

WESTERN SPRUCE AND THE WAR

Thirty thousand men are enlisted by the United States Government in the Spruce Service here in the Pacific Northwest. The purpose is to get an abundance of the best wood for the construction of airplanes to be used in the present Great World War.

It has been known for a long time that Spruce is one of the best of woods for the long "spars" in the wings of the airplanes. When the United States declared war, in April, 1917, the need of thousands of fighting airplanes was recognized, and attention was instantly directed toward the large Spruce trees at the mouths of Puget Sound rivers and elsewhere in the Pacific Northwest. Development was rushed, and interest has been keen in this new lumber industry where lumbering enterprises had been familiar since the earliest arrival of white men.

The history of this tree and the great coniferous forests of the Northwest will be of value at this time. Probably not less than nine-tenths of the original forests of the Pacific Northwest were composed of one species of trees — *Pseudotsuga taxifolia* — commonly called Douglas Fir. It is one of the best of the American timber trees, and for many years was about the only one used by our millmen and shippers. The next in abundance and use was the Cedar — *Thuja plicata* or *Thuja gigantea*, as it is named in Sargent's *Silva*. The wood of this tree was used for finishings and more especially for shingles. In later years there have been developed some uses for White Fir (*Abies grandis*), the Lovely Fir (*Abies amabilis*) and Hemlock (*Tsuga heterophylla*). In former years, however, logs of these trees were usually rejected from the booms at the mills if a venturesome logger undertook to smuggle them in with his Douglas Fir logs.

The same fate of rejection often befell the Spruce logs in early days. This was modified when a relatively limited demand for the lumber developed. It was found to be especially desirable for shelving and pantry finish, because the wood was quite free from pitch. An occasional shipment was made to piano factories, as Spruce is acknowledged to be a more resonant wood than Pine or Fir. It may be of interest to remark here that the most famous violins in history were made of carefully selected Spruce. The length of fiber in the wood made it desirable also in the manufacture of paper. Its freedom from pitch caused the development of another use about twenty or more years ago. This was for berry- and butter-boxes, which re-

quired the installation of a number of veneering machines. Thus the demand for Spruce was gradually growing, when suddenly the United States Government introduced a new vigor which has made the harvest of Spruce the dominant item in this timber region. All logging sections are alive to the great industry, and the greatest "cut-up" camp in the world is at Fort Vancouver, where the Spruce timbers are rived before being shipped on favored trains to the airplane factories.

The propellers of airplanes are made of hardwoods, and especially of Black Walnut. The Boy Scouts of America are being used to search out every possible supply. In the absence of such hardwoods here we are interested in supplies for the "spars." Probably all the actual fighting planes will be made of the best Spruce. Practice planes are needed by the hundred, and materials for these may be chosen from other woods. At least two of these woods are being secured on the Pacific Coast — Douglas Fir and (from Northern California) Port Orford Cedar (*Chamaecyparis lawsoniana*). The Forest Products Laboratory of the United States Forest Service at Madison, Wisconsin, has issued a carefully prepared table entitled: "Properties of Various Woods, Strength Values at Fifteen Per Cent. Moisture, for Use in Airplane Design." Hardwoods for propellers and other words are here shown. A few of the items are selected to show the relative values of the three "spar" timbers of the Pacific Coast:

"Weight, pounds per cubic foot — Port Orford Cedar, 31; Douglas Fir, 34; Spruce, 27.

"Modulus of rupture, pounds per square inch — Port Orford Cedar, 10,300; Douglas Fir, 9,700; Spruce, 7,900.

"Modulus of elasticity, 1,000 pounds per square inch — Port Orford Cedar, 1,700; Douglas Fir, 1,780; Spruce, 1,300.

"Work to maximum load, inch pounds per cubic inch — Port Orford Cedar, 9.7; Douglas Fir, 7.2; Spruce, 7.4."

The Spruce used in these tests included the eastern and Canadian species as well as the western. It is claimed that the western species has advantages over the two eastern species. The average Spruce tests shown above reveal the reason for selecting Spruce — the comparatively favorable strength test and relative lightness in weight.

In its botanical history this western Spruce has been classified as a Pine, a Fir and a Hemlock. Finally it was placed among the true Spruces and was given the scientific name, *Picea sitchensis*. The specific name indicates that it was first described as from Sitka, although it was discovered on the shores of Puget Sound by Archibald Menzies, surgeon and naturalist of the Vancouver expedition of 1792.

It was introduced into European botanical gardens by the Scotch botanist, David Douglas, in 1831. The common names of the tree are Sitka Spruce or Tideland Spruce.

Aside from the value of its timber and just as a tree in the forest, the Tideland Spruce has won warm praise. For example: "The greatest of all the Spruce-trees, this inhabitant of the northwest coast is surpassed by few other trees in thickness and height of stem. No tree in the American forest grows with greater vigor or shows stronger evidences of vitality, and there are few more beautiful and impressive objects in the forests of temperate North America than one of these mighty Spruce-trees, with its spire-like head raised high above its broad base of widely sweeping and gracefully upturned branches resting on the surface of the ground, its slender branchlets loaded with handsome cones nodding in the slightest breeze, and its leaves, now silvery white and now dark and lustrous, shimmering in the sunlight."

That quotation is from Charles Sprague Sargent's *Silva of North America*, Volume XII., pages 57-58. When that greatest work on American trees was published in 1898 it was greatly desired for the University of Washington Library. It cost twenty-five dollars a volume, and there being no funds for such an expensive work, I laid the case before S. G. Simpson, the most prominent timberman on Puget Sound of that day. He seemed interested, and suggested a call on the following Monday. Anticipating success, I prepared a newspaper article filled with gratitude for the gift. Mr. Simpson held up a check. "One condition," said he; "no publicity. Promise, or I'll tear up the check." As a pledge, I tore up the manuscript of the newspaper article, and the fourteen large volumes have been doing fine service in the library ever since. Mr. Simpson has been dead a number of years. No confidence is violated by this late acknowledgment of his gift. After making this statement, I wish to quote further from the same work, showing the area in which the Tideland Spruce is found:

"Small and stunted, and sometimes only a shrub toward the extreme northwestern limit of its range, it becomes on the coast of southeastern Alaska, where its principal companion is the western Hemlock, the largest and most abundant tree in this part of the great coniferous forest which stretches from Cross Sound to Cape Mendocino, growing at the sea-level often to a height of more than a hundred feet and ascending to elevations of three thousand feet, but decreasing in size as it ascends or leaves the immediate neighborhood of the ocean. Very abundant in the northern coast region of British Colum-

bia, farther south it is principally confined to the low sandy alluvial plains at the mouths of streams, on which, mingling with the western *Arbor vitae* [Cedar], it grows to its largest size along the coast of Washington and Oregon, and to moist bottom-lands which it follows inland to the foothills of the Cascade Mountains of Washington and northern Oregon, sometimes ascending on the Nisqually and other streams which flow into Puget Sound to elevations of two thousand feet above the sea. South of the valley of the Columbia River it is confined to the neighborhood of the coast, and although the Tideland Spruce grows in northern California to a very large size on the rich alluvial plains at the mouths of streams and in low valleys facing the ocean, where it is associated with the Redwood and the White Fir, it is less common and of less magnificent proportions than on the shores of Puget Sound. South of Cape Mendocino it is not common."

As the American aviators help to win the war in France, Belgium and Germany, the wings of their airplanes will be sustained by wood from trees which were well grown before their homeland was discovered by white men. The Spruce-trees are not as old as the great Redwoods of California, and still many of them are from five hundred to a thousand years old. "Of three trees measured by John Muir, at Wrangell, Alaska, one was 764 years old, with a trunk five feet in diameter; the second was 500 years old, with a trunk six feet three inches in diameter, and the third was 385 years old, with a trunk four feet in diameter. A tree measured by him, which had grown on the edge of a meadow on the Snoqualmie River in Washington, was 180 feet high, with a trunk four feet six inches in diameter and was 240 years old. Another tree, also measured by him, near the city of Vancouver, in British Columbia, was only 48 years old, but had a trunk three feet in diameter."

War has grown wonderfully complex, as have all the other activities of man in this Twentieth Century. In this complexity success can neglect no element. This being true, there will be heroism in the Spruce forests, the shipyards, the munition factories, on the transports and railroads, as well as in the air, in the Navy and at the battlefronts in Europe.

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