

# BLACK SPRUCE

## Cover Type Guidelines

### **ROTATION AGES**

<u>Site Index</u>	<u>Rotation Age</u>
25-45	90 years
45 +	60 years

Stands with site indices greater than 45 are usually growing on mineral soil or on upland sites. Harvest black spruce stands on mineral soils before 60 years of age because root and butt rots can begin to seriously limit fiber production after age 60 on these soils.

Regardless of age, if a stand is infected with dwarf mistletoe it should be harvested as soon as merchantable to reduce the spread of mistletoe.

### **HARVEST SYSTEMS**

Harvest by clearcutting all live black spruce 5 feet and taller in height. If harvesting in strips or small patches to encourage natural regeneration, the harvested area should be no wider than 4 to 6 chains. Natural seeding of black spruce is reliable up to 4 chains from the windward side of a mature stand and up to 3 chains from the leeward side.

If it is not feasible to require the logger to cut or kill all black spruce stems 5 feet and taller on the sale area, some type of site preparation is needed. Prescribed burning, herbicide application, or winter shearing is mandatory to kill all infected black spruce trees prior to regenerating the new stand.

If dwarf mistletoe is present in the stand, adjust the timber sale boundaries to include the infected areas (pockets) and a 2-chain wide buffer of uninfected trees around the infected pockets. This is to remove latent infections which cannot be seen at the time of harvest. Lay out the sale area so landings are located in mistletoe infected pockets to help break off and kill small, infected black spruce.

Prescribed burning is the best method for controlling dwarf mistletoe. Harvest infected stands in such a way that will allow prescribed burning of the site.

Winter logging on low land sites is usually necessary for access and to avoid site deterioration. When logging during non-frozen periods use wide tired skidders.

## **REGENERATION SYSTEMS**

With proper design of the timber sale, natural seeding can provide adequate regeneration if the stands being harvested and the surrounding stands are healthy and vigorous, and an adequate seedbed is present.

When stands being harvested are surrounded by stands that are in a state of decline due to old age, dwarf mistletoe, etc., artificial seeding is needed due to the lack of a good seed source, even when an adequate seedbed is present.

A seedbed survey should be done prior to harvesting. A site has an adequate seedbed for natural or artificial seeding if it has a minimum of 60% coverage with sphagnum moss. If the site has less than 60% coverage with sphagnum moss, plant with black spruce seedlings or prepare the site. Before seeding, shear using a wide pad crawler tractor and burn to promote sphagnum mosses.

When relying on natural or artificial seeding to regenerate a site, it is difficult to determine the success until 5 years after seeding.

Planting will be necessary on sites without an adequate seedbed. This is most common on the most productive sites where feather mosses predominate.

Container planting stock is preferred over bare root stock. Fall planting is preferred over spring and summer planting.

Use prescribed burning to remove slash, temporarily remove brush, kill dwarf mistletoe residual trees, and to prepare a seedbed when feather mosses predominate a site.

## **STAND MAINTENANCE AND TIMBER STAND IMPROVEMENT**

Brush competition will seldom cause mortality of black spruce but will reduce growth if dense. At age 5 to 6, if brush competition height is exceeding 6 to 8 feet in height and is dense, release of the seedlings may be necessary.

Mistletoe infected sites which have been harvested should be checked in 10 years to make sure the disease is under control.

## **PEST CONSIDERATIONS**

The major disease problems on black spruce are dwarf mistletoe, *Arceuthobium puillum* and root and butt rots. Black spruce is attacked and killed in all stages of its development by dwarf mistletoe. Root and butt rots caused by *Armillaria* spp. and *Inonotus tomentosus* are present in all stands over 30 years of age. Losses from root and butt rots may range up to 40% of the merchantable volume of the stand. Rots are the major contributing factor to wind damage. In historic outbreak areas, spruce budworm, *Chortistoneura fumiferana*, can be an important insect pest especially on upland sites where black spruce is growing with balsam fir.

**Dwarf Mistletoe:** This disease is best controlled at the time of harvest, during site preparation activities, or during regeneration. Specific principles to consider include:

1. Dwarf mistletoe is an obligate parasite, that is, it is only able to survive and grow on living trees. To control dwarf mistletoe, infected trees must be killed, but it is not necessary to remove the trees from the site.
2. Broadcast burning of harvested sites is the best way to eradicate dwarf mistletoe. Care must be taken to get good coverage especially on and around known infection areas. Whenever possible, slash disposal regulations should stipulate that the slash will be lopped and evenly scattered on infected sites. Slash-free alleys with a minimum width of 16 feet should be required.
3. Kill all black spruce stems over 5 feet tall. Require the logger to do this on all timber sales whether or not mistletoe has been detected. Use of the 5 foot cutting rule on all timber sales will reduce the impact of mistletoe and will eradicate the disease from some harvested sites. However, the only way to be certain dwarf mistletoe has been completely eradicated from a site is to kill all black spruce on the site regardless of tree size. It may be necessary to follow a harvest with another silvicultural treatment to eradicate mistletoe.
4. Design timber sale boundaries to include the mistletoe pockets plus a two chain buffer of non-infected (no witches brooms) black spruce. This is to remove latent infections that cannot be seen.
5. Locate landings in mistletoe pockets if possible. The extra traffic and activity is likely to kill more of the small black spruce and will therefore provide better control.
6. When preparing planned cut lists, mistletoe infected stands should be considered high risk stands in order to reduce the spread of mistletoe within the stand and to reduce the establishment of new pockets in nearby stands.
7. Establish buffer strips between infected and uninfected stands primarily between recent cutover sites and infected unmerchantable sites.
8. Regenerate densely stocked stands of black spruce because mistletoe spreads more slowly and causes less damage in them than in open stands.
9. Mistletoe infected sites which have been harvested or treated to control mistletoe should be surveyed 1 to 2 years later, to check for the presence of living black spruce trees 1 foot and taller. After the survey the forester should decide if follow up treatment, such as hand cutting, is necessary or feasible. To ensure eradication of dwarf mistletoe all remaining black spruce trees 1 foot and taller must be killed. On some sites eradication may not be feasible with current technology or economics.
10. Timber harvests with the 5 foot cutting rule can not be used in the following situations:
  - A. The stand is too heavily infected with mistletoe to get a logger to purchase the sale if

the 5 foot cutting rule is included.

- B. The stand is bordered by unmerchantable black spruce infected with mistletoe.
- C. The stand is immature but so badly infected with mistletoe it will never be merchantable and a new stand must be regenerated.

11. In these types of situations, other methods must be used to kill all the residual black spruce on the site, in an infected edge, or where entire immature stands must be removed. Methods which may be used are listed below:

- A. If the acreage or the number of trees involved is small, a hand crew can be utilized.
- B. With large projects and immature stands, it may be more economical to use a caterpillar with a KG blade to shear the standing timber.
- C. In heavily infected stands, broadcast burning in combination with shearing will probably be necessary to insure that small trees are killed and not just pushed over.

**Root and Butt Rots** - These diseases usually begin to seriously limit fiber production on upland black spruce sites after age 60-70, and may become a problem on lowland black spruce after age 100. Therefore, manage upland black spruce on a rotation of 60-70 years and lowland black spruce on a rotation of less than 100 years.

If root and butt rots become a problem, clearcut the stand to avoid losses. Treatment of just the pocket of rot is not sufficient since many nearby trees showing no symptoms are also infected.

On upland sites if root and butt rots become a problem, the stand should be clearcut and converted to pines or hardwoods.

Root and butt rots caused by Inonotus tomentosus seem to be most prevalent under the following conditions:

- acidic soils with pH's ranging between 4 and 5.
- soils low in nutrients.
- soils low in moisture holding capacity.
- situations in which root depth is limited by shallow soils or a hard pan.

**Spruce Budworm** - This defoliator may become a problem on upland black spruce growing with balsam fir, but usually the damage is insignificant. In historic spruce budworm outbreak areas, black spruce may be considered as an alternate species to break up large continuous stands of balsam fir. When this is done try to exclude balsam fir from black spruce stands.

## **WILDLIFE CONSIDERATIONS**

Many species of wildlife utilize the black spruce type to some extent. Birds use black spruce

for nesting (branches and cavities), perching, escape and severe weather cover. There is also a rich habitat of insect foods provided by the black spruce. Mammals use this species for some browse, escape cover, severe weather cover, and it produces den trees for smaller animals. Browse and other wildlife foods are more abundant in newly harvested areas and young stands as opposed to mature and overmature stands.

## **PREFERRED SITE CONDITIONS**

Black spruce is typically managed on organic or wet mineral soils. Key factors in site productivity include origin and decomposition of organic material, depth of organic material, and characteristics of the water system that feeds the rooting zone. Best growth on organic soils occurs on moderately to well decomposed material (dark brown to blackish) that contain many fragments of partially decomposed wood fibers AND has mineral soil in the rooting zone OR a water system that is carrying nutrients from a mineral soil to the rooting zone (minerotrophic water). The surface 6" need not contain woody fragments.

Poorest growth occurs on poorly decomposed (yellowish brown) deep peats of sphagnum origin that depend on precipitation for incoming nutrients.

On mineral soils black spruce is suited to a wide range of sites from sandy to clayey and will typically out produce stands occurring on organic soils although root and butt rots may limit production on these drier soils. Productivity is best on moist, fine textured soils, and it is poorest on dry, sandy soils.

Site productivity for black spruce would be increased by drainage or fertilization. However, these practices are not economically feasible at this time.