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Landscape Tree Performance

R. L. TICKNOR

Although Oregon is the leading state in the nursery production of shade and flowering trees, little research data have been available on the performance of these trees in a garden situation in the state. Since many people change their places of residence frequently, they are interested in landscape performance within a short period following planting. This study helps to identify some of the trees that will quickly produce the shade and beauty which make the house and yard a pleasant place to live.

To provide factual information on the growth characteristics of ornamental trees, a trial was established at

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Oregon State University's North Willamette Experiment Station near Astoria in April 1965. This station is located 20 miles south of Portland at an elevation of 150 feet. The average frost-free season is 202 days, considerably shorter than the 263 days listed for Portland, because of occasional late spring and early fall frosts. This difference is of greater importance to tender vegetable crops than to most trees, which are somewhat frost tolerant. Average rainfall for the station is 42.7 inches, but this occurs primarily during fall, winter, and spring. The average rainfall during July and August is 1.3 inches. The soil is a Willamette sandy loam, a well-drained and fertile type.

Measurements and observations have been made on the rate of growth, time of foliation, period of bloom,

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fruit characteristics, and time and duration of fall color on various types of trees. Problems with insects, disease, wind, and cold have been noted. This report is based on observations during a four-year period. In cases where the tree did not remain in the trial for four years, the age and size at the time of removal are noted. It is intended that this trial be continued so that additional information on tree performance under Willamette Valley conditions can be obtained. Ultimate sizes of the trees listed in this publication are those found in the literature, although it may take a very long time under favorable conditions to reach this size. At present the maximum height of many of the named selections is not known, so they have been listed in the same height category as the parent species.

This report covers 168 types of trees, mostly planted in 1965, 1966, or 1967. Normally, four trees of each selection were planted 6 feet apart in rows 30 feet apart. In some cases four trees were not available for planting, so a wider spacing was used. As the branches started to touch in the row, alternate trees were removed to avoid growth reduction.

The trees planted were usually bare root whips four to nine feet tall, a size likely to be planted by a homeowner. Trees started from seed and other trees growing in containers were planted in smaller sizes to avoid root-crowding problems.

Cultural practices included fertilizing, pruning, irrigation, and weed control, but no insecticides nor fungicides were used. Fertilizer and water were applied at rates comparable to those used on an adequately maintained lawn, or 100 pounds of nitrogen per acre each year. The importance of nitrogen in developing canopy (shaded area) in pin oak has been shown by van de Werken (6)*. He found that annual applications of 0, 60, and 120 pounds of nitrogen for seven years resulted in canopy areas of 38, 108, and 172 square feet. A progressive system of pruning was followed to gradually raise the branch level of the larger-growing trees so that it was possible to walk beneath them. Shorter trunks were developed on the smaller-growing trees. Herbicides were used to keep the area around the trees weed-free. Harris (3) has reported more rapid growth of some species when they were not grown in competition with turf grasses. The rates of growth in this test planting may be faster than those obtained in many plantings because of this lack of competition from grasses.

The tables record the tree's scientific name, common name if one was found, ultimate height, height and width at planting, and height and width after four grow-

* Numbers in parentheses refer to Literature Cited, page 2.

ing seasons. If the plant was in the trial less than four years this is indicated by an asterisk and the reason for this short duration is given. E (early), M (midseason), and L (late) are used to indicate the relative time of foliage, bloom, fall color, and defoliation. Table 1 provides the dates on which the symbols used were based. The symbols E, M, or L are included in the "Bloom" column only if the tree bloomed within the four-year trial period. A symbol in the fall color column indicates the color is worth noting.

Table 1. DATES¹ OF GROWTH EVENTS IN LANDSCAPE TREES AT NORTH WILLAMETTE EXPERIMENT STATION

	Early	Mid-season	Late
Foliation ²	2/26- 3/31	3/26- 4/28	4/15- 5/27
Flowering	2/26- 3/25	3/26- 5/23	5/27- 8/25
Fall color ³	9/3 - 9/29	10/2 -11/3	10/28-12/15
Defoliation ⁴	10/12-11/5	11/10-12/8	12/5 and after

¹ These dates represent the extremes for a 4-year period, 1967-1970; thus there is some overlap as a growth stage may vary 2 to 4 weeks from year to year.

² When first true leaf is visible.

³ Start of fall coloration.

⁴ Complete defoliation.

The size classification (Table 2) follows that of OSU Extension Bulletin 758, "Plant Materials for Landscaping" (5). Additional information about some of the plants in this study as well as a large number of plants which are outside the scope of this study can be found in that bulletin.

Tables 3 to 5 list the plants affected by cold, disease or insects, and wind. Some of these plants may be satisfactory for special situations but have been listed separately to indicate they probably are not suitable for general use in this area.

Literature Cited

1. Editors, Sunset Magazine. 1967. *Sunset Western Garden Book*, new ed. Lane Magazine and Book Company, Menlo Park, Calif.
2. Grant, John A., and Carol L. Grant. 1943. *Trees and Shrubs for Pacific Northwest Gardens*. University of Washington Press, Seattle, Washington.
3. Harris, Richard W. 1966. Influence of turfgrass on young landscape trees. Abstract 81 of 17th International Horticultural Congress.
4. Kelly, Stan. 1969. *Eucalyptus*. Thomas Nelson Ltd., Melbourne, Australia.
5. Martel, D. J., and George N. Fredeen. 1969. Plant materials for landscaping. Oregon State Univ. Ext. Bull. 758.
6. van de Werken, Hendrik. 1970. Fertilizing shade trees. Tenn. Farm and Home Science Prog. Report 72.
7. Wyman, Donald. 1965. *Trees for American Gardens*, rev. ed. The Macmillan Company, New York.

Table 2. LANDSCAPE PERFORMANCE OF SELECTED TREES IN SEVERAL HEIGHT CATEGORIES AT NORTH WILLAMETTE EXPERIMENT STATION, AURORA, OREGON

Botanical and common name	Height					Width		Time ¹			Remarks
	Ultimate	At	At	At	At	Foli-	Fall	Defo-			
	height	plant-	After	plant-	After	ation	Bloom	color	liation		
	Ft.	Ft.	Ft.	Ft.	Ft.						
TREES 10-20 FEET											
<i>Acer platanoides</i> 'Globe' Globe Norway Maple	20	6.3	11.0	1.0	5.8	M	M	M	M	Very dense globe shape.	
<i>Cercis occidentalis</i> California Redbud	20	1.6	7.9	1.4	5.5	M	M		M	Purplish pink pea flower. Dark red new growth.	
<i>Laburnum alpinum pendulum</i> Weeping Scotch Laburnum		5.5	5.8	2.4	3.1	M	M		L	Weeping habit. Height determined by grafting height.	
<i>Magnolia stellata</i> Star Magnolia	20	2.8	4.9	1.5	4.0	M	E		M	Flowers over a long period.	
<i>Rhamnus alaternus</i> 'John Edwards' John Edwards Italian Buckthorn	12	3.0	8.1	1.0	9.7	M	E			Evergreen shrub. Flowers insignificant.	
<i>Rhus typhina laciniata</i> Cutleaf Staghorn Sumac	15	1.3	8.0	0.3	9.8	L	L	E	E	Excellent red-orange fall color. Sends up suckers.	
TREES 20-30 FEET											
<i>Acer campestre</i> Hedge Maple	25	9.1	16.4	3.1	9.6	M	M		M		
<i>Acer ginnala</i> Amur Maple	20	9.6	13.0	2.6	8.4	E	M	E	E	Yellow, orange, and red fall color. Heavy seed producer.	
<i>Cercis siliquastrum album</i> White Judas Tree	30	2.9	9.4	2.5	6.7	M	M	M	M	White pea flower. Pale green new leaves.	
<i>Cornus kousa chinensis</i> Chinese Dogwood	21	5.3	9.5	2.3	5.0	M	L	E	M	White flowers in June. Good red fall color.	
<i>Crataegus oxyacantha</i> 'Paul's Scarlet' Paul's Scarlet Hawthorn	30	7.1	14.5	3.0	9.3	E	M		M	Attractive red flowers. Very dense, twiggy habit.	
<i>Eucalyptus niphophila</i> Snowland Eucalyptus	20	1.1	15.3	0.9	13.5	M				Evergreen. Grey foliage. Hardest eucalyptus in trial.	
<i>Eucalyptus perrimiana</i> Spinning Leaf Snow Gum	27	3.6	20.7	1.9	14.5	M	E			Only minor foliage burn at 8° F. Grey-green leaves.	
<i>Laburnocytisus adami</i> Adam's Laburnocytisus	25	6.4	18.1	1.6	11.7	M	M		L	A graft hybrid. Pinkish-purple laburnum flowers.	
<i>Laburnum vossi</i> Voss Goldenchain	30	9.3	13.9	1.8	8.0	M	M		L	Yellow flowers. Sparse growth.	
<i>Lagerstroemia indica</i> Crepe Myrtle	21	5.8	8.4	2.5	3.8	L	L	M	M	Bloom in late summer. Good red fall color. Slight twig dieback in cold winters.	
<i>Magnolia kobus</i> Kobus Magnolia	30	3.1	8.0	1.5	5.4	M	E		M	Showy white flowers.	
<i>Magnolia soulangeana</i> Saucer Magnolia	25	2.3	5.9	1.3	4.2	M	E		L	Large pale pink flowers early.	
<i>Malus floribunda</i> Japanese Flowering Crabapple	30	6.8	12.7	3.3	13.9	E	E		L	Red buds opening to white flowers. Small yellow and red fruit.	
<i>Oxydendron arboreum</i> Sorrel-tree		3.5	6.9	1.3	4.2	M	L	E	M	One of the best red fall color plants. Good summer bloom.	
<i>Parrotiopsis jacquemontana</i> Parrotiopsis	21	1.4	5.7	1.2	5.3	M	E	M	M	Cream colored flowers early. Yellow fall color.	

Botanical and common name	Height					Width		Time ¹			Remarks
	Ultimate height	At plant- ing		At plant- ing		Foli- ation	Bloom	Fall color	Defo- liation		
		4 yrs.	4 yrs.	4 yrs.	4 yrs.						
<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>						
<i>Prunus serrulata amanogawa</i> Amanogawa Flowering Cherry	20	6.9	13.3	0.4	3.5	M	M	M	M	Columnar white flowering tree. Good red and yellow fall color.	
<i>Prunus serrulata</i> 'Kwanzan' Kwanzan Flowering Cherry	25	3.3	14.3	0.3	5.2	M	M	M	M	Round, pink-flowering tree. Good red and yellow fall color.	
<i>Salix babylonica</i> Babylon Weeping Willow	30	7.1	15.6	4.0	24.2	E			L	Leaves drop while green.	
<i>Styrax japonica</i> 'Kusan' Kusan Japanese Snowbell	30	0.9	6.1	0.6	4.2	E	M		L	White bell flowers. Subject to spring frost damage.	
<i>Syringa amurensis japonica</i> Japanese Tree Lilac	30	3.4	8.5	0.6	3.5	E	L		E	Late white flowers. Bark cherry-like.	
TREES 30-50 FEET											
<i>Albizia julibrissin</i> Silktree	36	5.9	9.3	0.0	11.5	L	L		M	Wide-spreading, pink summer-flowering tree.	
<i>Carpinus caroliniana</i> American Hornbeam	36	7.0	14.4	3.0	11.0	M	E	E	M	Yellow, orange, and red fall color.	
<i>Cercis siliquastrum</i> Judas-Tree	30	5.3	14.6	3.8	15.0	M	M		L	Purplish pink pea flower. Reddish-green new leaves.	
<i>Cercis canadensis</i> Eastern Redbud	36	4.2	9.6	2.7	8.4	M	M		M	Pink pea flower.	
<i>Chionanthus virginicus</i> White Fringetree	30	3.3	2.9	1.6	3.4	L	M		M		
<i>Cladrastis lutea</i> American Yellowwood	50	5.6	9.7	0.6	5.4	M		E	M	Trees died back after planting. Good yellow fall color.	
<i>Cornus florida rubra</i> Red Flowering Dogwood	40	3.9	7.5	2.0	4.7	M	M	E	M	Showy pink flowers and good red fall color.	
<i>Eucalyptus aggregata</i> Black Gum	40	4.0	19.2	2.0	10.0	E				Willow-like evergreen leaves.	
<i>Maytenus boaria</i> Mayten	35	3.4	7.2	1.0	3.2	E				Normally evergreen but defoliates and has dieback at below 20° F.	
<i>Parrotia persica</i> Persian Parrotia	50	1.1	4.8	0.9	3.5	E		M	L	Red new growth. Red and yellow fall color.	
<i>Pterostyrax corymbosa</i> Little Epaulettetree	45	1.3	8.2	0.0	4.1	E	M	M	L	White flowers. Yellow fall color.	
<i>Pyrus calleryana</i> 'Bradford' Bradford Callery Pear	50	3.2	17.4	0.3	13.4	E	E		L	Upright habit; holds green leaves late. Blooms very early.	
<i>Quercus douglasi</i> Blue Oak	20-60	3.0	6.4	0.8	4.5	M			L	Blue-green new leaves. Leaf size small for an oak.	
<i>Robinia 'Idaho'</i> Idaho Locust	40	5.4	15.6	1.1	12.3	M	M		L	Pink pea flowers.	
<i>Sorbus aucuparia</i> European Mountain Ash	45	8.6	18.0	0.0	6.9	E	M	M	M	Very good red-orange fruit in fall.	
TREES 50-75 FEET											
<i>Acer negundo</i> Box Elder	60	11.9	16.1	3.0	9.0	E	M	E	E	Early yellow fall color.	
<i>Acer negundo variegatum</i> Variegated Box Elder	60	8.0	13.1	2.5	8.0	M	M	E	E	Interesting green and white leaves.	
<i>Acer rubrum</i> 'Autumn Flame' Autumn Flame Red Maple	60	6.3	14.5	1.1	10.8	M	E	E	E	Round-headed tree with excellent red fall color. First tree to color.	

Botanical and common name	Height		Width		Time ^a			Remarks	
	Ultimate height	At	At	After 4 yrs.	Foli-ation	Bloom	Fall color		Defoliation
		plant-ing	After plant-ing						
<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>					
<i>Aesculus carnea brioti</i> Briot Red Horsechestnut	75	5.6	8.7	2.1	5.3	M	M	M	Interesting red flowers.
<i>Betula pendula</i> European White Birch	60	9.6	21.0	4.0	12.2	M	E	M	White bark develops in third year. Aphid and leaf miner problems.
<i>Betula pendula gracilis</i> Cutleaf Weeping Birch	60	8.6	16.6	2.6	6.1	M	M	E	White bark develops in fourth year. Aphids and a few leaf miners.
<i>Betula pendula verrucosa</i> Clump Birch	60	9.5	15.9	5.1	12.4	M	E	M	White bark develops in fourth year. Aphids and leaf miner.
<i>Carpinus betulus fastigiata</i> Upright European Hornbeam	60	5.0	18.3	0.5	4.8	E		M	Upright habit. Yellow fall color.
<i>Cedrela sinensis</i> Chinese Toona	70	5.2	9.1	0.0	2.2	M		E	Large compound leaves, reddish when emerging.
<i>Cornus nuttalli</i> Pacific Dogwood	75	3.2	6.9	1.6	2.9	M	M	E	White blooms in spring and orange-red fall color.
<i>Cornus nuttalli</i> 'Goldspot' Goldspot Pacific Dogwood	75	5.0	8.5	2.1	4.6	E	M&L	M	L Blooms April and August. Yellow-spotted leaves which become red in fall.
<i>Corylus colurna</i> Turkish Hazel	75	7.5	14.4	2.5	7.5	E		E	Yellow fall color. Corky bark.
<i>Fraxinus ornus</i> Flowering Ash	60	3.6	9.5	0.0	3.9	M		M	Yellow fall color with some purple.
<i>Liquidambar orientalis</i> Oriental Sweetgum	60	3.6	7.7	1.9	4.3	E		M	L Pastel yellow-orange fall color.
<i>Lithocarpus densiflorus</i> Tanoak	75	1.7	5.4	0.5	4.5	L			Evergreen. Slow starting but can grow rapidly.
<i>Magnolia sprengeri</i> Sprenger Magnolia	60	1.4	8.0	0.2	3.0	M			M
<i>Pistacia chinensis</i> Chinese Pistache	75	1.6	7.2	1.5	5.5	E		L	L Good red fall color.
<i>Quercus coccinea</i> Scarlet Oak	75	4.9	18.0	1.1	10.2	L		M	L Very good red fall color. Holds leaves.
<i>Quercus ilex</i> Holly Oak	60	1.4	5.1	0.7	3.9	L			Evergreen; some shoot-kill at 8° F.
<i>Quercus lobata</i> California White Oak	40-125	3.6	9.7	0.8	7.0	M			L
<i>Quercus palustris</i> Pin Oak	75	5.3	16.5	2.7	12.4	L		M	L Good red fall color. Holds brown leaves into winter.
<i>Quercus phellos</i> Willow Oak	50	5.6	19.5	2.3	15.5	L		M	M Willow-shaped leaves with yellow to red fall color.
<i>Quercus robur fastigiata</i> Pyramidal English Oak	75-150	5.1	16.0	1.0	6.9	L			L Columnar tree retaining brown leaves in winter.
<i>Quercus wislizeni</i> Interior Live Oak	70	3.0	11.4	0.8	8.5	M			Evergreen. Slight dieback at 8° F.
<i>Robinia pseudoacacia</i> ² Black Locust	75	8.6	20.7	1.7	14.5	M			M Fast growing but produces suckers from roots. Three years' growth.
<i>Salix alba tristis</i> Niobe Weeping Willow	75	3.9	21.9	1.4	25.4	E		L	M Wide-spreading and fast growing. Yellow twigs and fall color.
<i>Sophora japonica</i> Japanese Pagoda Tree	75	10.5	15.0	2.6	15.2	M		E	M Round-headed with yellow fall color.

Botanical and common name	Height		Width		Time ⁴					Remarks
	Ultimate height	At	At	After 4 yrs.	Foli-ation	Fall Bloom	Defo- liation	Fall color		
		plant- ing	After 4 yrs.						plant- ing	
	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>					
<i>Stewartia pseudocamellia</i> Japanese Stewartia	60	3.5	8.3	1.8	4.4	E	L	E	M	White flowers June-July. Good red fall color.
<i>Zelkova serrata</i> 'Village Green' Village Green Zelkova	75	6.5	15.9	5.3	16.0	M		M	L	Interesting bronze fall color.
TREES 75-100 FEET										
<i>Acer platanoides</i> 'Cleveland' Cleveland Norway Maple	90	10.5	16.9	2.0	4.7	M	M	M	M	Narrow, upright habit.
<i>Acer platanoides</i> 'Crimson King' Crimson King Norway Maple	90	6.1	15.1	0.0	5.9	M			M	Red foliage all summer.
<i>Acer platanoides drummondii</i> Variegated Norway Maple	90	3.0	15.8	0.0	5.6	M		E	E	Interesting green and white leaves.
<i>Acer platanoides</i> 'Emerald Queen' Emerald Queen Norway Maple	90	7.3	21.8	0.0	10.0	M	M	M	M	Good yellow fall color.
<i>A. p.</i> 'Fassen's Redleaf' Fassen's Redleaf Norway Maple..	90	9.6	15.2	1.5	5.8	M	M	M	E	Red foliage all summer. Best fall color and earliest defoliating of red-leaf types.
<i>A. p.</i> 'Royal Red' Royal Red Norway Maple	90	7.0	14.4	0.2	5.8	M		M	M	Red foliage all summer.
<i>A. p.</i> <i>schwedleri</i> Schwedler Norway Maple	90	7.5	15.3	0.9	6.3	M	M	M	E	Leaves red in spring, dark green in summer. Yellow fall color.
<i>A. p.</i> 'Summershade' Summershade Norway Maple	90	5.6	17.6	0.9	11.5	M	M	M	M	Wide branch angle. Young trees vary in appearance.
<i>A. p.</i> 'Superform' Superform Norway Maple	90	7.0	19.7	0.5	9.8	M		M	M	Yellow fall color.
<i>A. pseudoplatanus</i> (seedlings) Sycamore Maple	90	5.0	13.5	0.8	5.4	L	M	M	M	Variable in growth (9.1 to 15.1 feet at 4 years).
<i>Acer pseudoplatanus purpureum</i> Spaeth Sycamore Maple	90	10.8	22.0	1.6	9.8	M	M	M	M	Purple underside of leaves.
<i>A. rubrum</i> 'October Glory' October Glory Red Maple		6.1	17.2	2.1	8.5	M	E	M	M	Very good red fall color on oval-shaped tree.
<i>Betula maximowicziana</i> Monarch Birch	90	5.4	10.3	1.5	6.0	M	E	E	E	Yellow fall color. Creamy white bark in fourth year. Less leaf miner damage than European white birch.
<i>Betula papyrifera</i> Paper Birch	90	6.0	15.9	1.9	7.6	M	M	E	E	Good yellow fall color. White bark fourth year. Less leaf miner than European white birch.
<i>Celtis occidentalis</i> Common Hackberry	100	6.6	11.6	2.1	11.3	M		M	M	
<i>Eucalyptus gunnii</i> (Leffley) Cider Eucalyptus	90	1.8	24.3	1.9	16.4	E	M			Blue-green evergreen leaves. Top damaged at 8° F.
<i>Eucalyptus gunnii</i> (Whareja) Cider Eucalyptus	90	1.8	27.0	1.6	17.0	E				Blue-green evergreen leaves. Some top injury at 8° F.
<i>Fagus sylvatica atropunica</i> Purple European Beech	90	3.5	10.5	1.4	6.6	L		M	L	Purple leaves all summer. Brown leaves persist in winter.
<i>Halesia monticola</i> Mountain Silverbell	90	3.5	9.7	0.3	5.4	E	M	E	M	White bell-shaped flowers. Yellow fall color.
<i>Nyssa sylvatica</i> Black Gum	90	2.8	5.7	0.8	5.0	L		E	E	Excellent red fall color.

Botanical and common name	Height					Width		Time ¹			Remarks
	Ultimate height	At plant-ing		At After plant-ing		Foli-ation	Bloom	Fall color	Defo-liation		
		4 yrs.	4 yrs.	4 yrs.	4 yrs.						
	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>						
<i>Platanus acerifolia</i> London Planetree	100	6.4	17.8	0.0	9.5	M			M	Bark starting to exfoliate at five years.	
<i>Tilia americana</i> American Linden	90	6.6	15.5	0.6	8.6	M			E	Large leaves. Aphids can be a problem.	
<i>Tilia cordata</i> Little-Leaved Linden	90	7.3	14.8	2.9	9.6	L	L		E	Aphids can be a problem. Variable habit.	
<i>Tilia cordata</i> 'Greenspire' Greenspire Littleleaf Linden	90	6.1	16.6	2.4	13.2	L	L		E	Uniform growth. Aphids can be a problem.	
<i>Zelkova serrata</i> Zelkova	90	7.2	16.9	6.3	18.3	M		M	M	Interesting bronze fall color.	
TREES OVER 100 FEET											
<i>Acer rubrum</i> 'Armstrong' ² Armstrong Red Maple	120	4.8	20.2	1.0	5.5	M	E		M	Upright habit.	
<i>Acer rubrum</i> 'Bowhall' Bowhall Red Maple	120	5.2	17.7	0.8	4.4	M	E	E	E	Red fall color. Upright habit.	
<i>Acer rubrum</i> 'Red Sunset' Red Sunset Red Maple	120	5.7	19.3	2.3	10.1	M	E	E	M	Good red fall color.	
<i>Acer rubrum</i> 'Scanlon' Scanlon Red Maple	120	10.8	19.8	2.6	4.9	M	E	M	E	Red fall color. Upright habit.	
<i>Acer rubrum</i> 'Schlesenger' Schlesenger Red Maple	120	8.4	21.0	3.4	11.3	M	E	E	M	Yellow, orange, and red fall color.	
<i>Acer saccharum</i> Sugar Maple	120	9.9	16.1	2.4	5.5	M		M	M	Yellow-orange fall color.	
<i>Acer saccharum</i> 'Green Mountain' Green Mountain Sugar Maple	120	8.3	15.5	1.1	6.1	L			E		
<i>Acer saccharum</i> 'Sweet Shadow' Sweet Shadow Sugar Maple	120	10.1	16.0	3.9	5.3	L		M	M	Orange-brown fall color. Cutleaf type.	
<i>Ginkgo biloba</i> (seedlings) Ginkgo	120	4.9	9.9	1.1	3.8	M			M		
<i>Ginkgo biloba</i> 'Autumn Gold' Autumn Gold Ginkgo	120	2.6	6.7	0.3	3.2	M			M		
<i>Ginkgo biloba</i> 'Fairmont' Fairmont Ginkgo	120	2.4	5.7	0.0	3.2	M			M		
<i>Ginkgo biloba</i> 'Roosevelt' Roosevelt Ginkgo	120	3.5	7.6	0.8	2.6	M			M		
<i>Gleditsia triacanthos</i> 'Sunburst' Sunburst Honeylocust	135	7.8	11.8	2.0	8.7	L	L	E	M	New foliage yellow, turning green later. Yellow fall color.	
<i>Liquidambar formosana</i> Formosa Sweetgum	120	2.7	8.0	1.1	5.8	M			L	Grows late in fall. Leaves and twigs often frosted.	
<i>Liquidambar formosana</i> 'Afterglow' Afterglow Formosa Sweetgum	120	4.3	9.0	1.4	3.9	M			L		
<i>Liquidambar styraciflua</i> (cuttings) American Sweetgum	125	5.4	14.5	2.2	7.3	M		M	L	Yellow to red fall color.	
<i>Liquidambar styraciflua</i> (seedlings) American Sweetgum	125	7.3	14.3	3.3	7.4	L		M	L	Yellow, orange, and red fall color.	
<i>Liquidambar styraciflua</i> 'Palo Alto' Palo Alto Sweetgum	125	3.2	10.1	0.9	3.9	L		E	L	Red fall color.	
<i>Liriodendron tulipifera</i> Tuliptree	150	11.0	16.9	2.6	7.3	E		E	M	Yellow fall color.	

¹ See Table 1 for dates of Early, Midseason, and Late designations.

² Not suited for general use in the Willamette Valley.

Table 3. TREES SUBJECT TO WIND DAMAGE

Botanical and common name	Height		Width		Time**		Fall Bloom	Defoliation	Remarks	
	Ultimate height	At plant-ing	After 4 yrs.	At plant-ing	After 4 yrs.	Foli-ation				
	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>					
* <i>Celtis sinensis</i> Chinese Hackberry	60	5.4	18.5	2.0	10.0	M		L	Three of four plants had limbs broken by wind. Removed third year.	
* <i>Eucalyptus dalrympleana</i> Mountain Gum	120	5.2	12.0	3.7	13.6	E			Single plant broken off at base because of girdling root, second year. Hardy at 21° F.	
<i>Gleditsia triacanthos inermis</i> Thornless Honeylocust	135	8.1	16.1	0.3	13.5	L	L	E	Limbs break in wind. Flowers insignificant.	
* <i>Prunus cerasifera</i> 'Thundercloud' Thundercloud Flowering Plum	24	9.5	16.3	2.2	8.4	E	E	M	L	Plants tipped over by strong wind 10-2-67 after three years.
* <i>Ulmus</i> 'Improved Coolshade' Improved Coolshade Elm	75	8.0	18.0	1.5	14.6	M			M	Subject to limb breakage during growing season. Removed after three years.
* <i>Ulmus parvifolia sempervirens</i> Evergreen Elm	50	4.0	8.5	0.5	9.6	M			L	Not evergreen. Poor growth habit. Wind damage. Removed after three years.
* <i>Ulmus parvifolia sempervirens</i> 'Drake' Drake Evergreen Elm	50	4.0	7.4	0.7	9.9	M				Partial leaf retention. Poor growth habit. Removed after three years.

* Not suited for general use in the Willamette Valley.

** See Table 1 for dates of Early, Midseason, and Late designations.

Table 4. TREES SUBJECT TO INSECT OR DISEASE PROBLEMS

Botanical and common name	Height		Width		Time**		Fall Bloom	Defoliation	Remarks
	Ultimate height	At plant-ing	After 4 yrs.	At plant-ing	After 4 yrs.	Foli-ation			
	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>				
<i>Alnus cordata</i> Italian Alder	45	2.3	20.9	1.5	13.8	M		L	Fast-growing. Leaves damaged by leaf miner. Leaves green when dropping.
* <i>Alectryon subcinereum</i> Smooth Rambutan		2.8		1.0					Died from root rot first summer.
<i>Crataegus oxyacantha contorta</i> Contorted Hawthorn	4	1.5	2.0	1.2	2.1	M	M	E	Defoliates early with leaf spot each year.
<i>Eucryphia</i> 'Nymansay' Nymansay Eucryphia	25	2.5	4.4	0.5	2.2	M	L		Evergreen but damaged at 8° F. Plants die from root rot.
<i>Fraxinus velutina glabra</i> Smooth Ash	20-45	7.5	13.9	1.8	6.5	M		M	Foliage disfigured by disease each summer.
* <i>Nothofagus dombeyi</i> Southern Falsebeech	90	5.8	7.4	2.8	4.5	L			Died of root rot during second growing season.
<i>Platanus racemosa</i> California Sycamore	120	2.0	7.9	1.6	4.4	M		M	Dieback from disease each year.

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** See Table 1 for dates of Early, Midseason, and Late designations.

Table 5. TREES SUBJECT TO COLD DAMAGE

Botanical and common name	Height		Width		Time**		Remarks
	Ultimate height	At plant-ing	After 4 yrs.	At plant-ing	After 4 yrs.	Foli-ation	
	Ft.	Ft.	Ft.	Ft.	Ft.		
* <i>Brachychiton populneum</i> Bottle tree	60	1.7	2.0	0.9	1.5		One year's growth. Winter-killed at 23° F.
* <i>Cinnamomum glanduliferum</i> Nepal Camphortree	40	1.1	7.5	0.8	6.8	M	Three years' growth. Killed to ground at 8° F. Slight damage at 21° F. Evergreen.
* <i>Clethra arborea</i> Lily-of-the-Valley Clethra	25	1.9		0.8			Killed at 18° F. before first-year growth measurements taken.
* <i>Cunonia capensis</i> African Red Alder	50	2.9	2.6	1.4	2.5		Killed at 8° F. after one year's growth.
* <i>Eucalyptus agglomerata</i> Blueleaved Stringybark		4.3	10.2	3.0	5.8	E	Killed at 8° F. after two years' growth. Hardy at 21° F.
* <i>Eucalyptus andreana</i>		3.2	12.1	4.4	10.7	E	Killed at 8° F. after two years' growth. Hardy at 21° F.
<i>Eucalyptus archeri</i>	90	1.3	23.3	1.4	16.2	M	L Killed to ground after four years. Sprouted from base. Hardy at 18° F.
<i>Eucalyptus bicostata</i> Eurabbie Eucalyptus	125	1.5	22.0	0.9	15.0	M	Killed after four years by 8° F. Hardy at 21° F.
* <i>Eucalyptus caleginosa</i>	60	5.1	9.4	3.3	5.7	E	Killed at 8° F. after two years' growth. Hardy at 21° F.
<i>Eucalyptus cinerea</i> Silverdollar Tree	45	3.0	19.8	2.0	13.2	M	M Killed to ground after four years by 8° F. Hardy at 18° F.
<i>Eucalyptus coccifera</i> Ridgetop Eucalyptus	100	1.7	23.3	1.9	17.5	M	L Killed at 8° F. after four years. Hardy at 21° F.
* <i>Eucalyptus codoncarpa</i>		5.2	8.2	3.0	6.5	E	Killed at 8° F. after two years' growth. Hardy at 21° F.
<i>Eucalyptus delegatensis</i> Delegate Eucalyptus	200	2.3	23.7	1.6	10.2	M	Killed at 8° F. after four years' growth. Hardy at 21° F.
* <i>Eucalyptus eremophilla</i>	10-25	0.9	1.1	0.2	1.6		Killed at 18° F. after one year's growth.
* <i>Eucalyptus fastigata</i> Brown-Barrel Eucalyptus	150	4.6	11.4	3.4	8.5	E	Killed at 8° F. after two years' growth. Hardy at 21° F.
* <i>Eucalyptus laevopinea</i> Silvertop Stringybark	105	3.5	8.8	2.9	8.8	E	Killed at 8° F. after two years' growth. Hardy at 21° F.
* <i>Eucalyptus lehmanni</i> Bushy Yate Eucalyptus	20-30	1.7		2.1			Top killed at 21° F. Complete kill at 8° F.
* <i>Eucalyptus maculata</i> Spotted Gum Eucalyptus	150	4.8	3.9	3.0	5.1		Top killed at 21° F. first year. Complete kill at 8° F. second year.
* <i>Eucalyptus megacornuta</i>	20-25	1.5	1.9	0.6	1.2		Killed at 18° F. after one year's growth.
* <i>Eucalyptus neglecta</i>	15	0.7	19.5	1.8	18.5	M	M Top killed at 8° F. after four years' growth. Sprouted. Hardy at 21° F.
* <i>Eucalyptus nitida</i> Shinyleaf Eucalyptus		3.2	5.3	1.5	4.2		Killed at 8° F. after one year's growth.
<i>Eucalyptus perriniana</i> (Hyanville) Spinningleaf Gum	27	2.4	19.0	1.7	17.8	M	M Top killed at 8° F. after four years' growth. Sprouted. Hardy at 18° F.
* <i>Eucalyptus platypus</i> Round-Leaved Moort	20	1.2	0.9	1.0	1.1		Killed at 18° F. after one year's growth.

Botanical and common name	Height					Width		Time**		Remarks
	Ultimate height	At plant-		At plant-		Foli-ation	Bloom	Fall color	Defoliation	
		ing	After 4 yrs.	ing	After 4 yrs.					
<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>					
<i>Eucalyptus pulverulenta</i> Dollarleaf Eucalyptus	27	1.7	19.2	2.5	18.5	E	E			Top killed at 8° F. after four years' growth. Sprouted. Hardy at 18° F.
* <i>Eucalyptus scoparia</i> Wallangarra White Gum	30-40	4.4	10.8	3.7	11.2	E				Killed at 8° F. after two years' growth. Hardy at 21° F.
<i>Eucalyptus simmondsi</i>	55	1.6	17.6	1.8	12.4	E	M			Top killed at 8° F. after four years' growth. Sprouted. Hardy at 18° F.
* <i>Eucalyptus spathulata</i> Swampmallet Eucalyptus	15-20	0.9	1.4	0.5	0.9					Killed at 18° F. after one year's growth.
<i>Eucalyptus subcrenulata</i> (Hartz Mts.)	180	1.5	20.0	1.3	11.3	M	L			Top killed at 8° F. after four years' growth. Sprouted but died of disease. Foliage and stem damage at 8° F. Hardy at 18° F.
<i>Eucalyptus subcrenulata</i> (Oregon)..	180	1.5	25.0	1.0	12.5	E				
<i>Eucalyptus urnigera</i> Urnpod Eucalyptus	45	2.4	23.4	1.5	12.3	E	E			Top killed at 8° F. after four years' growth. Sprouted but died of disease.
<i>Firmiana simplex</i> Chinese Parasol Tree	40	3.0	4.7	0.0	1.8	L		L		Top dieback every winter. Interesting large leaves.
* <i>Fraxinus uhdei</i> Shamel Ash	30	6.5	6.2	1.8	4.2	E				Top damaged at 21° F. Killed second year at 8° F.
* <i>Fraxinus uhdei</i> 'Tomlinson' Tomlinson Ash	30	5.5	8.0	1.0	4.1	E				Top killed at 8° F. after two years' growth. Sprouted. Not evergreen. Killed at 8° F. after two years' growth. Top damage at 24° F.
* <i>Geijera parvifolia</i>		1.5	3.0	1.0	2.5	L				
<i>Melaleuca linarifolia</i> Melaleuca	20	4.3	8.9	1.6	5.1	M	L			Evergreen. Feathery cream flowers. Killed at 8° F. in third year. Hardy at 22° F.
* <i>Quillaja saponia</i> Soapbark Tree	60	2.0	5.4	1.0	4.1	M				Evergreen. Tip damage at 21° F. Killed at 8° F. in third year.
* <i>Sophora secundiflora</i> Texas Mountain Laurel	35	0.6	0.7	0.4	0.5					Evergreen but killed back at 21° F. Removed second year.
* <i>Trachycarpus fortunei</i> Fortune's Windmill Palm	20	1.5	2.0							Killed first winter at 8° F. Larger plants survive better.
* <i>Tristania laurina</i> Kanooka Tristania	20-30	5.7	6.7	0.8	3.2	L	L			Evergreen. Yellow flowers. Hardy at 21° F. Killed at 8° F. after three years.

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** See Table 1 for dates of Early, Midseason, and Late designations.

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