

In Praise of Black Spruce

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It's about time the under-appreciated black spruce (*Picea mariana*) receives the attention and recognition it deserves. Its resilience, economic importance and pan-Canadian distribution make it the stalwart, humble and inspirational icon of the Canadian boreal forest. Let's celebrate its many contributions to Canadian life and psyche. Forget the geographically limited sugar maple and picturesque wind-swept white pine and let us respect black spruce as the most important and consequential Canadian forest tree.

The black spruce is **resilient** and has robust, diverse and effective survival strategies. It reflects the legendary Canadian resilience demonstrated by indigenous peoples and early immigrants to cope with harsh and varied environmental conditions and a raw and rugged physical landscape.

Small, semi-serotinous, egg-shaped cones clustered at the top of the tree open readily after a wildfire passes through. This reproductive strategy effectively re-establishes black spruce after fire. Its small and mobile

(FIGURE 1 SIX GENERATIONS OF LAYERED BLACK SPRUCE ON MOSS OVER BEDROCK. THE ORIGINAL MOTHER TREE IS A REMNANT STUMP AT THE CENTRE OF THIS CLUMP.)

seeds are also distributed annually from their elevated perch, catching the wind to disperse a "seed-rain" to suitable downwind seedbeds. This "seed rain", moderate shade-tolerance and its ability to germinate on both exposed mineral soils and most mossy forest floors encourage spruce regeneration within even the oldest of forests. Another strategy in their resilience repertoire is their ability to "layer" with lower branches that reach a mossy forest floor taking root to form a new tree without having to rely on seed dispersal. Generations of "layered" trees may perpetuate black spruce forest communities for hundreds of years in the absence of fire or other disturbance (Figure 1).

Resilience is also demonstrated in the ability of black spruce needle litter, and rain percolating through its canopy to acidify the forest floor and the underlying soil, slowing rates of decomposition, and developing a thick carpet of feathermosses (Figure 2). Not only does this thick feathermoss carpet support layering to perpetuate the genetic material as a clone of the mother tree, but it also represents a significant nutrient and carbon bank that accumulates through time and contributes to the process of

long-term carbon storage in boreal soils. The majority of black spruce feeder roots occupy this very same moss layer the tree helped create. Talk about sustainability.

Black spruce can exploit a wider range of soil conditions than any other conifer species. Although peak growth performance is expected on moist, well-drained mineral soils, it may tolerate greater amounts of

FIGURE 2 DEEP FEATHERMOSS CARPET UNDER A NATURAL 70 YR OLD EVEN-AGED, FIRE ORIGIN BLACK SPRUCE STAND.

soil saturation than any conifer species other than tamarack and eastern cedar; finding a home in swamps, bogs and fens. It can colonize and nurture growing environments on bedrock that have little to no mineral soils through its sharing of nutrients and moisture through interlocking and grafted roots and beneficial fungi. These root mats also provide better wind support on rock, and helps it form support a secondary canopy in old forest on droughty and sandy sites. Its' shallow rooting even allows it to populate raised palsas underlain by permafrost. Although semi-shade-tolerant, peak growth rates occur in full sun. Shade tolerance allows black spruce to exist in even- and uneven-aged stands and even succeed into an old growth steady state on xeric and mesic sites but to a much lesser degree on richer sites. The narrow crown and drooping branch structure reduce snow interception and help shed snow quickly and efficiently to reduce winter breakage. Black spruce is resilient. Black spruce is a survivor. Black spruce is a species built for Canada.



Black spruce is **valuable** to the well-being of Canadians through both industrial and cultural uses. It has high economic importance and is a preferred conifer pulp species, valued highly for its long fibre length and superior strength for fine papers. Longer fibre is correlated with more rapid growth on more productive sites (Figure 3), but even slow growing trees have superior pulping qualities relative to many other conifers. Black spruce lumber is highly desirable for construction based on its straight lines, durability, light weight, and strength. Larger trees are highly prized for their lumber but quality black spruce wood can also be used in fine wood products such as musical instruments and sounding boards due to unique resonance qualities.

Wilderness travellers and campers in all seasons hold black spruce in high regard as a quality firewood when dry. It is easy to split and burns with less popping and spitting than many other conifers. The very fine twig structure on lower dead branches represent some of the finest kindling for starting campfires winter or summer. Living boughs are prized by wilderness campers for their flexible twigs, softer less prickly needles, and three-dimensional structure for winter bough-beds that provide superior insulation as a sleeping platform or canopy of a lean-to. Closely spaced black spruce are narrow, straight and strong, providing readily available wilderness construction materials for a lean-to, a travois or structural

framing for a prospector tent, while more open-grown black spruce with their crown-to-ground branch structure provide an effective natural shelter from the wind. Black spruce is the winter camper / trekker's best friend and survival support.



FIGURE 3 TALL LARGE DIAMETER BLACK SPRUCE ARE PRIZED FOR THEIR LUMBER QUALITY. FASTER GROWING TREES HAVE LONGER FIBRE LENGTH.

Spruce roots are shallow and supple, making them easy to harvest and use for tying, lashing, or sewing. Although not as flexible as white spruce roots, they are common, widespread, and readily available for emergencies.

As a dependable and available source of vitamin C almost anywhere in Canada, black spruce needles and twig tips have traditionally been used as a herbal remedy for colds and the flu. Indigenous knowledge of spruce tea was instrumental for Samuel de Champlain to reduce his devastating losses to scurvy in his early years in Acadia 1604-1606. Spruce beer offers a unique flavour and an opportunity for the creative brewer.

Black spruce is a key component of the conifer forests that support habitat for another iconic Canadian species, woodland caribou. The ability of black spruce to moderate the rate of nutrient cycling on rich sites, acidify the soils and persist as primary forest cover in very nutrient poor and extreme moisture conditions make it a key component of woodland caribou habitat. The dynamics of black spruce and jack pine forests are a key part of the caribou conservation story.

Black spruce and the boreal landscape have captured the imagination and inspired the expression of artists depicting the wildness of the Canadian boreal landscape (*Isles of Snow*, Arthur Harris; *Black Spruce in Autumn*, Tom Thomson; *Spruce and Snow*, Lawren Harris; *Black Spruce*, Eyvind Earle). Other than the wind-swept formations of white pine, no other tree species comes close to matching the ability of black spruce to find a new and unique physical expression of structure and posture in response to environmental conditions. Their artistic appeal increases with age for this long-lived tree. Old (150-200 yr) black spruce have long shaggy shards of bark, a tight club-top of branches, an upper bole bent and twisted with the weight of the top branches and tremendously long pendant branches hugging the stem. No image is more emblematic of the Canadian boreal wilderness than the ragged skyline of ancient black spruce forests bordering northern lakes and waterways (Figure 4); the towering veterans warped and twisted under their own weight; the club-tops, and uneven age structure. The sculpted club-tops are also modified by red squirrels revealing sections of naked stem where cone-bearing

branches have been harvested. The fanciful forms are not limited to the skyline. The persistent pendant live branches on old black spruce bear witness to advanced age (Figure 5). These pendant branches, growing a mere millimetres per year, may hang for three to five metres down the stem of the tree often forming a twisted, sinuous pattern and exhibiting an upturned tip at the end.



Figure 4 Ragged black spruce shoreline is emblematic of the wilderness experience in boreal Canada.

In truly Canadian fashion we don't always appreciate and give thanks for what we have. Industrial forestry has not always been kind to the black spruce, typically favouring regeneration of faster growing jack pine or trembling aspen and mixed forests on the most productive sites, partly due to the relative cost of effective post-harvest silviculture. At the same time, mature black spruce stands on moist to well-drained fine - moderate texture soils are highly sought after and are primary targets for harvest where accessible. The pursuit of quality conifer fibre is a primary driver of forest management activities at the most distant extent of economically feasible forest management operations. Yet I fear the black spruce is not given the respect it deserves.

Although not always given its due, the black spruce is an iconic Canadian tree species and deserves to be recognized as such. It should be our National Tree.



FIGURE 5 OLD (160 YR +) BLACK SPRUCE WITH LONG PENDANT BRANCHES AND SHAGGY BARK BEARING WITNESS TO ITS ADVANCED AGE.