

## ROOT-DAMAGING TEMPERATURES-

The actual killing temperature will vary with the degree of plant dormancy at the time of exposure to the low temperature. When plants are preconditioned for low-temperature storage and the temperature remains uniformly low prior to exposure to cold-temperature, the roots will generally survive provided that the temperature does not go below the average killing temperature for the species.

However, if the low-temperature follows a period of fluctuating temperatures, especially temperatures that are conducive to growth, the roots could be injured at temperatures significantly higher than the average killing temperature. Also, the roots of newly rooted cuttings have a tendency to be less tolerant of cold-temperature stress than plants with a year or more of growth.

**"To minimize root injury, plants should be stored at a temperature at least 3-5°F above the average root-killing temperature." - Harold Davidson and Roy Mecklenburg. 1981. Nursery Management - Administration And Culture. 450 pages. Prentice-Hall, Inc.**

In the following table, non-notated temperatures were reported by Bruce Briggs (1980 Ornamentals Northwest Seminars - based on observations at the Briggs Nursery in Olympia, WA) and data reported by John R. Havis (1976, HortScience 11(4):385-386), and Peter L. teponkus, George L. Good, and Steven C. Wiest (1976, American Nurseryman 144(6):16, 76-79).

G = Reported by Francis R. Gouin, American Nurseryman, October 1, 1977, pp 56-57. These are the temperatures that will injure immature and possibly mature roots, but will not result in 100 percent kill of the root systems in moist soils.

**DECIDUOUS PLANTS**

<u>Genus species</u> .....	<u>° F</u>
Acer circinatum, Vine Maple .....	0
Acer ginnala, Amur Maple .....	0
Acer macrophyllum, Bigleaf Maple .....	0
Acer negundo 'Variegatum', Variegated Box Elder .....	10
Acer palmatum, Japanese Maple .....	15
'Atropurpureum' .....	15 (G)
Acer platanoides, Norway Maple .....	0
Acer rubrum, Red Maple .....	0
Acer saccharum, Sugar Maple .....	0
Aesculus hippocastnum, Common Horsechestnut .....	0
Berberis thunbergii, Japanese Barberry .....	10-15
Betula papyrifera, Paper birch .....	0
Betula pendula, European White Birch .....	0
Betula pendula 'Darlecarlica' ('Laciniata'), Cutleaf Weeping Birch .....	0
Carpinus betulus fastigiata, Narrow European Hornbeam .....	0
Catalpa speciosa, Western Catalpa .....	0
Chaenomeles speciosa, Flowering Quince .....	5

Cornus florida Eastern Dogwood .....	20 22 (G)
Cornus mas, Cornelian Cherry .....	18
Cornus nuttallii, Pacific Dogwood .....	22
Corpus stolonifera, Red Osier Dogwood .....	18
Cotinus coggygia, Smoketree .....	18
Cotoneaster adpressus praecox .....	12 (G)
Cotoneaster congestus .....	25 (G)
Cotoneaster dammed .....	23 (G)
'Skogholmen' .....	20 (G)
Cotoneaster horizontalis Rock Cotoneaster .....	17 (G)
Deutzia gracilis, Slender Deutzia .....	15
Fagus sylvatica 'Purpurea', Purple Beech .....	15
Ginkgo biloba, Ginkgo, Maidenhair Tree .....	15
Gleditsia triacanthos 'Sunburst' Sunburst Honey Locust .....	10
Koelreuteria paniculata Goldenrain-tree .....	16(G)
Liquidambar styraciflua American Sweetgum .....	15
Liqustrum vulgare Common or English Privet .....	5
Liriodendron tulipifera Tulip Tree .....	18
Magnolia x 'Ricki' .....	20
Magnolia x Soulangeana Saucer Magnolia .....	23 (G)
Magnolia stellata, Star Magnolia .....	17 22 (G)

Oxydendrum arboreum, Sourwood .....	10	Aucuba japonica	
Philadelphus cultivars		Aucuba, Japanese Aucuba .....	24
Mock Orange cultivars .....	15	Berberis julianae, Wintergreen Barberry .....	15
Potentilla fruticosa		Berberis verruculosa, Warty Barberry .....	5
Potentilla Cinquefoil .....	-9 (G)	Buxus sempervirens	
Prunus blireana (blireiana)		English Boxwood .....	15, 27 (G)
Blireana Flowering Plum .....	10	Calluna vulgaris, Scotch Heather .....	15
Prunus serrulata 'Shirotae'		Calocedrus decurrens, Incense Cedar .....	0
Mt. Fuji Flowering Cherry .....	10	Camellia japonica	
Rhododendron		Common Camellia varieties .....	24
Deciduous Azalea .....	12	Camellia sasanqua	
Exbury hybrid .....	17 (G)	Sasanqua Camellia varieties .....	24
R. prunifolium .....	20 (G)	Cedrus atlantica 'Glauca'	
R. schlippenbachi .....	15 (G)	Blue Atlas Cedar .....	10
Rhus typhina, Staghorn Sumac .....	0	Cedrus deodara, Deodar Cedar .....	10
Stephanandra incisa .....	18 (G)	Chamaecyparis lawsoniana 'Allumii'	
		Allumi Cypress, Blue Lawson Cypress .....	12
		'Ellwoodii', Ellwood Cypress .....	12
		Chamaecyparis obtusa, Hinoki Cypress .....	0
		Chamaecyparis pisifera 'Filifera'	
		Thread Cypress, Threadbranch Cypress .....	0
		Choisya ternata, Mexican Orange .....	20
		Cistus corbariensis, White Rockrose .....	20
		Cortaderia selloana, Pampas Grass .....	24
		Cryptomeria japonica .....	17 (G)
		'Elegans' .....	15
		Cytisus praecox .....	16 (G)
		Moonlight Broom .....	12
<b>EVERGREEN PLANTS</b>			
Abelia grandiflora, Glossy Abelia .....	18		
Abies amabilis, Silver Fir .....	0		
Abies concolor, White Fir .....	0		
Abies grandis, Grand Fir .....	5		
Abies lasiocarpa, Alpine Fir .....	0		
Abies procera, Noble Fir .....	0		
Arbutus menziesii, Madrona .....	20		
Arbutus unedo, Strawberry Tree .....	20		

Daphne cneorum .....	23 (G)	Ilex hybrid, `San Jose' .....	22 (G)
Rock Daphne, Garland Daphne .....	18	(I. X altaclarensis 'Wilsonii' & I. sikkimensis)	
Daphne odora, Winter Daphne .....	22	Juniperus chinensis 'Kaizuka' ('Torulosa').	20
Erica carnea, Heath .....	18	`Old Gold' .....	5
Escallonia rubra, Escallonia .....	18	'Pfitzerana', Pfitzer Juniper .....	0
Euonymus alata .....	19 (G)	Juniperus conferta, Shore Juniper .....	12 (G)
Euonymus fortunei		Juniperus horizontalis 'Douglasi' .....	0 (G)
'Argenteo-marginatus' .....	15 (G)	'Plumosa' .....	12 (G)
'Carrieri' .....	15 (G)	Juniperus squamata .....	12 (G)
'Colorata' .....	5 (G)	Kalmia latifolia	
'vegetus' .....	23 (G)	Kalmia, Mountain Laurel .....	0 15 (G)
Euonymus kiautschovicus (patens) .....	22 (G)	Leucothoe fontanesiana (catesbaei)	
Fatsia japonica, Fatsia, Aralia .....	22	Drooping Leucothoe .....	5 (G)
Gaultheria shallon, Salal .....	12	Ligustrum japonicum	
Hedera helix 'Baltica' .....	15 (G)	Waxleaf Privet, Japanese Privet .....	20
Hypericum species .....	23 (G)	Magnolia grandiflora, Southern Magnolia....	20
Ilex aquifolium, English Holly .....	20	Mahonia aquifolium .....	10 (G)
Ilex 'Blue Holly' .....	5	Oregon Grape .....	15
Ilex X meserveae (I. aquifolium x I. rugosa)		Mahonia bealei .....	23 (G)
Ilex cornuta 'Burfordii'		Mahonia nervosa	
Burford Holly .....	20	Low Oregon Grape, Cascades Mahonia ....	15
'Dazzler' .....	25 (G)	Nandina domestica	
'Nellie Stevens' .....	23 (G)	Nandina, Heavenly Bamboo .....	20
Ilex crenata 'Convexa' .....	18 23 (G)	Osmanthus delavayi	
'Helleri', 'Hetzi' .....	23 (G)	Delavay Osmanthus .....	24
'Stokes'.....	23 (G)	Osmanthus heterophyllus	
Ilex glabra .....	16 (G)	Hollyleaf Osmanthus .....	20
Ilex meserveae .....	23 (G)	Pachysandra terminalis .....	15 (G)
Ilex opaca .....	23 (G)	Pernettya mucronata, Chilean Pernettya .....	18
		Photinia fraseria, Fraser Photinia .....	12

Phyllostachys aurea, Golden Bamboo .....	20	Raphiolepis indica 'Rosea', Rosea Raphilepis, Pink India Hawthorn .....	20
Picea abies 'Nidiformis' Nest Spruce, Birds' Next Spruce .....	0	Rhododendron carolinianum .....	0 (G)
Picea glauca .....	-9(G)	catawbiense .....	0(G)
Albertiana 'Conica', Dwarf Alberta Spruce, Albertina Spruce .....	0	Evergreen Azaleas and Rhododendrons .....	10-18
Picea omorika .....	-9(G)	'Hino Crimson' .....	19(G)
Picea pungens 'Glauca' Colorado Blue Spruce .....	9	'Hinodegiri' .....	10(G)
Pieris formosa forrestii, Chinese Pieris .....	20	PJM hybrids .....	- 9(G)
Pieris floribunda .....	5(G)	Rosmarinus officinalis, Rosemary .....	20
Pieris japonica Japanese Pieris .....	10-12 15 (G)	Sarcococca ruscifolia Fragrant Sarcococca .....	20
Pinus contorta, Shore Pine .....	5	Sciadopitys verticillata, Umbrella Pine .....	5
Pinus densiflora 'Umbraculifera' Tanyosho Pine .....	15	Sequoia sempervirens, Coast Redwood .....	15
Pinus mugo mughus, Dwarf Mugo Pine .....	0	Sequoiadendron giganteum, Giant Sequoia.....	5
Pinus thunbergii, Japanese Black Pine .....	5	Skimmia japonica, Japanese Skimmia .....	8
Prunus subhirtella 'Autumnalis' Autumn Flowering Cherry .....	10	Stewartia pseudo-camellia Japanese Stewartia .....	15
Pyrus Calleryana 'Bradford' Bradford Pear .....	15	Stranvaesia davidiana undulata Low Stranvaesia .....	10
Prunus laurocerasus, English Laurel .....	15	Styrax japonica, Japanese Snowbell .....	15
Prunus laurocerasus 'Otto Luykens' Otto Luykens Laurel .....	15	Taxus baccata 'Repandens' Spreading English Yew .....	12
Pseudotsuga menziesii, Douglas Fir .....	0	Taxus media 'Hicksii', Hick's Yew .....	17(G)
Pyracantha coccinea 'Lalandei' Lalandei Pyracantha, Lalandei Firethorn .....	12 23 (G)	'Nigra' .....	12(G)
		Thuja occidentalis .....	10(G)
		'Fastigiata' (Pyramidalis) .....	0
		Thuja plicata, Western Red Cedar .....	0
		Trachycarpus fortunei, Windmill Palm .....	24
		Umbellularia californica, Oregon Myrtle .....	24

Vaccinium ovatum, Evergreen Huckleberry,	Viburnum davidii, Davidi Viburnum .....	18
Box Blueberry .....		15
Viburnum burkwoodii	Viburnum plicatum 'tomentosum' .....	20 (G)
Burkwood Viburnum .....	Vinca minor .....	18 15 (G)
Viburnum carlesi .....	Yucca filamentosa	15(G)
	Adam's Needle Yucca .....	15

