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Foothills Growth and Yield Association Quicknote #15

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Regenerated Lodgepole Pine Trial 10-year Results: Possible Implications for Foothills Forest Management

Introduction

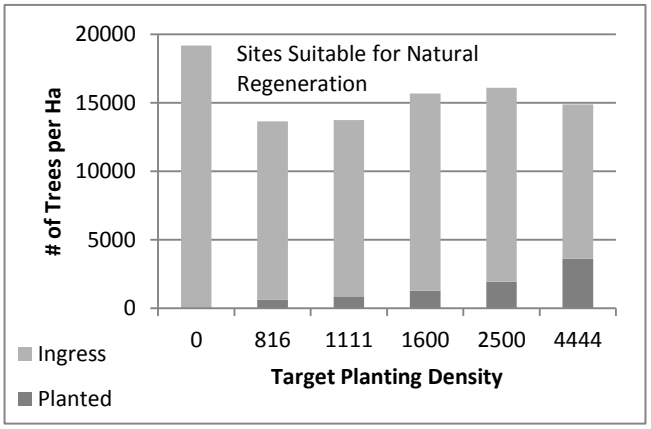
The Regenerated Lodgepole Pine Trial consists 102 one-hectare permanent sample plot clusters installed about 10 years ago throughout the Alberta foothills to monitor stand development of lodgepole pine, planted and naturally regenerated after harvesting, in relation to site and treatment factors. This note is one of 3 summarizing results after10 years. A more detailed report is also available.[1] Observed high and persisting rates of natural regeneration, but also of disease and mortality, merit consideration of the implications of trial results for site preparation, planting, tending and reforestation standards.

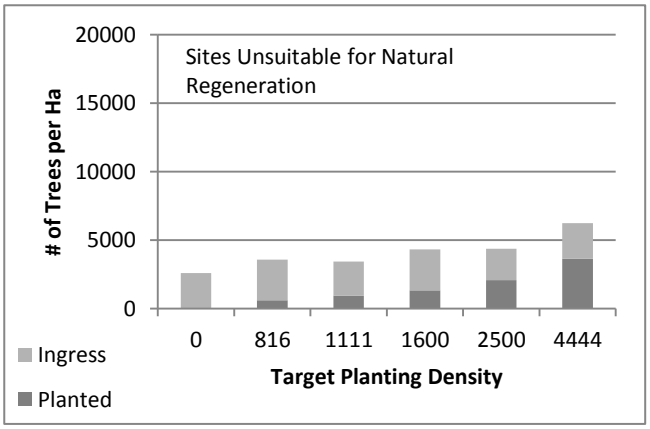
Site Preparation

Processing of trees at roadside (versus topping and de-limbing at stump) is now the most usual harvesting system among FGYA members. Planting is frequently relied on for assuring or augmenting regeneration of sites where, with adequate seed and cone dispersal, natural ingress would be abundant. The trial results suggest that reduction of reliance on planting such sites may be facilitated by assessing the distribution of cones and, where necessary, spreading cone-bearing slash.

Planting

On many sites planting is unnecessary to meet reforestation targets. Where good potential for natural regeneration exists it can be encouraged by appropriate site preparation and cone dispersal. Where abundant natural regeneration is uncertain and mortality risks for lodgepole pine are high, planting of alternative species or mixtures may be a more prudent strategy. The figure below left shows average densities of planted stock and ingress 10-12 years after harvest on ecological site classes with medium to poor nutrient regimes and mesic to subxeric moisture regimes. Such sites generally have good potential for natural regeneration. Much less natural regeneration typically occurs on rich sub-hygric and poor hygric sites (averages shown in figure below right).





[1] *Regenerated lodgepole pine trial 10-year crop performance report*. Foothills Growth and Yield Association, February 2012. http://foothillsresearchinstitute.ca/pages/Publications/

The trial results support reports in the literature of the risks of planting pine soon after harvest, when opportunistic pathogens like *Armillaria* and *Hylobius* are most abundant and when trees physiologically stressed by planting, climate or other factors are most likely to succumb to them. Continuation of lodgepole pine natural ingress into the second decade following disturbance is usual in Alberta not only following harvesting, but also following natural fire-disturbance. It may well be a survival adaptation by the species that silviculturists should not ignore. Different species have different adaptations to survive physiologically stressful conditions. Whereas lodgepole pine relies on high densities and rapid early growth to offset mortality risks, spruces may survive unfavourable establishment conditions by reduced seedling growth. Unfortunately, little data is currently available to compare the survival of planted white and black spruces with that of lodgepole pine on the sites studied in this project.

Tending

The trial results are consistent with the view widely held by field foresters that, regardless of tending, natural regeneration of lodgepole pine cannot be relied on to reforest either rich sites or poor hygric sites. On such sites planting and tending of climax spruce species or mixtures may be preferable to pure lodgepole pine reforestation. The main opportunities for increased reliance on natural regeneration are on sites that, with appropriate initial site preparation, often do not require weeding, especially if modest levels of deciduous tree or shrub species, which are probably beneficial from a forest health perspective, are tolerated. An arguably more fundamental policy issue is the possibility that widespread removal of young aspen may not be effective for sustained-yield management of foothills forests, where sustention of pine yields is threatened by mountain pine beetle and climate change, but habitat suitability for aspen is forecast to improve.

Reforestation Standards

Trial results illustrate the danger of relying on establishment surveys conducted 4-8 years following harvest to judge reforestation success. Alberta's yield-based reforestation standards and focus on regeneration performance at 12-14 years provide an excellent opportunity to avoid over-reliance on earlier establishment targets. Regeneration modeling and continued measurement of the trial are providing an improved basis for linking establishment to performance standards.