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by
B.C. WILE

MARITIMES

MARITIMES FOREST RESEARCH CENTRE

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ABSTRACT

Some trees and shrubs that are hardy in the climate of the eastern Maritimes Provinces of Canada and resistant to the common pollutants, road salt, sulphur dioxide, and ozone, have been selected from the literature as suitable for planting in urban areas, along roads, and as windbreaks.

RESUME

Quelques arbres et arbrisseaux qui sont vivaces dans le climat des provinces maritimes orientaux du Canada et qui résistent aux polluants communs, le sel routier, l'anhydride sulfureux, et l'ozone, ont été choisis de la litérature en tant qu'espèces convenables à planter dans les zones urbaines, le long des routes, et comme brise-vents.

INTRODUCTION

Most publications on the planting and care of shade trees and ornamental shrubs advise people to select species that will flourish in the local climate (Oliver 1957, Sherk and Buckley 1968, Sherk 1971). A map showing the hardiness zones is sometimes included. Plants with a climatic hardiness of 2 will grow anywhere in the Maritimes, but those with a hardiness of 5 will grow only in the warmer parts (Fig. 1). In the last decade or so, trees and shrubs in urban areas and along roads and highways have been exposed to the additional hazards of road salt and air pollution. These new hazards are likely to worsen and should be considered when selecting trees and shrubs for such areas. If survival can be increased by selecting hardy species, we hope that trees and shrubs will be used more for aesthetic purposes, windbreaks, and snowfences. They also are good sound deflectors to lessen the annoyance of motor vehicle traffic, screens to hide unsightly areas and objects, and shelters for birds, animals, and man.

COMMON POLLUTANTS

Road salt. Road salt or de-icing salt, usually sodium chloride and sometimes calcium chloride, is applied to assist the movement of motor traffic, but the advantages are offset by the disadvantages. Salt corrodes vehicles, crumbles concrete, rusts steel bridges, culverts, guardrails, and posts. Salt costs money to buy and apply. It contaminates water supplies, and damages and kills some trees and shrubs.

Salty water is flung into the air by moving vehicles and falls on trees and shrubs. Salt on evergreen foliage causes needle browning, especially on the side of the plants facing the road and above the snow cover. Browning is evident first in late winter and early spring. It begins at the tip of the conifer needle and gradually spreads down the whole needle. On deciduous plants, buds on the tips of branches facing the road are retarded and slow to open in spring.

Salty water also runs off the road surface into the ground and is absorbed by plant roots. Salt in the root zone causes lower leaves to turn yellow and eventually die and drop. Plants lose vigor and become stunted. If salt damage is severe the plant dies after a few years. Studies of damage help to identify resistant species (Lumis et al. 1973, Dirr 1975, Blaser 1976).

Air Pollutants. Air pollutants that injure plants come mostly from motor vehicle exhaust, industry, and the generation of electricity (Davis and Gerhold 1975). Sulphur dioxide and ozone are probably the most common air pollutants. Most of the sulphur dioxide comes from man's use of fossil fuels (coal, petroleum, and natural gas) and from smelting and refining ore. Ozone is formed when exhaust gases react in the presence of sunlight.

Symptoms of injury by air pollutants are similar to salt damage but usually are more uniformally distributed over the plant. Beginning at the tips, foliage first turns yellow, then brown, and the plant eventually dies. However, if pollution is mild, the foliage may develop yellow and brown spots, some leaves die and drop prematurely, the crown becomes thin and open, and growth slows.

TREES AND SHRUBS RESISTANT TO POLLUTION

Until we are more considerate of our environment, only species that are able to survive should be planted in polluted places. Table 1 lists some trees and shrubs, both native and exotic or foreign, that according to most references have a good chance of surviving pollution. Ratings of tolerance to pollution vary according to methods and criteria used, and genetic variation within the species. Very few species have high tolerance to road salt, either as a spray or in ground water, or to the various air pollutants. While the trees and shrubs listed in Table 1 should be more tolerant of pollution than others, they will be damaged or killed if the concentration is high.

WINDBREAKS

Windbreaks or shelterbelts are more important on the Great Plains than in the forested Maritimes. Nevertheless, trees could have greater use in the Maritimes as snowfences, sound deflectors, screens, and shelters.

The simplest windbreak is a single row of trees with shrubs on both sides (Fig. 2A). Green ash (*Faxinus pennsylvanica*) trees flanked by Siberian peashrubs are commonly used (Cayford and Bickerstaff 1968). Green ash is usually rated as only moderately tolerant to salt and sensitive to sulphur dioxide and ozone, so we do not recommend it for polluted areas. Lombardy poplar (*Populus nigra 'Italica'*), probably the most common tree used for row planting because of its narrow crown, ascending branches, and fast

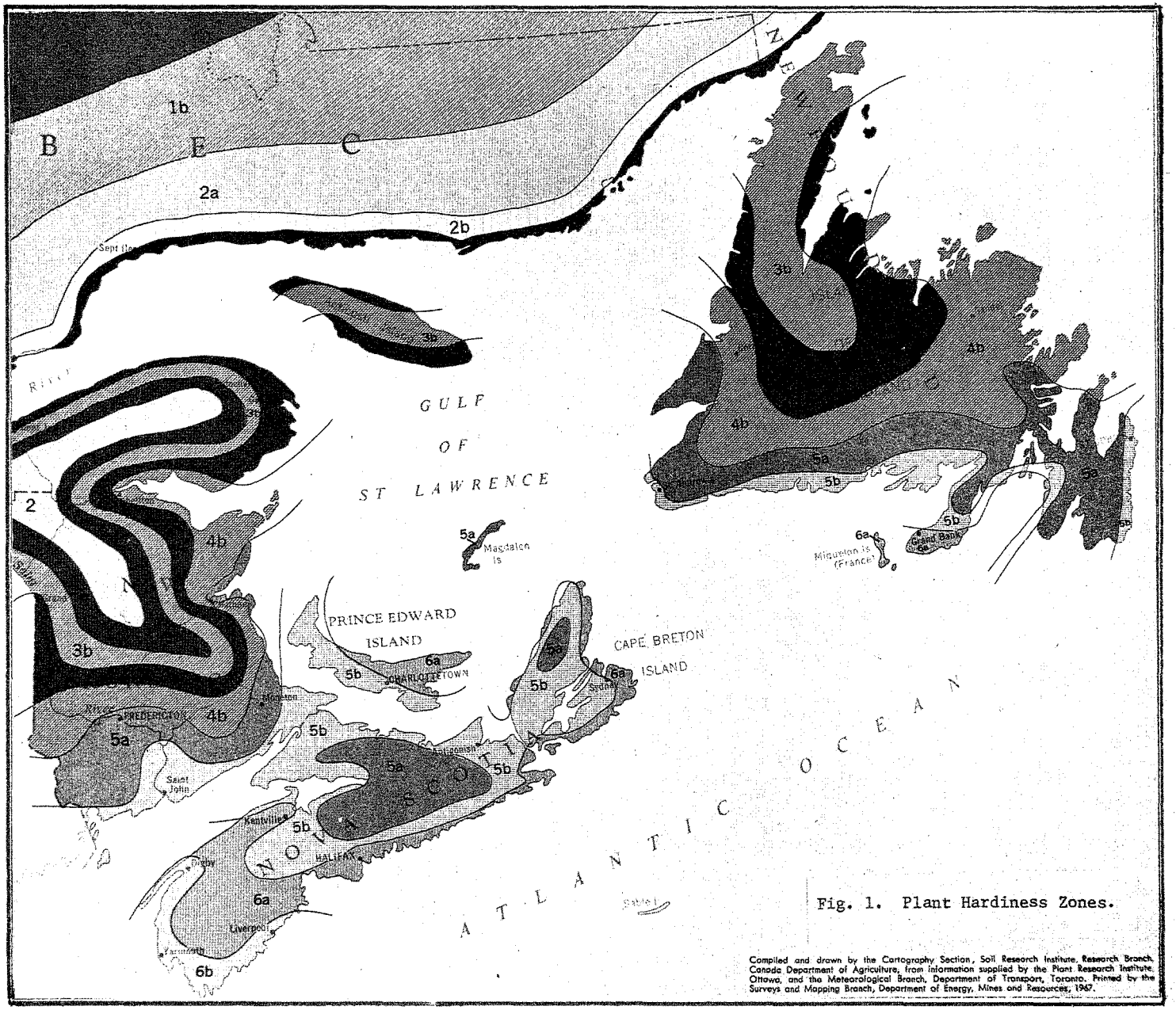


Fig. 1. Plant Hardiness Zones.

Compiled and drawn by the Cartography Section, Soil Research Institute, Research Branch, Canada Department of Agriculture, from information supplied by the Plant Research Institute, Ottawa, and the Meteorological Branch, Department of Transport, Toronto. Printed by the Surveys and Mapping Branch, Department of Energy, Mines and Resources, 1967.

Table 1. Some ornamental trees and shrubs that are hardy in the Maritime Provinces and tolerant of road salt and air pollution

Common name	Scientific name	Hardiness zone
	Coniferous Trees	
Eastern red cedar*	*Juniperus virginiana*	3
Tamarack*	*Larix laricina*	1
Colorado spruce	*Picea pungens*	2
Pitch pine*	*Pinus rigida*	5
	Deciduous Trees	
Norway maple	*Acer platanoides*	5
Sugar maple*	*Acer saccharum*	4
Hackberry*	*Celtis occidentalis*	4
Amur cork-tree	*Phellodendron amurense*	4
Ussurian pear	*Pyrus ussuriensis*	2
Red oak*	*Quercus rubra*	4
Black locust	*Robinia pseudoacacia*	5
	Evergreen Shrubs	
Pfitzer's juniper	*Juniperus chinensis 'Pfitzeriana'*	4
Creeping juniper*	*Juniperus horizontalis*	2
Mugho pine	*Pinus mugo*	2
Adam's needle	*Yucca filamentosa*	4
	Deciduous Shrubs	
Siberian pea-shrub	*Caragana arborescens*	2
Amur privet	*Ligustrum amurense*	5
Honeysuckle	*Lonicera* sp.	2
Common lilac	*Syringa vulgaris*	3

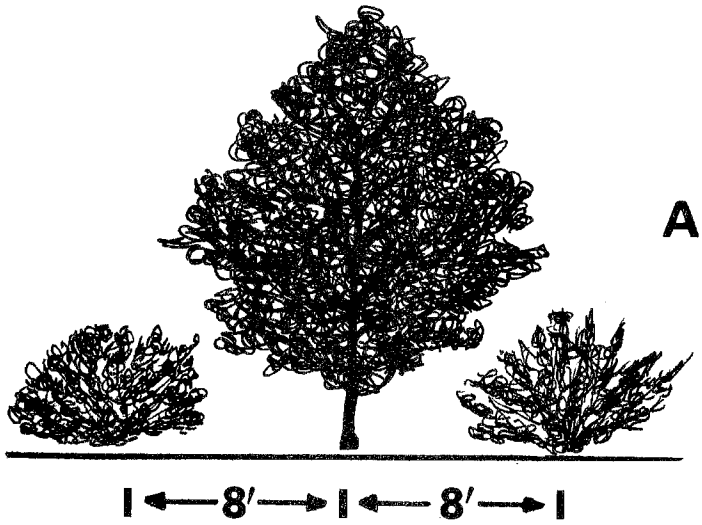
* Native to Canada

growth is not recommended for the same reasons. However, both trees are popular and useful where pollution is no problem.

A row of coniferous trees makes the windbreak more effective in winter (Darby 1971). Suitable conifers are Colorado spruce and red cedar (Fig. 3), and where there is little air pollution, Austrian pine (*Pinus nigra*), or salt, white spruce (*Picea glauca*). A mixture of deciduous and coniferous trees is best for year-round reduction of noise (Van Haverbeke and Cook 1974).

The effectiveness of a windbreak or shelterbelt increases with its width (Reethof and Heisler 1975). One or two rows of deciduous trees and one or two rows of conifers, flanked on each side by one or two rows of tall shrubs such as Siberian pea and Mugho pine, in turn flanked by one or two rows of low shrubs like juniper, make an excellent shelterbelt (Fig. 2B).

Trees should be planted about 2.4 m (8 ft) apart, in rows 2.4-3.6 m (8-12 ft) apart, to permit rapid growth and long live crowns. Lower limbs should ***not*** be pruned away or the effectiveness of the shelterbelt will be reduced. Shrubs can be planted at similar spacings.



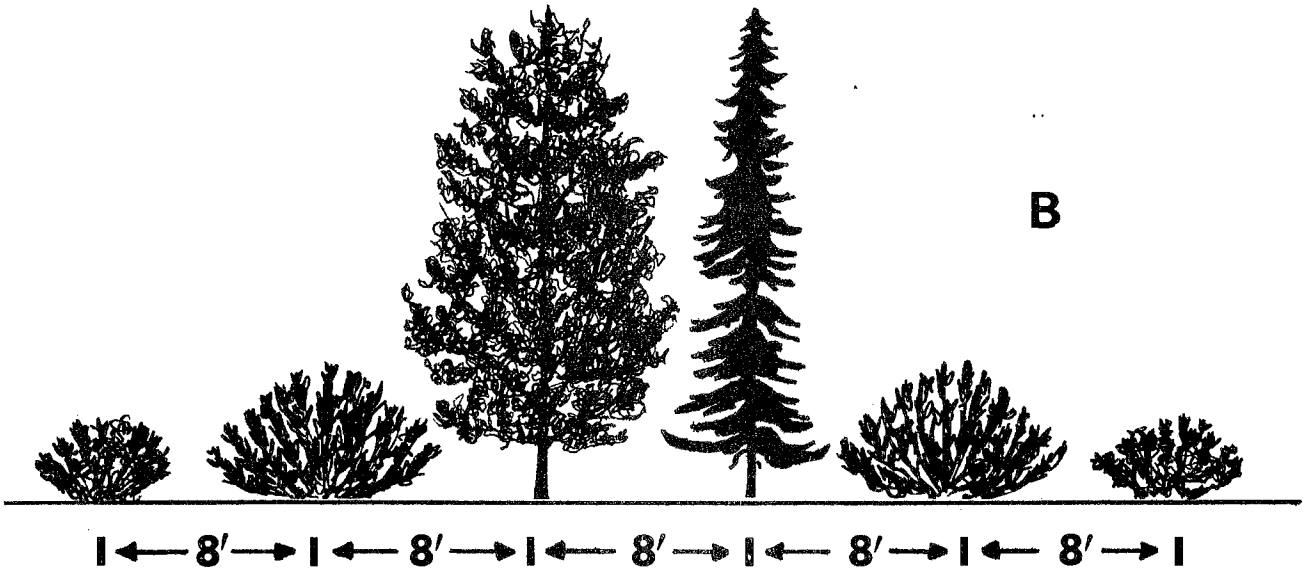


Fig. 2 WINDBREAKS

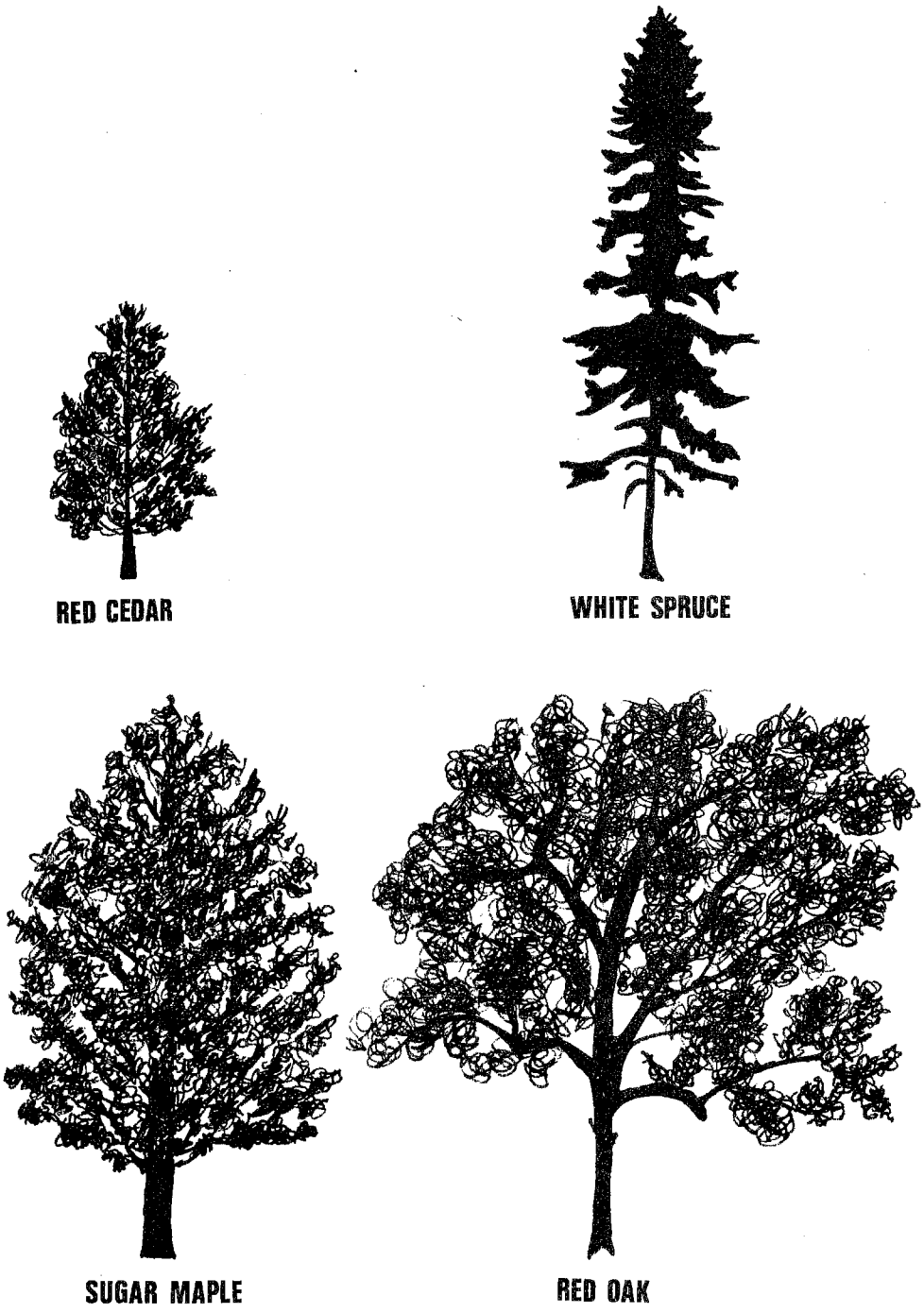


Fig. 3 TREE PROFILES

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