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PLANT

HARDINESS

ZONE MAP

Miscellaneous Publication No. 814

AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

INDICATOR PLANT EXAMPLES

Following are names of representative persistent plants listed under the coldest zones in which they will normally succeed. Such plants may serve as useful indicators of the cultural possibilities of each zone.

ZONE 1 (below -50° F.)

Betula glandulosa
Empetrum nigrum
Populus tremuloides
Potentilla pensylvanica
Rhododendron lapponicum
Salix reticulata

Dwarf birch
Crowberry
Quaking aspen
Pennsylvania cinquefoil
Lapland rhododendron
Netleaf willow

ZONE 2 (-50° to -40° F.)

Betula papyrifera
Cornus canadensis
Elaeagnus commutata
Juniperus communis
Picea glauca
Potentilla fruticosa

Paper birch
Bunchberry dogwood
Silverberry
Common juniper
White spruce
Bush cinquefoil

ZONE 3 (-40° to -30° F.)

Elaeagnus angustifolia
Lonicera tatarica
Malus baccata
Parthenocissus quinquefolia
Syringa vulgaris
Thuja occidentalis

Russian olive
Tatarian honeysuckle
Siberian crabapple
Virginia creeper
Common lilac
American arbor-vitae

ZONE 4 (-30° to -20° F.)

Berberis thunbergii
Hydrangea paniculata
Juniperus chinensis
Ligustrum amurense
Spiraea vanhouttei
Taxus cuspidata

Japanese barberry
Panicled hydrangea
Chinese juniper
Amur River privet
Vanhoutte spirea
Japanese yew

ZONE 5 (-20° to -10° F.)

Cornus florida
Deutzia gracilis
Forsythia ovata
Ligustrum vulgare
Parthenocissus tricuspidata
Rosa multiflora

Flowering dogwood
Slender deutzia
Early forsythia
Common privet
Boston ivy
Japanese rose

ZONE 6
(-10° to 0° F.)

Acer palmatum
Buxus sempervirens (6b to 7)
Forsythia suspensa
Hedera helix
Ilex opaca
Ligustrum ovalifolium

Japanese maple
Common box
Weeping forsythia
English ivy
American holly
California privet

ZONE 7
(0° to 10° F.)

Azalea Kurume hyb. 'Hinodegiri'
Cedrus atlantica
Cercis chinensis
Chamaecyparis lawsoniana
Cotoneaster salicifolia
Ilex aquifolium

Red Hussar azalea
Atlas cedar
Chinese redbud
Lawson cypress
Willowleaf cotoneaster
English holly

ZONE 8
(10° to 20° F.)

Arbutus menziesi
Choisya ternata
Melia azedarach
Olearia haasti
Prunus laurocerasus
Viburnum tinus

Pacific madrone
Mexican orange
Chinaberry
New Zealand daisy-bush
Cherry-laurel
Laurestinus

ZONE 9
(20° to 30° F.)

Arbutus unedo
Eucalyptus globulus
Grevillea robusta
Myrtus communis
Pittosporum tobira
Quercus virginiana

Strawberry tree
Tasmanian blue gum
Silk-oak
Myrtle
Japanese pittosporum
Live oak

ZONE 10
(30° to 40° F.)

Acacia baileyana
Arecastrum romanzoffianum
Bougainvillea spectabilis
Casuarina equisetifolia

Eucalyptus citriodora
Ficus macrophylla

Cootamundra wattle
Queen palm
Bougainvillea
Horsetail beefwood
(Australian pine)
Lemon eucalyptus
Moreton bay fig

Cold Hardiness Ratings for Some Additional Woody Plants

	Zone		Zone
<i>Abeliophyllum distichum</i> (white forsythia)....	5b	<i>Hypericum patulum</i> 'Hidcote' (Hidcote St. Johnswort)....	7
<i>Acer platanoides</i> (Norway maple).....	4	<i>Iberis sempervirens</i> (evergreen candytuft)....	6
<i>Aesculus carnea</i> (red horsechestnut).....	4	<i>Ilex crenata convexa</i> (convexleaf Japanese holly)....	7
<i>Arctostaphylos uva-ursi</i> (bearberry).....	3	<i>Jacaranda acutifolia</i> (jacaranda).....	10
<i>Azalea Indian hybrid</i> (Indian azalea).....	9	<i>Juglans regia</i> (English or Persian walnut)....	6
<i>Azalea Kurume hybrid</i> (Kurume azalea)....	7	<i>Juniperus horizontalis</i> (creeping juniper)....	3
<i>Azalea Mollis hybrid</i> (Mollis azalea).....	5	<i>Koelreuteria paniculata</i> (goldenrain-tree)....	6
<i>Bauhinia variegata</i> (purple orchid tree)....	10	<i>Laburnum watereri</i> (Waterer laburnum).....	6
<i>Berberis darwini</i> (Darwin barberry).....	8	<i>Lagerstroemia indica</i> (crapemyrtle).....	7
<i>Betula pendula</i> (European white birch).....	2	<i>Mahonia aquifolium</i> (Oregon hollygrape)....	6
<i>Bouvardia 'Coral'</i> (Coral bouvardia).....	9	<i>Malus arnoldiana</i> (Arnold crabapple).....	5
<i>Butia capitata</i> (Pindo palm).....	8b	<i>Metasequoia glyptostroboides</i> (Dawn redwood)....	5b
<i>Camellia reticulata</i> (reticulata camellia)....	9	<i>Nerium oleander</i> (oleander).....	8
<i>Camellia sasanqua</i> (sasanqua camellia).....	7b	<i>Olea europaea</i> (common olive).....	9
<i>Carya pecan</i> 'Major' (pecan).....	5 (grows) 6 (fruits)	<i>Picea abies</i> (Norway spruce).....	2
<i>Ceanothus impressus</i> (Santa Barbara ceanothus)....	8	<i>Pieris japonica</i> (Japanese andromeda).....	6
<i>Cedrus deodara</i> (deodar cedar).....	7b	<i>Pinus mugo mughus</i> (Mugho pine).....	3
<i>Chamaecyparis pisifera</i> (Sawara cypress)....	4	<i>Pinus radiata</i> (Monterey pine).....	7
<i>Cinnamomum camphora</i> (camphor tree).....	9	<i>Pinus strobus</i> (white pine).....	4
<i>Cistus laurifolius</i> (laurel rock-rose).....	7	<i>Raphiolepis indica rosea</i> (pink raphiolepis)...	8
<i>Cistus purpureus</i> (purple rock-rose).....	8	<i>Rhododendron 'America'</i> (hybrid rhododendron)....	5
<i>Cornus alba</i> (Tatarian dogwood).....	3	<i>Rhododendron loderi</i> 'King George' (hybrid rhododendron)....	8
<i>Cytisus praecox</i> (Warminster broom).....	6	<i>Rhododendron 'Purple Splendor'</i> (hybrid rhododendron)....	7
<i>Elaeagnus multiflora</i> (cherry multiflora)....	5	<i>Rosa rugosa</i> (rugosa rose).....	3
<i>Elaeagnus pungens</i> (thorny elaeagnus).....	7	<i>Schinus terebinthifolius</i> (Brazilian pepper tree)....	9
<i>Eriobotrya japonica</i> (loquat).....	8	<i>Sequoia sempervirens</i> (redwood).....	8
<i>Euonymus alatus</i> (winged euonymus).....	4	<i>Sequoiadendron giganteum</i> (giant sequoia)...	7
<i>Euphorbia pulcherrima</i> (poinsettia).....	10	<i>Ulmus americana</i> (American elm).....	2
<i>Fremontia mexicana</i> (San Diego fremontia)...	9	<i>Zelkova serrata</i> (Japanese zelkova).....	6
<i>Ginkgo biloba</i> (ginkgo, maidenhair-tree)....	5		
<i>Hibiscus rosa-sinensis</i> (Chinese hibiscus)....	9b		
<i>Hibiscus syriacus</i> (shrub althea).....	6		

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INDICATOR PLANT EXAMPLES

Japanese maple	Common box	Weeping forsythia	English ivy	American holly	California privet
<i>Acer palmatum</i>	<i>Buxus sempervirens</i> (6b to 7)	<i>Forsythia suspensa</i>	<i>Hedera helix</i>	<i>Ilex opaca</i>	<i>Ligustrum ovalifolium</i>
ZONE 6	(-10° to 0° F.)				
Red Husar azalea	Atlas cedar	Chinese redbud	Lawson cypress	Willowleaf cotoneaster	English holly
<i>Azalea Kurume</i> hyb. 'Hinodegiri'	<i>Cedrus atlantica</i>	<i>Cercis chinensis</i>	<i>Chamaecyparis lawsoniana</i>	<i>Cotoneaster salicifolia</i>	<i>Ilex aquifolium</i>
ZONE 7	(0° to 10° F.)				
Arbutus menziesi	Choisya ternata	Melia azedarach	Olearia haasi	Prunus laurocerasus	Viburnum tinus
ZONE 8	(10° to 20° F.)				
Pacific madrone	Mexican orange	Chinaberry	New Zealand daisy-bush	Cherry-laurel	Laurestinus
Strawberry tree	Tasmanian blue gum	Silk-oak	Myrtle	Japanese pittosporum	Live oak
ZONE 9	(20° to 30° F.)				
Arbutus unedo	Eucalyptus globulus	Grevillea robusta	Myrtus communis	Pittosporum lobata	Quercus virginiana
ZONE 10	(30° to 40° F.)				
Acacia baileyana	Arceuthobium tomentosum	Bougainvillea spectabilis	Casuarina equisetifolia	Eucalyptus citriodora	Ficus macrophylla
Coolamandra wattie	Queen palm	Bougainvillea	Hortellai beechwood	Lemon eucalyptus	Moreton bay fig

Belula glandulosa	Empetrum nigrum	Populus tremuloides	Populus pennsylvanica	Rhododendron lapponicum	Salix reticulata
ZONE 1	(below -50° F.)				
Dwarf birch	Crowberry	Quaking aspen	Pennsylvania cinquefoil	Lapland rhododendron	Netleaf willow
Belula papyrifera	Cornus canadensis	Blagaynus communis	Picea glauca	Potentilla fruticosa	
ZONE 2	(-50° to -40° F.)				
Paper birch	Bunchberry dogwood	Silverberry	Common juniper	White spruce	Bush cinquefoil
ZONE 3	(-40° to -30° F.)				
Russian olive	Tatarian honeysuckle	Siberian crabapple	Virginia creeper	Common lilac	American arbor-vitae
Blagaynus angustifolia	Lonicera tatarica	Malus baccata	Parthenocissus quinquefolia	Syringa vulgaris	Thuya occidentalis
ZONE 4	(-30° to -20° F.)				
Japanese barberry	Panicle hydrangea	Chinese juniper	Amur River privet	Vanhoutte spirea	Japanese yew
Cornus florida	Deutzia gracilis	Forsythia ovata	Ligustrum vulgare	Parthenocissus tricuspidata	Rosa multiflora
ZONE 5	(-20° to -10° F.)				
Flowering dogwood	Slender deutzia	Early forsythia	Common privet	Boston ivy	Japanese rose

Following are names of representative persistent plants listed under the coldest zones in which they will normally succeed. Such plants may serve as useful indicators of the cultural possibilities of each zone.

INDICATOR PLANT EXAMPLES

The Zones of Plant Hardiness—This is an adapted version of the color map on the reverse side. It may be useful for small-scale reproduction in books, magazines, and nursery catalogs. This map is not copyrighted, and permission for reproducing it is not required.

PLANT HARDINESS ZONE MAP

Prepared by the U.S. National Arboretum, Agricultural Research Service, U.S. Department of Agriculture in cooperation with the American Horticultural Society¹

This map shows in moderate detail the expected minimum temperatures of most of the horticulturally important areas of the United States (excluding Alaska and Hawaii) and Canada. It shows 10 different zones, each of which represents an area of winter hardiness for certain ornamental plants.

Cold hardiness zones for the United States area of this map are based on isotherms of average minimum winter temperatures for the years 1899 through 1938. Readjustments were made for 34 States on the basis of January mean minimum temperatures for 1931 through 1952, as published by the U.S. Weather Bureau.

Data for the adjacent area in Canada were provided by the Canadian Meteorological Division, and are based on a 20- to 40-year period.

Data from both sources in the United States and Canada have been modified or reinterpreted in many localities to conform with recent and more detailed information provided by State experiment stations and numerous individual cooperators.

HOW TO USE THE MAP

Each zone of the map on the reverse side has been subdivided into darker-colored and lighter-colored sections that represent 5-degree differentials within the 10-degree zone. The lighter color of each zone represents the colder section; the darker color, the warmer section. The accompanying table lists representative plants that normally survive in each zone.

The hardiness zones should be enough for most general reference purposes. However, plant survival differences can be noted at smaller north-south progressions than a full zone represents. When this additional detail is needed, use the 5-degree differentials within the 10-degree zone.

Some examples of these differences are as follows: Saucer magnolia (*Magnolia soulangeana*) and wisteria (*Wisteria sinensis*) are suit-

¹ Based on studies conducted by a commission of the Society (formerly the American Horticultural Council) upon recommendation of the American Association of Nurserymen. Further background information may be found in an article titled, *The Geographic Charting of Plant Climatic Adaptability*, by H. T. Skinner, Report of the 15th International Horticultural Congress, 1958.

able for zone 5b, but not for zone 5a; orchard peaches (*Prunus persica*) are suitable in zone 6b, but will also succeed in those parts of zone 6a that are relatively free of late frosts; Japanese camellia (*Camellia japonica*), Chinese holly (*Ilex cornuta*), and Southern magnolia (*Magnolia grandiflora*) are suitable in zone 7b but doubtful in 7a.

In determining if a certain plant will survive in a given zone, it is necessary to consider factors other than the minimum temperature range of each zone. For example, temperatures of adjacent zones become increasingly similar near their boundaries. Moreover, there are innumerable island climates that may be considerably milder or colder than the zone average. These islands are especially frequent in hilly or mountainous areas. Mountainous areas on this map are not shown to be as cold as might be expected. The reason for this is that most weather stations from which records were obtained are located in valleys where temperatures tend to be somewhat milder, and where plants are most likely to be cultivated.

Other plant-growth factors must also be considered. Frost occurrence, seasonal rainfall distribution, humidity, soil characteristics, and duration and intensity of sunlight may bear little relationship to mean winter temperatures. The combined effects of all factors determine true plant adaptability. They would be difficult to depict geographically.

Minimum temperatures, on the other hand, can be readily depicted. They are of prime importance in plant survival. Their effects can seldom be changed by cultural practices.

A plant species that flourishes in one part of a given zone is likely to be adaptable in other parts of the same zone or in a warmer zone. Other growth factors, such as rainfall, soil, and summer heat, have to be reasonably comparable, however, or capable of being made comparable through irrigation, soil correction, wind protection, partial shade, or humidity control. Frost dates, length of growing season, and minimum winter temperatures are among the least readily controlled of the major factors that govern the geographic adaptability of plants.

The zone in which a given plant may survive is not necessarily the zone in which it should generally be recommended for planting. *Abelia grandiflora*, for example, usually survives as a low-growing, winter-retarded specimen in the colder areas of zone 6 or even in zone 5. It develops and flowers normally, however, in zone 7. This species, therefore, should be properly recommended for zones 7 and above.

Some gardeners may question a zone rating when a plant fails to survive its first winter. A single test, however, is rarely reliable. A small, young plant may be tender, whereas an older plant may become quite hardy. Cultural conditions may affect the degree of hardiness. Furthermore, no single winter is ever quite average; some may be more severe than others in suddenness of freezing or in degrees of frost registered.

Cold Hardiness Ratings for Some Additional Woody Plants

Zone	Zone
<i>Abeliophyllum distichum</i> (white forsythia).....	5b
<i>Acer platanoides</i> (Norway maple).....	4
<i>Aesculus carnea</i> (red horsechestnut).....	4
<i>Arctostaphylos uva-ursi</i> (bearberry).....	3
<i>Azalea Indian hybrid</i> (Indian azalea).....	9
<i>Azalea Kurume hybrid</i> (Kurume azalea).....	7
<i>Azalea Mollis hybrid</i> (Mollis azalea).....	5
<i>Bauhinia variegata</i> (purple orchid tree).....	10
<i>Berberis darwini</i> (Darwin barberry).....	8
<i>Betula pendula</i> (European white birch).....	2
<i>Bouvardia 'Coral'</i> (Coral bouvardia).....	9
<i>Butia capitata</i> (Pindo palm).....	8b
<i>Camellia reticulata</i> (reticulata camellia).....	9
<i>Camellia sasanqua</i> (sasanqua camellia).....	7b
<i>Carya pecan 'Major'</i> (pecan).....	5 (grows 6 (fruits)
<i>Ceanothus impressus</i> (Santa Barbara ceanothus).....	8
<i>Cedrus deodara</i> (deodar cedar).....	7b
<i>Chamaecyparis pisifera</i> (Sawara cypress).....	4
<i>Cinnamomum camphora</i> (camphor tree).....	9
<i>Cistus laurifolius</i> (laurel rock-rose).....	7
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<i>Cornus alba</i> (Tatarian dogwood).....	3
<i>Cytisus praecox</i> (Warminster broom).....	6
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<i>Euonymus alatus</i> (winged euonymus).....	4
<i>Euphorbia pulcherrima</i> (poinsettia).....	10
<i>Fremontia mexicana</i> (San Diego fremontia).....	9
<i>Ginkgo biloba</i> (ginkgo, maidenhair-tree).....	5
<i>Hibiscus rosa-sinensis</i> (Chinese hibiscus).....	9b
<i>Hibiscus syriacus</i> (shrub althea).....	6
<i>Hypericum patulum</i> 'Hidecote' (Hidecote St. Johnswort).....	7
<i>Iberis sempervirens</i> (evergreen candytuft).....	6
<i>Ilex crenata convexa</i> (convexleaf Japanese holly).....	7
<i>Jacaranda acutifolia</i> (jacaranda).....	10
<i>Juglans regia</i> (English or Persian walnut).....	6
<i>Juniperus horizontalis</i> (creeping juniper).....	3
<i>Koeleruteria paniculata</i> (goldenrain-tree).....	6
<i>Laburnum watereri</i> (Waterer laburnum).....	6
<i>Lagerstroemia indica</i> (crapemyrtle).....	7
<i>Mahonia aquifolium</i> (Oregon hollygrape).....	6
<i>Malus arnoldiana</i> (Arnold crabapple).....	5
<i>Metasequoia glyptostroboides</i> (Dawn redwood).....	5b
<i>Nerium oleander</i> (oleander).....	8
<i>Olea europaea</i> (common olive).....	9
<i>Picea abies</i> (Norway spruce).....	2
<i>Pieris japonica</i> (Japanese andromeda).....	6
<i>Pinus mugo mughus</i> (Mugho pine).....	3
<i>Pinus radiata</i> (Monterey pine).....	7
<i>Pinus strobus</i> (white pine).....	4
<i>Raphiolepis indica rosea</i> (pink raphiolepis).....	8
<i>Rhododendron 'America'</i> (hybrid rhododendron).....	5
<i>Rhododendron loderi</i> 'King George' (hybrid rhododendron).....	8
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<i>Rosa rugosa</i> (rugosa rose).....	3
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<i>Sequoia sempervirens</i> (redwood).....	8
<i>Sequoiadendron giganteum</i> (giant sequoia).....	7
<i>Ulmus americana</i> (American elm).....	2
<i>Zelkova serrata</i> (Japanese zelkova).....	6

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