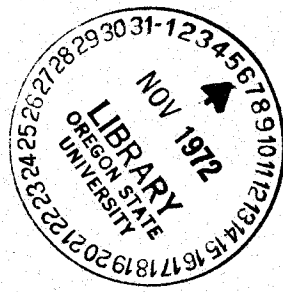


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Eastern Oregon Windbreak Trees and Shrubs

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EASTERN OREGON WINDBREAK TREES AND SHRUBS

Observations of Various Species Over a Period of 22 Years

by

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INTRODUCTION

For twenty-two years, I observed trees and shrubs planted for windbreaks in eastern Oregon. In this paper some conclusions are drawn, although I will be the first to emphasize that the knowledge we need and do not have would fill a much more extensive report. My observations and field work in eastern Oregon were occasional rather than continuous. An effort was made to study the results of research and to consult with other workers, especially those in Washington and Idaho.

A paper frequently referred to is the March, 1965, Station Circular 450, a publication of the WSU Agricultural Station entitled "Adaptation Tests of Trees and Shrubs for the Intermountain Areas of the Pacific Northwest."

The experiences of Extension Agents and other field men were drawn upon, as was a 1967 report of the Windbreaks Committee in Washington State.

CONIFERS FOR WINDBREAKS AND SHADE TREES

General Comments. For 22 years, I observed certain species of evergreens, or conifers, planted as windbreaks in eastern Oregon. Of the species observed, ponderosa pine, Rocky Mountain juniper, Virginia juniper, and Austrian pine would be rated as generally good performers. All are suitable for irrigated ground. For non-irrigated, only ponderosa pine and the junipers would receive a rating of fair or better. If the non-irrigated land has deep soil and the better moisture conditions, Austrian pine and several other desirable evergreens can be maintained.

I hesitate to rate certain conifers for the fact that in eastern Oregon field-test information concerning them is scanty or lacking. But these reputable windbreak species may do very well: Norway spruce, Engelmann spruce, American arborvitae, blue spruce, and incense cedar.

Douglas-fir and lodgepole pine possess some favorable points but I am inclined to give them lower ratings based upon the few plantings seen. Scotch pine grows well, but the stock seen in this state tends to have poor form.

Ponderosa pine and Rocky Mountain juniper are natives of this region and are reported favorably as windbreak trees by practically all field men experienced in windbreak plantings. With good planting and maintenance practices you can count upon almost certain success with them on either poor or good soils, on irrigated and on dry sites.

Ponderosa Pine. I would rate it the best conifer at Moro and getting better at 23 years. It is very good at the Union Station where sub-irrigation is available. It is considered the most reliable conifer in Gilliam County by Lou Gilliam, a SCS worker of 30 years' experience. Healthy

trees are seen at Moro that were planted 47 years ago and never irrigated. Ponderosa pine is rated very favorably at the Umatilla Experiment Station on irrigated ground, after 37 years. It is definitely superior to the strain of Scotch pine established there for comparison and is on a par with Austrian pine in the same planting although the latter is considered to have greater density.

Evaluations reported by WSU Circular 450 do not detract from our high opinion. Diseases and insects do not commonly attack ponderosa pine, although insects may cause terminal damage. The tree is somewhat intolerant of shade and should have maximum sunlight to develop a dense full crown. Under close spacing or other shading, lower branches tend to lose foliage or die.

Rocky Mountain Juniper. Few plantings of this species over 15 years of age are seen throughout eastern Oregon. One less-than-top rating came from County Agent Bierman at Hermiston, who says spider mites bother the species there. He prefers the Virginia juniper which is unscathed. The Rocky Mountain juniper is an outstanding tree at Moro and at the Roscoe Moore farm in Sherman County. A more dense and beautiful evergreen tree can hardly be imagined. Its dense and overflowing habit at the ground level immediately mark it as a superior barrier to the ground winds.

Virginia Juniper, or Eastern Redcedar (J. virginiana). Just about all the reports and experiences I have concerning this tree are favorable. Windbreak students of the SCS and WSU have not recommended this species because it is an alternate host to the cedar apple rust. WSU Experiment Station Circular 450 states that this particular rust has not yet been

found to be adapted to the Pacific Northwest; nevertheless, to be on the safe side, eastern redcedar has not yet been recommended. Washington is an apple-growing state. Says one SCS specialist, "The Rocky Mountain juniper is good, so why bother to introduce Virginia juniper?" *J. virginiana* is found occasionally in eastern Oregon communities. I have heard no arguments in this state for excluding it. The apple rust risk is said to be negligible.

A big advantage of *J. virginiana* is that it is easily established, whereas Rocky Mountain juniper is not easily established with bare-rooted stock. At the Moro Experiment Station, the Virginia juniper seems as well adapted as the Rocky Mountain juniper. As previously mentioned, Bierman believes the Virginia juniper to be superior in his area to Rocky Mountain juniper because he observed no insect problems.

Virginia juniper is probably not as ornamental as Rocky Mountain juniper. Even when growing wild throughout the Rocky Mountains, Rocky Mountain juniper is notably symmetrical.

WSU Circular 450 expresses the belief that Rocky Mountain juniper will never be planted widely until the problem of poor survival of bare-rooted stock is solved, or until potted stock is used. A recommended method is that of transplanting Rocky Mountain juniper seedlings into containers to grow a larger seedling with a compact root system better able to survive and grow.

Austrian Pine. This species is generally recommended in the Pacific Northwest windbreak literature. Favorable features are its partial shade tolerance, enabling it to hold lower branches rather well, and a foliage that is exceptionally dense for a pine. These are good windbreak characteristics.

The trouble we have observed in eastern Oregon is that, when planted on most dryland sites, the Austrian pine may succumb to moisture stress when a very droughty period comes along, as it always does. For example, in the late summer of 1968, two dryland windbreaks in Sherman County were seen in which whole rows of Austrian pine were either dead or dying, the result of two seasons of deficient moisture. In the same county, another 23-year old planting of Austrian pine appeared healthy because of good cultivation practice and the presence of a deeper soil (5 feet). At all of these locations, the ponderosa pine was generally surviving and a more promising species. Other reports of failing Austrian pine were known.

Therefore, do not plant Austrian pine on dryland areas unless you have deep soils of good moisture-holding capacity. Better yet, restrict it to areas under irrigation. It does exceptionally well under irrigation.

Austrian pines growing in an irrigated windbreak of northeast Morrow County are up to 30 feet high after 17 years--a happy situation. Without irrigation, the windbreak would certainly have failed there.

Austrian pine looks great as both a windbreak and an ornamental species. Observers are invariably attracted to it, especially when the trees are one of the better strains possessing density and symmetry. It was commonly said at the Moro Station that one row of Austrian pine is equal to two rows of ponderosa pine when both are young. Despite its glamorous appearance, the species should not be planted unless its moisture requirements can be satisfied.

An irrigated field windbreak of Austrian pine and Rocky Mountain juniper near Moses Lake, Washington, was visited in the summer of 1967. Although the plantings were only 12 years old, the owner stated his conviction

that this planting had increased his farmstead sale value by \$10,000.

Western Juniper. The western juniper, native and abundant throughout central Oregon, is probably our toughest evergreen. It is a good wind-break candidate. One 40-year old planted western juniper on an abandoned farm in Sherman County equals ponderosa pine in size and surpasses it for density and vigor. Dr. Lewis Roth, Oregon State University pathologist, recommends the western juniper and the ponderosa pine as species likely to endure longer with least care on eastern Oregon dryland farms. Unfortunately, the commonplace western juniper, often viewed a range weed, would probably be shunned by many ranches even if planting stock were available.

Ranchers in those areas where crop sprayings pose some potential injury to other trees, and where irrigation of the windbreak is not possible, it would do well to consider this juniper.

Norway Spruce. I have not encountered this species in any older windbreaks visited in eastern Oregon but have observed shade trees in the region. For example, two specimens about 50 years old are growing at the Sherman Branch Station as ornamentals, where they have received irrigation. They would be ideal windbreak specimens because of their height and dense crowns that extend to the ground. At Hermiston, Bierman says Norway spruce have at times been bothered by aphids and the needle miner. Nevertheless, their performance was noted favorably. Engelmann spruce growing in yards and public grounds here has escaped the insects and is a conifer deserving trials, Bierman believes. Norway spruces have grown well at the Umatilla Station.

Tests reported at three Pacific Northwest locations by WSU Circular 450 speak well of this species, especially when used under irrigation. It is better adapted to the drier and less fertile areas than is the blue spruce. No particular insect and disease problems were reported for either Norway or blue spruces, but for both species crown development is sometimes impaired by stunting of the terminal leader due possibly to zinc deficiency.

Blue Spruce. Recommended for better soils where moisture and fertility are good, especially irrigated areas. This spruce is a favorite ornamental tree that starts rather slowly, but has a good rate of growth when once established. At Moro (12 inches rainfall) 14-year old trees attained 12 feet in height; at another test location this species attained seven feet and showed moisture stress (Lind, Washington, 10 inches or less). Galls formed by Cooley's gall louse are reported common on tips of the branches.

Engelmann Spruce. I know of no usage of this species in windbreaks. County Agent Bierman at Hermiston thought well of its performance at the McNary Dam town site and in Hermiston yards. He believes it may be more trouble-free than is Norway spruce under the conditions obtaining in his area. Dr. McArthur, Superintendent of the Eastern Oregon Experiment Station, reported the favorable performance of Engelmann spruce at the Union Station. A species acclimated to eastern Oregon will normally have built-in advantages in coping with insects, disease, soil problems, and climatic extremes. I have learned nothing against the Engelmann spruce; we simply have few plantings.

Douglas-fir. The 23-year old planting at Moro appeared healthy, but does not match the ponderosa and Austrian pines in size and desirable windbreak characteristics. The WSU report takes a like view in discussing results from the three other test stations: Lind, Pullman, Prosser. I have not been impressed with the Douglas-fir seen in the few eastern Oregon windbreaks. The literature speaks fairly well of it for windbreak use, mentioning some frost damage in warmer areas due to its breaking dormancy somewhat early in the spring, and the possibility of damage from the Douglas-fir tussock moth during epidemics.

Lodgepole Pine. This native eastern Oregon species has been little planted for windbreak purposes. Examples seen have grown fairly well. While I would not condemn it, I believe its density and other windbreak characteristics are not equal to those of ponderosa and Austrian pine.

Oriental and American Arborvitae. The Oriental arborvitae is particularly subject to winter damage. Ornamentals of this species are often wrapped to prevent desiccation in winter. Plantings of it have been killed by cold at Ontario and other points in eastern Oregon. The arborvitae require considerable moisture and should be irrigated if planted in our lower rainfall areas. WSU Circular 450 cites the variability of seed-grown stock, and high cost, as disadvantages.

The American arborvitae is well recommended by an Idaho specialist for irrigated ground. It makes an extremely dense single row windbreak. The Idaho experience is admittedly limited. Experience is lacking in Oregon also. I have observed a ten-year old windbreak of American arborvitae (northern whitecedar) on irrigated ground in Jefferson County. I

was doing well. Ornamental trees at the Eastern Oregon Experiment Station, Union, have been good trees, on the whole, for 32 years. They have experienced spot "burning" but recover. Heavy fall watering will prevent much of this type of injury to evergreens. Knowledge of the types of arborvitae we have here and elsewhere is lacking.

Incense Cedar. Incense cedar should be adapted to eastern Oregon conditions; it is widely present in central Oregon pine forests. I have observed two plantings; both about 10 years old and irrigated. A personal observation is that specimens of this species in a good many cases will have a narrow or irregular crown, lacking the width expected of a "cedar". Specimens of good density are seen west of the Cascades. Trees observed on the eastside are too few and too small to provide data.

Scotch Pine. I know of no plantings of this species in eastern Oregon where it is rated superior to ponderosa pine or Austrian pine. At the Hermiston Experiment Station the three species have grown some 35 years on irrigated ground. The Scotch obviously has poorer form, whereas the ponderosa pine and Austrian pine appear about equal. Plantings at the Moro Station at 23 years likewise reveals the Scotch in third position, and at the Pendleton Station, Scotch has poorer form than does ponderosa. WSU Circular 450, summarizing tests at four locations over two or three decades, rates ponderosa and Austrian somewhat higher on most counts. Growth rates, however, are rather similar, and evidence indicates Scotch survives very well. The most noticeable disadvantage of Scotch is the tendency to have crooked or leaning trunks. The form of the species is quite variable. Although the common strains often have poor form, there are strains with good form.

BROADLEAF TREES

Lombardy Poplar. This is a favorite species of farmers in the Columbia Basin of Washington State, where many Lombardy poplar windbreaks are seen protecting orchards. The farmers were planting all they could get. Its faults have been well-documented. Dr. R. W. Dingle of WSU says emphasis should be given to where Lombardy poplar should not be planted. Its very fast growth to a useful height overweighs frequent recommendations against it.

Lombardy poplar would be as well-spoken of in eastern Oregon as it apparently is in eastern Washington were it not for the reports out of Hermiston, Oregon. Some 250 farms around Hermiston have or have had windbreaks of various species on irrigated and very light, sandy soil easily subject to wind movement. Lombardy windbreaks were numerous in the Hermiston area 20 years ago. Bierman estimated in 1969 that three-fourths of these older windbreaks were dead, and others dying. The writer did not see one healthy older Lombardy poplar windbreak in the area. The Pendleton Grain Growers' feed mill had a Lombardy poplar row in its windbreak, about 10 years old. Already a few trees were dead. To our knowledge, pathologists have not studied the problem here; one has speculated that it is a particular condition in the area--a cultural thing. Extension Entomologist Bob Every believed insects could be involved; the carpenter moth does kill Lombardy poplar in dry regions, he reported. A canker disease is mentioned in literature as a frequent hazard. Robert J. Olson, one of the authors of the WSU Experiment Station's Circular 450, believes that poor drainage (irrigation water meeting an impervious layer) is one cause. Tom Davidson, Superintendent, Umatilla Station, points out

that disease spreads rapidly through irrigated areas here. But proven causes of these early failures in the Hermiston area cannot be adduced at this time.

At Sundale, Washington, 16-year old Lombardy poplars were reported a complete success. Many plantings are being made in the Columbia Basin of Washington.

Lombardy poplar apparently does well in other valleys of eastern Oregon. We know of many plantings 50 years old or older, although the species is by nature short-lived.

Has disease built up in the Hermiston area so that infection is now general? Will this happen at other locations where numerous plantings are made over an extensive farming district?

What Fast-Growing Broadleaf Will Substitute for Lombardy Poplar? What windbreak tree will grow to 25 feet in 4 or 5 years? That's the kind of tree ranchers will desire. The hybrid poplar seems a close second to the Lombardy in growth rates. The hybrid poplar distributed by the SCS in this region for windbreak plantings is reported to be a cross between P. taca-
mahaca candicans and P. berolinensis. Neither of these parents is the Lombardy species, or European black poplar (P. Nigra var Italica). The hybrid poplar is considered by Olson to grow about as fast as Lombardy poplar and to produce superior lower crown density. Stock was said to be available at Lincoln Oaks SWCD Nursery, Mandan, S.D. (1969)

The Carolina poplar and the eastern cottonwood, introduced into eastern Oregon decades ago, are growing successfully in the Hermiston area and elsewhere. So is the Native black cottonwood, but few examples of this species are seen in windbreaks. Nor is the Bolleanna poplar seen

in windbreaks.

Hybrid Poplar. The oldest hybrid poplars I have seen are the Dwight Macy plantings in Jefferson County and the Eastern Oregon Experiment Station plantings in Union County. The Macy planting, established about 1948, was 60 to 70 feet high in 1968; and from what the county agent and I could learn, successful in every respect. Mrs. Macy thought highly of this windbreak planting. She said that during the extraordinary Columbus Day storm of October 12, 1962, when winds reached 70 mph in the Jefferson area, the family was hardly aware that there was an unusual storm. The trees are about 20 feet apart, and in one row, so the windbreak is somewhat open.

The hybrid poplar at the Union Experiment Station was planted on June 14, 1948, by SCS cooperators, one of whom was Robert J. Olson. Records at the station showed this planting to be Windbreak Poplar No. 5641, a selected strain from Bellingham, Washington. WSU Stations Circular 450 states that accession P-5641 was the best among 24 hybrids tested at Pullman. This hybrid was selected from a large planting of hybrids at the Bellingham SCS Nursery. It is P. tacamahaca candicans plantierensis. This accession could be the one examined by the writer in Jefferson County. Height growth seems not much below that of Lombardy poplar. Good density prevails in the crown. Dr. James A. B. McArthur, Superintendent of the Eastern Oregon Experiment Station, spoke very highly of the hybrid poplar. It has grown rapidly and has given no trouble. Trees averaged about 70 feet high. They grow along a fence row in a pasture; are not irrigated, but have the sub-irrigation common in the Grande Ronde valley. A difference in density of foliage is observed among individuals in this row.

Dr. McArthur says they represent more than one strain.

Carolina Poplar and Eastern Cottonwood. Both types grow in eastern Oregon communities, especially around older settlements. The Carolina poplar, a hybrid of eastern, or plains, cottonwood and European black poplar, is very difficult to distinguish from the eastern cottonwood. "Don't try," says Landscape Architect Don Martel of Oregon State University. Distinguishing one from the other usually is not needed since the trees develop similarly here. The Carolina will be a male tree (without the messy cotton produced by female flowers); the eastern cottonwood will also be a male if the early planters happened to be knowledgeable of cottonwood sexuality. Both species apparently do well in eastern Oregon.

Black Locust. My observations and experience with this species are only confirmed by results reported by WSU Circular 450 from tests extending over 15 years: excellent for windbreaks, widely used for shade and park plantings, requires minimum care and maintenance, attractive, widely adapted, valuable for wildlife, and no insect or disease problems whatever at four locations over the long test period. Disadvantages: susceptible to early frosts (so avoid frost pockets), very sensitive to 2-4D, roots may sucker.

Bierman puts the black locust in a class by itself as to utility and widespread acceptance, but concedes it is messy in town. Thomas P. Davidson, Superintendent, Umatilla Experiment Station, also of Hermiston, acknowledges some imperfections of the species, but quotes a saying of old residents that "it made this country." Black locust trees have been growing at the Sherman Branch Station for 47 years without irrigation;

at Union Station for 50 years with sub-irrigation.

I have been deeply impressed by the fact that serviceable, healthy black locusts are to be seen in every county of eastern Oregon, some trees probably 100 years old and of great size. Abandoned farmsteads still have locust groves. Worst troubles observed seem to be: some breakage and littering, spread under irrigation (confine locust between rows of other species), partial killing from unseasonable or extreme cold, especially in high country such as the Burns area.

Russian Olive. My observations of this species for many years in eastern Oregon would accord it a very favorable position. Long-time Umatilla Extension Agent Vic Johnson told me many years ago that Russian olive was his favorite of all the shade trees in the Umatilla area because of its handsome silvery grey foliage and its ability to meet varied conditions. The main criticism of this species heard perennially in the irrigated districts is that it escapes cultivation and reproduces profusely in irrigated pastures, wasteways, and seep areas. Bierman termed it a "ruinous pest" in occupying wet grounds. However, he considers it his number one broadleaf for dryland planting. Some technicians and farmers see the additional plant growth in wasteways and sumps as beneficial for wildlife cover, shade, and aesthetics.

The WSU Circular 450 gives uniformly superior ratings on such points as drought hardiness, frost hardiness, wildlife value, windbreak value, aesthetic value, and its wide adaptability. No particular pest problems are noted at this time, although there was a dieback disease that caused some concern on dryland plantings farther east. The ability of this tree to form a tall, dense hedge when clipped is remarkable; also its exceptional

ornamental value. Russian olive is sometimes ragged in appearance on dryland. Trees 35 to 40 feet high of impressive form are seen on the Walt Hulden irrigated farm near Arlington, Oregon, and at the Eastern Oregon Experiment Station.

This tough tree is probably under-appreciated. Its potential for increased bushiness under shaping is emphasized.

Caragana. Caragana seems almost as well adapted to eastern Oregon conditions as is the juniper. I do not recall any failures of caragana in eastern Oregon except by rodent depredations. It is usually not affected by insects or disease. Grasshoppers are noted as an occasional pest by WSU Circular 450; Bierman cites the attraction it has for gophers, leading him to prefer lilac for the Hermiston area. Tests of caragana as reported by WSU Circular 450 confirm its superior characteristics of drought hardiness, frost hardiness, windbreak and aesthetic values, and general freedom from trouble.

This species has been established at the Moro Station since 1930 and earlier. I examined and photographed these plantings over 20 years ago; they do not appear to have increased in size since then. On drylands the shrub may reach its full size in 15 or 20 years. The 2, 4-D sprays that were general in the Oregon Columbia Basin have weakened and thinned the foliage of some dryland plantings. New weedicides in the offing are said to pose less injury to broadleaf trees.

Many older plantings were never properly cut back in each of the first two or three growing seasons to increase branching from the base. Ten or more canes per plant will develop with this treatment, which also stiffens the stems to better stand up against the wind. Annual pruning

back of the drooping leader is also recommended to thicken the tow and to produce more upright growth. The amount of twig wood is increased by these prunings, resulting in more wind resistance when the leaves are off. The WSU Circular says caragana is an outstanding shrub for irrigated plantings and that it is gaining in popularity for city plantings, where the unpruned hedge makes an effective screen 12 to 15 feet in height. The species can be pruned closely so that it will make a dense, compact, formal hedge.

Common Lilac. I have been much impressed by plantings of lilac to be seen in eastern Oregon, both under dryland and irrigated conditions. A neglected planting, 40 years old, on dryland in Sherman County remains healthy, dense, and attractive. Damage from continued exposure to 2, 4-D sprays was not evident, although effects showed visibly on other broadleaved species nearby. Bierman prefers lilac to caragana as a result of his observations in the Hermiston area. Recommended highly as tough, drought-resistant shrub in Idaho plantings.

Other Broadleaves Noted Favorably for Windbreaks and Shade Trees. Bierman, long-time observer of trees and shrubs in Umatilla County, likes the lilac better than caragana there. The Moraine locust he reports to be trouble-free and also tolerant of crop sprays. Davidson at Hermiston praises a podless honeylocust (varietal name reported as "elegantissima"), trouble-free and dense, as one of the better broadleaved trees at his station. He also likes the Kentucky coffeetree. Specimens at the station are quite large. The bolleanna poplar (P. Alba bolleanna L.) at Hermiston is liked by Bierman. It has rapid growth rather like the Lombardy poplar. The bolleanna is recommended for this region by Oregon State University