

WHITE SPRUCE

Cover Type Guidelines

ROTATION AGES

<u>Site Index</u>	<u>Pulp</u>	<u>Sawtimber</u>
45-55	60	---
55-65	60	70-80
65 +	70	80-90

Rotation ages should be shorter on coarse acidic soils or shallow soils to minimize volume loss from butt rot and root rot.

HARVEST SYSTEMS

Naturally regenerated white spruce commonly occurs as a component of balsam fir, aspen, or northern hardwood stands, and less commonly in pure stands. Harvest methods are dictated by the dominant species in the stand and management objectives. Clearcut if the site will be regenerated to white spruce. Residual overstory balsam fir and white spruce may act as sources of budworm infestation to the regeneration. When white spruce is a component in northern hardwood stands, all-aged management may be possible, due to shade tolerance of white spruce.

REGENERATION SYSTEMS

Artificial regeneration is required to establish white spruce stands. Stock or seed used should be from the appropriate seed collection zone. Planting is the most common method used. Both containerized and bare root stock are used. Direct seeding attempts have not shown consistent success. Spot seeding shows more promise than broadcast. However, methods still need to be perfected.

Plant bareroot stock in the spring. Container stock can be planted in the spring or fall. Frost heaving is a problem with fall planted stock on wet or clayey soils. Heaving can be greatly reduced by maintaining the litter layer and by planting as early as possible in the fall.

Separate plantations from large spruce-fir types with deciduous or red pine cover types. White pine weevil damage may occur if white spruce is established adjacent to jack or white pine stands. Open field plantings are susceptible to yellow headed spruce sawfly damage.

To reduce damage to new growth by late spring frost avoid areas that tend to collect cold air. Leave a cover canopy of deciduous trees or brush in frost prone areas (see below) or plant black spruce.

STAND MAINTENANCE AND TIMBER STAND IMPROVEMENT

Outplanted white spruce has slow height growth for 1 to 10 years while the roots become established. White spruce can survive up to 100% shade during this establishment period. A cover canopy of 50 to 75% reduces damage to seedlings from frost and sawflies.

Reduce shading after the period of establishment. Maximum growth occurs with 25 to 30% shading. Use the ratio of terminal leader growth to later leader growth in the first whorl as an indicator of vigor to assess the need for release.

Root competition may limit growth more than above ground competition on soils or climates where soil moisture or aeration is limiting.

PEST CONSIDERATIONS

The major insect and disease problems on white spruce are yellowheaded spruce sawfly, *Pikonema alaskensis*, spruce budworm, *Choristoneura fumiferana* white pine weevil, *Pissodes strobi* and *armillaria* root rot, *Armillaria* spp. *Armillaria* root rot can be an important killing agent especially when hardwood sites are converted to white spruce. White pine weevil kills the leader and causes forked or crooked stems. It is primarily a problem when white spruce is grown close to or with white pine. Spruce budworm outbreaks can cause heavy mortality to white spruce growing within extensive acreage of the spruce-fir type. High levels of yellowheaded spruce sawfly are very destructive to spruce. The sawfly prefers open grown trees in grassy areas and seldom builds up to damaging levels on shaded trees. Completely defoliated trees may die by midsummer. Trees suffering 3 or 4 consecutive years of moderate to heavy defoliation will also be killed. Top kill may result from heavy defoliation.

Management recommendations for the yellowheaded spruce sawfly are as follows:

1. Do not completely release white spruce plantations until the spruce are 10-12 feet in height. Twelve foot tall trees generally have enough foliage to withstand attack by high populations of the sawfly. White spruce is fairly tolerant and puts on good growth even when partially shaded. The sawfly prefers open-grown trees and seldom builds up to damaging levels on shaded trees.
2. Inspect open growing plantations with trees less than 10-12 feet tall in early June for sawfly larvae. If sawfly larval populations are high, especially if defoliation occurred last year and tree mortality or top kill are likely, direct control should be taken. Consult with the Region Insect and Disease Specialist when deciding if direct control is necessary. Sawfly damage generally occurs in pockets in plantations. In that case, only the pockets of heavy damage should be sprayed rather than the entire plantation. If no tree mortality is likely to occur, the trees should not be sprayed to give the parasites and predators a chance to build up.

PREFERRED SITE CONDITIONS

White spruce has a high moisture and nutrient demand. Best growth will occur with the following site characteristics:

- adequate soil moisture available throughout the growing season.
- medium to high fertility.
- medium to fine soil textures.
- good soil aeration.
- a rooting zone greater than 18 inches deep.
- somewhat poorly to well drained soil.
- gently rolling topography (slopes < 10 - 15%).

WILDLIFE CONSIDERATIONS

Shrubs and forbs in young plantations provide browse for deer and moose. A partial canopy of shrubs or hardwoods reduces insect, disease, and frost damage to seedlings. The value of a plantation for food decreases as the tree canopy closes because shrubs and forbs are shaded out. Older plantations may provide winter thermal cover for deer when spruce-balsam, white cedar, or other mixed conifer stands are absent.