm tall. Aspen suckering densities seen in this study fall within the range of those seen in studies done in Ontario (Miller, 1996). Miller cites eight studies with postharvest aspen suckering densties after two years ranging from approximately 30,000 to 200,000 stems per hectare. It was also noted that regardless of the aspen suckering density present at stand establishment, most stands progress towards a density in the range of 20,000 to 25,000 stems per hectare by about year six.

The treatment responses seen across ecosystems in these trials indicate that there is a need for ecosystem-specific stocking and free growing to reflect site differences. Many of the BC sites where mountain pine beetle has killed mature pine are best suited to regrow pine. Thus, from a "results-based" perspective, finding a balance between acceptable crop tree growth and yield, and retaining deciduous components that maintain natural biodiversity and improve nutrient input and future site quality, is essential to applying biologically appropriate competition density thresholds on a site-by-site basis.

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***Figure 1 (above).*** *A mature stand of aspen and pine in the Very Dry, Cold Sub-Boreal Pine–Spruce biogeoclimatic subzone.*

***Figure 2 (centre).*** *Fifteen-year-old site in the Dry, Warm Sub-Boreal Spruce, Horsefly Variant biogeoclimatic subzone.*