Red Alder – Coast Region

Hardwood Silviculture Cooperative Website.

Height-year old planted and thinned Red Alder stand located near Campbell River, B.C.

Site Characteristics

- Minimum moisture regime of fresh and medium nutrient regime.
- Aerated root zone ≥ 30 cm
- Abundant winter precipitation or root contact with seepage moisture or groundwater.
- Well-drained upland or alluvium sites.
- Common on recently disturbed sites (e.g. floodplains, old logging roads, landslides, burns, clearcuts).

Site Series (Edatopic Classes) where Optimal Red Alder Growth Occurs[1]

BEC Unit[2]	Site Series							
CDFmm	05{6/C}	06{6/D-E}	{07}[3]	{08}	[12]	[13]		
CWHxm	01{4/C}	05{4/D-E}	06{5-6/C}	07	{08}	[09]	[13]	[14]
CWHdm	01{4/C}	05{4/D-E}	06{5-6/C}	07	{08}	[09]	[13]	[14]
CWHds	01{4/C}	05{4/D-E}	06{5-6/C}	07	{08}	{09}		
CWHms	{07}	{08}						
CWHvm1	01{3-4/C}	05	06{5-6/C}	07	08	{09}	{10}	
CWHmm1	01{3-4/C}	05	06{5-6/C}	07	{08}	{09}		
CWHvh1	04{4/C}	05	06	07	{08}	{09}		
CWHwh1	01{3-4/C}	03	05	06	{07}	{08}		

[1]Courtin *et al.* (2002).

[2]See Meidinger and Pojar (1991) for an explanation of Biogeoclimatic Ecosystem Classification (BEC) zone, subzone, and variant abbreviations.

3{ }=alluvial floodplain site; [ ] = fluctuating water

Potential Red Alder Growth Key

Medium - Good

Optimal

Red Alder Management Considerations

- Site-specific evaluation is the most important step when planning for red alder regeneration and management.
- Intensive management is required when managing red alder for sawlogs in the short-term (e.g. 20 – 30 years).
- Red alder growth is rapid during the juvenile stage and declines after 50 years.
- The demand for alder solid wood products is high when compared to other coastal B.C. hardwoods such as cottonwood and bigleaf maple.
- Intensive, short-rotation management of alder should be limited to more productive sites (Site Index ≥ 27 m).
- Mixed-species forests that include alder can increase forest productivity and provide a variety of other ecosystem management values.

Silvicultural Considerations

Plantation Establishment - Mixed Species

Mixed-species management: three options to consider:

(1) **Underplanting an established red alder stand with conifers**: site preparation, weed control, and/or alder thinning or removal will likely be required;

(2) **Post harvest Site Regeneration** with red alder and associated conifer(s): depending on the conifer species red alder will need either be planted at densities that will not impact conifer growth or to be thinned or removed;

(3) **Delay red alder establishment until after conifer establishment:** timing of alder establishment will depend on site quality and conifer species, weed control and a thinning may be required.

Planting Considerations

- If the primary objective is nitrogen fixation, a 50– 200 well spaced sph of red alder should be planted with minimal effect on crop trees.
- Options for spatial variation include well-spaced intimate mixtures, alternating row planting, and cluster planting of various sizes.

Chemical Site Preparation to Reduce Red Alder Competition with Crop Trees

- Foliar application of triclopyr ester or glyphosate is over 90% effective when applied during the early foliara to senescence red alder stages.

Chemical Brushing to Thin Red Alder or Reduce its Competition with Crop Trees

- Stem injection of glyphosate is usually greater then 90% effective, although chemical flashback affecting residual trees via root grafts is a problem. Using half-strength mixtures may alleviate this.
- Basal bark applications of triclopyr ester in late foliar to later summer stages is also greater then 90% effective.

Manual Brushing to Reduce Red Alder Competition with Crop Trees

- Cutting trees older than 10 – 15 years old is completely effective at reducing alder regeneration (60 – 80% effective when younger; more effective in dense residual stands).
- For maximum mortality of young alder, manual cutting must be done during the middle of the growing season, and trees should be cut as low as possible.

Plantation Establishment – Red alder

- When managing alder for commercial harvest planting is preferred over natural regeneration as it produce higher quality saw logs due to uniform density. If alder-site-dominance is achieved in the first 3 years, vegetation management will not be required.
- 1700-2200 sph are recommended for commercial harvest. At this density alder will rapidly occupy the site, control understory competition and promote early self pruning. Two or more thinning will likely be required.
- A seedling calliper of > 4 mm, a height > 60 cm, and healthy buds along the entire length of the stem are desirable seedling characteristics.
- Red alder must be planted in mid-March – mid-April after the risk of frost is over but before summer drought stress.
- Preferable planting spots are in mineral soil on the sides of mounds.
- Seedlings should be planted deep into the mineral soil with minimal scalping to avoid heat stress. Root collar should be at least 2.5 cm below the soil.

Site preparation

- Growth and survival of alder may be reduced if vegetation cover exceeds 90%.
- Since there are no operational chemical treatments for release and because manual brush cutting is expensive, pre-planting vegetation control measures may be required when managing for red alder.
- Minimise soil disturbance and exposure of mineral soil to reduce natural regeneration alder on favourable sites.

Plantation Management – Red alder

Thinning

- The best time to thin is measured in "stage of development" instead of in years. Thinning should be conducted before crown recession exceeds 40– 50% (approximately 8 – 10m height). Generally, thin naturally regenerated red alder stands between 15 and 20 years of age. However, variables such as site quality, planting density, available markets, rotation age, etc. will affect when red alder should be thinned.
- Timing of thinning seems to be less important then thinning intensity.
- Avoid opening excessively to keep brush down and reduce sun scald (reduce to 600 – 1000 sph).

Pruning

- Only prune when it is combined with a thinning treatment.
- When pruning always keep at least 60% live crown. Healing rates are similar between live and dead branch pruning.
- Girdling older trees is also completely effective at reducing red alder competition.

Specific Autecological Characteristics

- The indeterminate growth pattern of red alder allows it to grow in height at any time when growing conditions are favourable.

Pre-disturbance

- Alder is a relatively short-lived tree, reaching maturity and maximum stand volume between 50 – 70 years.
- Mature alder characteristics are determined primarily by early stand conditions, before 20 years of age.
- Alder trees can bear seed as early as 3-4 years of age, but dominant trees in a stand usually produce seed at 6-8 years. Some seed is produced every year, and large numbers of alder seed may be expected in most years. Red alder seed viability decreases once trees reach 40 years of age.
- Other then black cottonwood, red alder requires more light than any of its associated tree species.
- Alder appears to have evolved higher N-fixing capacities on sites of higher environmental stress (e.g. high-elevation seed sources).

Post-disturbance

- Red alder seed is very light and susceptible to desiccation. Germination primarily occurs on moist mineral soil.
- Dominant, free-growing saplings can be produced in about 2-4 years on suitable sites.
- Red alder seedlings need full sun for normal development. However, they can tolerate partial shade for a number of years.
- Although young alders sprout vigorously after cutting, their capacity for vegetative reproduction is greatly reduced after 10-15 years.

Other Values/Considerations of Red Alder

Wildlife Food and Habitat

- A bigleaf maple or conifer component in an alder stand is desirable for providing persistent wildlife habitat structure.
- Red alder contributes to biodiversity both on the stand and landscape level through its effect on species, structures, wildlife, and the understory.
- Red alder is resistant to Phellinus weirii and only mildly attached by Armillaria ostoyae.
- Consider damage agents such as deer, elk (problem because of rubbing), beaver, bark beetles, voles (stem girdle of mostly larger dominant trees – fatal), sapsuckers (not fatal, cause point for breakage, occurs in clusters).
- Living and dead alder provide temporary foraging and nesting habitat for birds and mammals.

First Nations' Values

- Red alder wood was used to making eating implements, for smoking meats, and building fires. The outer bark provided orange-red dye and the inner bark was sometimes eaten.
- The wood is also used for making feast bowls, masks, and rattles.
- Alder bark was valued for a variety of medicinal purposes.

Other Benefits and Considerations

- Red alder has be ability to rapidly improve soil productivity through fixation of atmospheric nitrogen (approx. 100 – 300 kg/ha/yr), and through nutrient input through litterfall. It can improve growth of Douglas-fir (or other conifers) on nutrient poor sites. Red alder litterfall increases organic matter content in the soil, leading to improved soil aeration and lower soil bulk density. The leaves are a preferred food source for earthworms, which help to incorporate organic matter into the soil.
- Growth of red alder may be affected by the amount of phosphorus in the soil.
- Volume growth in conifer-hardwood stands is relatively slow until about age 50, perhaps reflecting a delay in conifer growth due to hardwood competition.
- A red alder version of TASS has been developed.
- The alder bark beetle (*Alniphagus aspericollis*) has become a major issue in many new red alder plantations in B.C.

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