

# **APPENDIX**

## **LANDSCAPING STANDARDS**

UPDATED MARCH 16, 2010

### **CITY OF FRUITA LANDSCAPING SPECIFICATIONS**

DEVELOPED AND COMPILED BY THE CITY OF FRUITA COMMUNITY DEVELOPMENT DEPARTMENT USING THE TRI RIVER AREA COLORADO STATE UNIVERSITY EXTENSION OFFICE PUBLICATIONS ON RECOMMENDED PLANT SPECIES.

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**THE CITY OF FRUITA IS LOCATED IN USDA HARDINESS ZONE: 6-7**

**LANDSCAPE PLANTS SUITABLE FOR THE  
CITY OF FRUITA**

*Compiled using the CSU Extension Office recommended landscape and planting publications*

**PLANT TYPE:**

*GC=Ground Cover; ET= Evergreen Tree; OG= Ornamental Grass; P=Perennial; S=Shrub; T= Tree; V=Vine*

**PLANT SIZE:**

*S=Small; M=Medium; L=Large*

**If the Xeriscape cell is selected, plant/tree/shrub is considered suitable for a Xeriscaping landscape.**

**Tree size at time of planting not to exceed 3" caliper. (Trunk measured at 6" above finished grade)**

**Staking and Guying of trees shall be completed immediately upon planting and stay for 1-2 years.**

<b>TREES</b>					
<b>BOTANICAL NAME</b>	<b>COMMON NAME</b>	<b>MIN. SIZE REQUIRED</b>	<b>PLANT TYPE</b>	<b>PLANT SIZE</b>	<b>XERISCAPE</b>
Acer campestre	Maple, Hedge	1" Caliper	T	S	
Acer freemanii 'Jeffersred'	Maple, Autumn Blaze	1" Caliper	T	L	
Acer ginnala	Maple, Amur	1" Caliper	T	S	

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Acer platanoides	Maple, Norway	1" Caliper	T	L	
Acer platanoides 'Emerald Queen'	Maple, Emerald Queen	1" Caliper	T	L	
Acer tataricum	Maple, Tatarian	1" Caliper	T	S	
Betula nigra	Birch, River	1" Caliper	T	L	
Catalpa speciosa	Catalpa, Western	1" Caliper	T	L	✓
Celtis occidentalis	Hackberry, Western	1" Caliper	T	L	✓
Cercis canadensis	Redbud, Eastern	1" Caliper	T	S	
Crataegus crus-galli inermis	Hawthorn, Thornless Cockspur	1" Caliper	T	S	
Crataegus laevigata 'Paul's Scarlet'	Hawthorn, Paul's Scarlet	1" Caliper	T	S	
Crataegus phaenopyrum	Hawthorn, Washington	1" Caliper	T	S	
Crataegus viridis	Hawthorn, Winter King	1" Caliper	T	M	
Corylus colurna	Filbert, Turkish	1" Caliper	T	L	
Fraxinus americana 'Autumn Purple'	Ash, Autumn Purple	1" Caliper	T	L	
Fraxinus pennsylvanica	Ash, Green	1" Caliper	T	L	✓
Fraxinus pennsylvanica 'Marshall'	Ash, Marshall's seedless	1" Caliper	T	L	✓
Ginkgo biloba	Maidenhair Tree	1" Caliper	T	L	
Gleditsia triacanthos inermis	Honeylocust, Thornless	1" Caliper	T	L	✓
Gymnocladus dioica	Kentucky Coffeetree	1" Caliper	T	L	✓

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Juniperus scopulorum	Juniper, Rocky Mountain	1" Caliper	ET	M	✓
Koelreuteria paniculata	Golden Rain Tree	1" Caliper	T	S	✓
Liriodendron tulipifera	Tulip Tree	1" Caliper	T	L	
Malus spp.	Crabapple (Spring Snow, Adams, Radiant)	1" Caliper	T	S	
Morus alba 'Pendula'	Mulberry, Weeping	1" Caliper	T	S	
Morus alba 'Stribling'	Mulberry, Fruitless	1" Caliper	T	L	
Picea glauca 'Conica'	Spruce, Dwarf Alberta	1" Caliper	ET	M	
Picea pungens	Spruce, Colorado	1" Caliper	ET	L	
Pinus aristata	Pine, Bristlecone	1" Caliper	ET	S	✓
Pinus cembroides edulis	Pine, Pinyon	1" Caliper	ET	M	✓
Pinus nigra	Pine, Austrian	1" Caliper	ET	L	
Pinus strobiformis	Pine, Southwestern White	1" Caliper	ET	L	
Pinus sylvestris	Pine, Scotch	1" Caliper	ET	L	
Platanus acerifolia	Planetree, London	1" Caliper	T	L	
Populus angustifolia	Cottonwood, Narrowleaf	1" Caliper	T	L	
Populus fremontii	Cottonwood, Fremont	1" Caliper	T	L	
Prunus cerasifera	Plum, Cherry	1" Caliper	T	S	
Prunus cerasifera 'Newport'	Plum, Newport Purple-Leaf	1" Caliper	T	S	
Prunus cerasifera 'Thundercloud'	Plum, Thundercloud Purple-Leaf	1" Caliper	T	S	
Prunus cerasifera 'Mt. St. Helens'	Plum, Mt. St. Helens Cherry	1" Caliper	T	S	
Prunus maackii	Chokecherry, Amur	1" Caliper	T	S	

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Prunus virginiana	Chokecherry	1" Caliper	T	M	
Pseudotsuga menziesii	Fir, Douglas	1" Caliper	ET	L	
Pyrus calleryana	Pear, Ornamental (Aristocrat, Autumn Blaze, Redspire, Bradford)	1" Caliper	T	S	
Quercus bicolor	Oak, Swamp White	1" Caliper	T	L	
Quercus macrocarpa	Oak, Bur	1" Caliper	T	L	✓
Quercus shumardii	Oak, Shumard	1" Caliper	T	L	
Robinia ambigua 'Idahoensis'	Locust, Idaho	1" Caliper	T	M	
Sophora japonica	Japanese Pagoda Tree	1" Caliper	T	L	
Thuja occidentalis	Arborvitae, American	1" Caliper	ET	M	
Tilia americana	Linden, American	1" Caliper	T	L	
Ulmus parvifolia	Elm, Lacebark	1" Caliper	T	L	

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BOTANICAL NAME	COMMON NAME	MIN. SIZE REQUIRED	PLANT TYPE	PLANT SIZE	XERISCAPE
Achillea hybrids	Yarrow	#1	P	S	✓
Agastache cana	Hyssop, Wild	#1	P	S	✓
Agastache rupestris	Hyssop, Sunset	#1	P	S	✓
Alcea rosea	Hollyhock	#1	P	M	✓
Alyssum saxatile 'Compactum'	Basket of Gold	#1	P	S	
Andropogon gerardii	Big bluestem	#1	OG	L	✓
Aegopodium podagraria 'variegatum'	Variegated Bishop's weed	#1	GC	M	✓
Amelanchier alnifolia	Serviceberry	#5	S	L	
Aquilegia hybrids	Columbine	#1	P	S	✓
Arctostophylos x coloradensis	Manzanita, Colorado	#5	S/GC	S	
Artemisia filifolia	Sage, Sand	#5	S	S	✓
Artemisia 'Powis Castle'	Sage, Silver	#1	P	S	
Artemisia schmidtiana	Sage, Silver Mound	#1	GC	S	✓
Artemisia tridentata	Sage, Basin	#5	S	M	✓
Aster spp.	Aster	#1	P	S-M	
Berberis thunbergii 'Crimson Pygmy'	Barberry, Crimson Pygmy	#5	S	S	✓
Berberis thunbergii 'Rosy Glow'	Barbery, Rosy Glow	#5	S	M	✓
Buddleia davidii	Butterfly bush	#5	S	M	
Buxus microphylla 'Wintergreen'	Boxwood, Wintergreen	#5	S	S	
Calamagrostis x acutiflora 'Karl Foerster'	Reed Grass, Karl Foerster	#5	OG	M	
Calamagrostis x acutiflora	Reed Grass, Overdam	#5	OG	M	

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'Overdam'	Feather				
Callirhoe involucrata	Poppy Mallow	#1	P	S	
Campanula persicifolia	Bellflower, Peachleaf	#1	P	S	
Campsis radicans	Trumpet Vine	#5	V	L	
Caragana arborescens	Siberian Peashrub	#5	S	L	
Carex buchananii	Japanese Red Sedge	#1	OG	S	
Caryopteris incana	Spirea, Bluemist	#5	S	S	
Centaurea montana	Bachelor Button	#1	GC	S	✓
Cerastium tomentosum	Snow-in-Summer	#1	GC	S	✓
Chaenomeles speciosa	Flowering quince	#5	S	M	
Chrysothamnus nauseosus	Rabbitbrush	#5	S	M	✓
Coreopsis grandiflora 'Sunray'	Coreopsis, Sunray	#1	P	S	✓
Coreopsis verticillata 'Moonbeam'	Coreopsis, Moonbeam	#1	P	S	✓
Cornus sericea	Dogwood, Redtwig	#5	S	L	
Cornus sericea 'Kelseyi'	Dogwood, Kelsey Redtwig	#5	S	S	
Cortaderia selloana 'Pumila'	Dwarf Pampas grass	#1	OG	M	
Cotinus coggygria 'Purple Robe'	Smoketree, Purple	#5	S	L	
Cotoneaster apiculatus	Cotoneaster, Cranberry	#5	S	S	

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Cotoneaster horizontalis	Cotoneaster, Rock	#5	S	M	✓
Cotoneaster acutifolia	Cotoneaster, Peking	#5	S	L	✓
Dalea purpurea	Purple Prairie Clover	#1	P	S	
Delphinium elatum 'Magic Mountain Mix'	Delphinium, Dwarf	#1	P	S	
Delosperma nubigenum	Iceplant, Hardy Yellow	#1	GC	S	✓
Dianthus 'Brilliantcy'	Dianthus, Pinks	#1	P	S	
Dianthus barbatus	Sweet William, mixed	#1	P	S	
Echinacea purpurea	Coneflower, Purple	#1	P	S	✓
Erianthus ravennae	Pampas Grass	#5	OG	L	
Erigeron hybrids	Daisy, Fleabane	#1	P	S	✓
Euonymus alatus	Burning bush	#5	S	L	
Euonymus alatus 'Compacta'	Dwarf Burning bush	#5	S	M	
Euonymus fortunei 'Emerald Gaiety'	Euonymus, Emerald Gaiety	#5	S	M	
Euonymus fortunei 'Emerald'n Gold'	Euonymus, Emerald'n Gold	#5	S	M	
Euonymus fortunei 'Moonshadow'	Euonymus, Moonshadow	#5	S/GC	S	
Euonymus kiautschovicus 'Manhattan'	Euonymus, Manhattan	#5	S	M-L	

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Euphorbia marginata	Snow-on-the-mountain	#1	GC	M	✓
Fallugia paradoxa	Apache Plume	#5	S	M	✓
Festuca ovina glauca	Fescue, Blue	#1	OG/GC	S	✓
Festuca idahoensis	Fescue, Idaho		OG	S	✓
Forestiera neomexicana	Privet, New Mexican	#5	S	L	✓
Forsythia spp.	Forsythia	#5	S	L	
Gaillardia x grandiflora 'Dazzler'	Dazzler Blanketflower	#1	P	S	✓
Gaillardia x grandiflora 'Goblin'	Goblin flower	#1	P	S	✓
Gaura lindheimeri	Whirling butterflies	#1	P	S	✓
Geranium sanguineum	Bloody Cranesbill	#1	P	S	
Geum hybrids	Geum	#1	P	S	
Helianthemum nummularium	Yellow sunrose	#1	P	S	✓
Helictotrichon sempervirens	Blue oat grass	#1	OG	S	✓
Heliopsis helianthoides 'Summer Sun'	False sunflower	#1	P	M	
Hemerocallis spp.	Daylily	#1	P	S	✓
Heuchera sanguinea	Coral bells	#1	P	S	
Hibiscus syriacus	Rose-of-Sharon	#5	S	L	

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Holodiscus dumosus	Rock Spirea	#5	S	M	✓
Hydrangea arborescens 'Annabelle'	Hydrangea, Annabelle	#5	S	S	
Iberis sempervirens	Candytuft	#1	P	S	✓
Imperata cylindrica 'Rubra'	Japanese Blood Grass	#1	OG	S	
Iris hybrids	Bearded Iris	#1	P	S	✓
Juniperus 'Blue Star'	Juniper, Blue Star	#5	S	S	
Juniperus 'Calgary Carpet'	Juniper, Calgary Carpet	#1	GC	M	✓
Juniperus chinensis 'Armstrong'	Juniper, Armstrong	#5	S	M	✓
Juniperus chinensis 'Blue Point'	Juniper, Upright	#5	S	M	
Juniperus chinensis 'Old Gold'	Juniper, Old Gold	#5	S	M	✓
Juniperus 'Hetzii'	Juniper, Hetzi	#5	S	L	✓
Juniperus horizontalis 'Blue Chip'	Juniper, Blue Chip	#1	GC	M	✓
Juniperus horizontalis 'Hughes'	Juniper, Hughes	#1	GC	M	✓
Juniperus horizontalis 'Prince of Wales'	Juniper, Prince of Wales	#1	GC	M	✓
Juniperus scopularum 'Gray'	Juniper, Gray Gleam	#5	S	L	✓

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Gleam'					
Kniphofia uvaria	Red Hot Poker	#1	P	S	✓
Lavandula angustifolia	Lavender	#1	P	S	✓
Leucanthemum x superbum	Daisy, Shasta	#1	P	S	
Liatrus spicata 'Kobold'	Blazing star	#1	P	S	✓
Ligustrum x vicaryi	Privet, Golden Vicary	#5	S	M	
Lilium asiatica	Lily, Asiatic	#1	P	S	
Lilium orientalis	Lily, Oriental	#1	P	S	
Lonicera japonica 'Halliana'	Hall's Japanese Honeysuckle	#1	V/GC	L	✓
Mahonia aquifolium	Oregon Grapeholly	#5	S	M	
Mirabilis multiflora	Desert Four O'Clock	#1	P	S	✓
Miscanthus sinensis 'Gracillimus'	Maiden Grass	#5	OG	L	
Miscanthus sinensis 'Silberfeder'	Variegated silver Maiden Grass	#5	OG	L	
Miscanthus sinensis 'Zebrinus'	Zebra grass	#5	OG	L	
Oenothera speciosa	Primrose, Mexican Evening	#1	P	S	✓
Paeonia hybrids	Peonies	#1	P	S	
Panicum virgatum	Switch grass	#1	OG	L	

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Papaver orientale	Poppy, Oriental	#1	P	S	
Parthenocissus quinquefolia	Virginia Creeper	#1	V	L	
Parthenocissus tricuspidata	Boston Ivy	#1	V	L	
Pennisetum alopecuroides	Fountain grass	#5	OG	M	
Pennisetum alopecuroides 'Hamelin'	Dwarf Fountain grass	#5	OG	S	
Penstemon caespitosus	Penstemon, Mat	#1	GC	S	✓
Penstemon strictus	Penstemon, Rocky Mountain	#1	P	S	
Perovskia atriplicifolia	Russian Sage	#5	S	M	
Phalaris arundinacea 'Picta'	Ribbon grass	#1	OG	M	
Philadelphus x virginalis	Mockorange	#5	S	L	
Phlox subulata	Phlox, Creeping	#1	GC	S	✓
Physocarpus opulifolius	Common ninebark	#5	S	L	
Picea glauca 'Conica'	Spruce, Dwarf Alberta	#5	S	M	
Pinus mugo	Pine, Mugo	#5	S	S-L	
Pinus mugo 'Slowmound'	Pine, Dwarf Mugo	#5	S	S	
Platycodon grandiflora	Balloonflower	#1	P	S	
Polygonum aubertii	Silver Lace Vine	#1	V	M	
Potentilla fruticosa	Cinquefoil	#5	S	S	✓
Potentilla verna	Creeping potentilla	#1	GC	S	✓

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Prunus x cistena	Plum, Cistena	#5	S	M	
Prunus tomentosa	Cherry, Nanking (Manchu)	#5	S	L	
Prunus virginiana	Chokecherry	#5	S	L	
Prunus virginiana 'Shubert'	Chokecherry, Shubert	#5	S	L	
Rhamnus frangula 'Columnaris'	Columnar buckthorn	#5	S	L	
Rhus trilobata	Sumac, Three-leaf	#5	S	M	✓
Rhus aromatica 'Grow-low'	Sumac, Grow Low	#5	S	S	
Ribes alpinum	Currant, Alpine	#5	S	S	
Ribes aureum	Currant, Golden	#5	S	M	
Rosa spp. (Climbing)	Climbing roses	#5	S	M-L	
Rosa spp. 'Meidiland or other'	Shrub roses	#5	S	S-L	
Rosa hybrid (Florabunda)	Florabunda roses	#5	S	M	
Rosa hybrid (Hybrid-Tea)	Hybrid-Tea roses	#5	S	M	
Rudbeckia fulgida	Black-eyed Susan	#1	P	S	✓
Salix purpurea nana	Willow, Dwarf arctic	#5	S	M	
Salvia nemorosa 'May Night'	Salvia, May Night	#1	P	S	
Sambucus canadensis 'Aurea'	Elderberry, Golden	#5	S	L	
Santolina	Gray Santolina	#1	GC	S	✓

# LANDSCAPE PLANTS SUITABLE FOR THE CITY OF FRUITA

*Compiled using the CSU Extension Office recommended landscape and planting publications*

**PLANT TYPE:**

*GC=Ground Cover; ET= Evergreen Tree; OG= Ornamental Grass; P=Perennial; S=Shrub; T= Tree; V=Vine*

**PLANT SIZE:**

*S=Small; M=Medium; L=Large*

*#5=5 Gallon, #1=1 Gallon*

**In some instances, perennials and ornamental grasses may be substituted in place of a shrub.**

**Perennials listed below are recommendations.**

**If the Xeriscape cell is selected, plant/tree/shrub is considered suitable for a Xeriscaping landscape.**

<b>SHRUBS, GROUNDCOVER, GRASSES, PERENNIALS &amp; VINES</b>					
<b>BOTANICAL NAME</b>	<b>COMMON NAME</b>	<b>MIN. SIZE REQUIRED</b>	<b>PLANT TYPE</b>	<b>PLANT SIZE</b>	<b>XERISCAPE</b>
chamaecyparissus					
Scabiosa caucasica	Pincushion flower	#1	P	S	
Schizachyrium scoparium	Little bluestem	#1	OG	M	✓
Sedum 'Autumn Joy'	Steoncrop	#1	P	S	✓
Sedum 'Dragon's Blood'	Stonecrop, Dragon's Blood	#1	GC	S	✓
Sedum pinifolium	Blue Spruce Sedum	#1	GC	S	✓
Sorbaria sorbifolia	Spirea, Ash-leaf	#5	S	L	
Spiraea x bumalda 'Anthony Waterer'	Spirea, Anthony Waterer	#5	S	S	
Spiraea x bumalda 'Froebelii'	Spirea, Froebel	#5	S	S	
Spiraea x bumalda 'Goldflame'	Spirea, Goldflame	#5	S	S	
Spiraea x vanhouttei	Spirea, Vanhoutte	#5	S	M	
Symphoricarpos albus	Snowberry	#5	S	M	
Symphoricarpos x chenaultii 'Hancock'	Hancock Coralberry	#5	S	S	
Syringa patula 'Miss Kim'	Lilac, Miss Kim	#5	S	M	
Syringa vulgaris	Lilac	#5	S	L	
Tanacetum niveum	Daisy, Snow	#1	P	S	
Tanacetum x coccineum	Daisy, Painted	#1	P	S	
Thuja occidentalis	Arborvitae, American	#5	S	L	

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*Compiled using the CSU Extension Office recommended landscape and planting publications*

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<b>SHRUBS, GROUNDCOVER, GRASSES, PERENNIALS &amp; VINES</b>					
<b>BOTANICAL NAME</b>	<b>COMMON NAME</b>	<b>MIN. SIZE REQUIRED</b>	<b>PLANT TYPE</b>	<b>PLANT SIZE</b>	<b>XERISCAPE</b>
Thymus pseudolanuginosa	Thyme, Woolly	#1	GC	S	✓
Thymus Serpyllum	Thyme, Wild	#1	GC	S	✓
Veronica pectinata	Speedwell, Blue Woolly	#1	GC	S	✓
Veronica prostrata	Speedwell, Prostrate	#1	GC	S	✓
Veronica spicata	Blue Spike Speedwell	#1	P	S	
Viburnum opulus	Cranberry bush, European (Snowball bush)	#5	S	L	
Viburnum opulus 'Compactum'	Cranberry bush, Compact European (Snowball bush)	#5	S	M	
Viburnum trilobum 'Compactum'	Cranberry bush, Compact American	#5	S	M	
Vinca minor	Periwinkle		GC	S	✓
Weigela florida 'Java Red'	Weigela, Java Red	#5	S	M	
Weigela florida 'Variegata'	Weigela, Variegated	#5	S	M	
Yucca baccata	Yucca, Banana	#5	S	M	✓
Yucca filamentosa 'Golden Sword'	Yucca, Golden Sword	#5	S	S	✓
Yucca harrimaniae	Yucca, Harriman's	#5	S	S	✓
Zinnia grandiflora	Zinnia, Rocky Mountain	#1	P	S	✓

## **Choosing a Soil Amendment**

**no. 7.235**

by J.G. Davis and C.R. Wilson<sup>1</sup>(5/05)

### **Quick Facts...**

- Soil amendments improve the physical properties of soils.
- Amendments are mixed into the soil. Mulches are placed on the soil surface.
- The best soil amendments increase water- and nutrient-holding capacity and improve aeration and water infiltration.
- Wood products can tie up nitrogen in the soil.
- Sphagnum peat is superior to Colorado mountain peat.
- When using biosolids, choose Grade 1 biosolids.

A soil amendment is any material added to a soil to improve its physical properties, such as water retention, permeability, water infiltration, drainage, aeration and structure. The goal is to provide a better environment for roots.

To do its work, an amendment must be thoroughly mixed into the soil. If it is merely buried, its effectiveness is reduced, and it will interfere with water and air movement and root growth.

Amending a soil is not the same thing as mulching, although many mulches also are used as amendments. A mulch is left on the soil surface. Its purpose is to reduce evaporation and runoff, inhibit weed growth, and create an attractive appearance. Mulches also moderate soil temperature, helping to warm soils in the spring and cool them in the summer. Mulches may be incorporated into the soil as amendments after they have decomposed to the point that they no longer serve their purpose.

### **Organic vs. Inorganic Amendments**

There are two broad categories of soil amendments: organic and inorganic. Organic amendments come from something that is or was alive. Inorganic amendments, on the other hand, are either mined or man-made. Organic amendments include sphagnum peat, wood chips, grass clippings, straw, compost, manure, biosolids, sawdust and

wood ash. Inorganic amendments include vermiculite, perlite, tire chunks, pea gravel and sand.

Not all of the above are recommended by Colorado State University. These are merely examples. Wood ash, an organic amendment, is high in both pH and salt. It can magnify common Colorado soil problems and should not be used as a soil amendment. Don't add sand to clay soil -- this creates a soil structure similar to concrete.

Organic amendments increase soil organic matter content and offer many benefits. Organic matter improves soil aeration, water infiltration, and both water- and nutrient-holding capacity. Many organic amendments contain plant nutrients and act as organic fertilizers. Organic matter also is an important energy source for bacteria, fungi and earthworms that live in the soil.

### **Application Rates**

If your soil has less than 3 percent organic matter, then apply 3 cubic yards of your chosen organic amendment per 1,000 square feet. To avoid salt buildup, do not apply more than this. Retest your soil before deciding whether to add more soil amendment.

### **Wood Products**

Wood products can tie up nitrogen in the soil and cause nitrogen deficiency in plants. Microorganisms in the soil use nitrogen to break down the wood. Within a few months, the nitrogen is released and again becomes available to plants. This hazard is greatest with sawdust, because it has a greater surface area than wood chips.

If you plan to apply wood chips or sawdust, you may need to apply nitrogen fertilizer at the same time to avoid nitrogen deficiency.

### **Sphagnum Peat vs. Mountain Peat**

Sphagnum peat is an excellent soil amendment, especially for sandy soils, which will retain more water after sphagnum peat application. Sphagnum peat is generally acid (i.e., low pH) and can help Gardeners grow plants that require a more acidic soil. Colorado mountain peat is not as good a soil amendment. It often is too fine in texture and generally has a higher pH.

Mountain peat is mined from high-altitude wetlands that will take hundreds of years to rejuvenate, if ever. This mining is extremely disruptive to hydrologic cycles and mountain ecosystems. Sphagnum peat is harvested from bogs in Canada and the northern United States. The bogs can be revegetated after harvest and grow back relatively quickly in this moist environment.

### **Are Biosolids Safe?**

Biosolids are byproducts of sewage treatment. They may be found alone or composted with leaves or other organic materials. The primary concerns about biosolids are heavy metal content, pathogen levels and salts. To avoid excessive levels of heavy metals and to ensure that pathogens have been killed, always choose a Grade 1 biosolid. While Grade 1 biosolids are acceptable for food Gardens, do not use them on root Crops because they will come in direct contact with the edible portion of the plant. Do not use biosolids below Grade 1.

### **Manure vs. Compost**

Fresh manure can harm plants due to elevated ammonia levels. To avoid this problem, use only aged manure (at least six months old). Pathogens are another potential problem with fresh manure, especially on vegetable Gardens. Compost manure for at least two heating cycles at 130 to 140 degrees F to kill any pathogens before applying the manure to vegetable Gardens. **Most home composting systems do not sustain temperatures at this level.** Home-composted products containing manure are best used in flower Gardens, shrub borders and other nonfood Gardens. See fact sheets [9.369, Preventing E. coli From Garden to Plate](#), and [7.212, Composting Yard Waste](#).

During composting, ammonia gas is lost from the manure. Therefore, nitrogen levels may be lower in composted manure than in raw manure. On the other hand, the phosphorus and potassium concentrations will be higher in composted manure. Modify fertilizer practices accordingly. Salt levels also will be higher in composted manure than in raw manure. If salt levels are already high in your Garden soil, do not apply manures.

Other composts are available that are made primarily from leaf or wood products alone or in combination with manures or biosolids.

### **Factors to Consider When Choosing an Amendment**

There are at least four factors to consider in selecting a soil amendment:

- how long the amendment will last in the soil,
- soil texture,
- soil salinity and plant sensitivities to salts, and

- salt content and pH of the amendment.

Laboratory tests can determine the salt content, pH and organic matter of organic amendments. The quality of bulk organic amendments for large-scale landscape uses can then be determined.

### Longevity of the Amendment

The amendment you choose depends on your goals.

- Are you trying to improve soil physical properties quickly? Choose an amendment that decomposes rapidly.
- Do you want a long-lasting improvement to your soil? Choose an amendment that decomposes slowly.
- Do you want a quick improvement that lasts a long time? Choose a combination of amendments.

<b>Amendment</b>	<b>Decomposition rate</b>
Grass clippings, manures	Rapid decomposition (days to weeks)
Composts	Moderate decomposition (about six months)
Wood chips (redwood, cedar), hardwood bark, peat	Slow decomposition (possibly years)

### Soil Texture

Soil texture, or the way a soil feels, reflects the size of the soil particles. Sandy soils have large soil particles and feel gritty. Clay soils have small soil particles and feel sticky. Both sandy soils and clay soils are a challenge for Gardeners. Loam soils have the ideal mixture of different size soil particles.

When amending sandy soils, the goal is to increase the soil's ability to hold moisture and store nutrients. To achieve this, use organic amendments that are well decomposed, like composts or aged manures.

With clay soils, the goal is to improve soil aggregation, increase porosity and permeability, and improve aeration and drainage. Fibrous amendments like peat, wood chips, tree bark or straw are most effective in this situation.

Use Tables 2 and 3 for more specific recommendations. Because sandy soils have low water retention, choose an amendment with high water retention, like peat, compost or vermiculite. Clay soils have low permeability, so choose an amendment with high permeability, like wood chips, hardwood bark or perlite. Vermiculite is not a good choice for clay soils because of its high water retention.

<b>Soil Texture</b>	<b>Permeability</b>	<b>Water Retention</b>
Sand	high	low
Loam	medium	medium
Silt	low	high
Clay	low	high

<b>Amendment</b>	<b>Permeability</b>	<b>Water Retention</b>
<b>Fibrous</b> Peat Wood chips Hardwood bark	low-medium high high	very high low-medium low-medium
<b>Humus</b> Compost Aged manure	low-medium low-medium	medium-high medium
<b>Inorganic</b> Vermiculite Perlite	high high	high low

### **Soil Salinity and Plant Sensitivity to Salts**

Some forms of compost and manures can be high in salts. Avoid these amendments in soils that are already high in salts (above 3 mmhos/cm) or when growing plants that are sensitive to salts. Raspberry, strawberry, bean, carrot, onion, Kentucky bluegrass, maple, pine, viburnum and many other landscape plants are salt sensitive. In such cases, choose sphagnum peat or ground leaves instead of compost or manures.

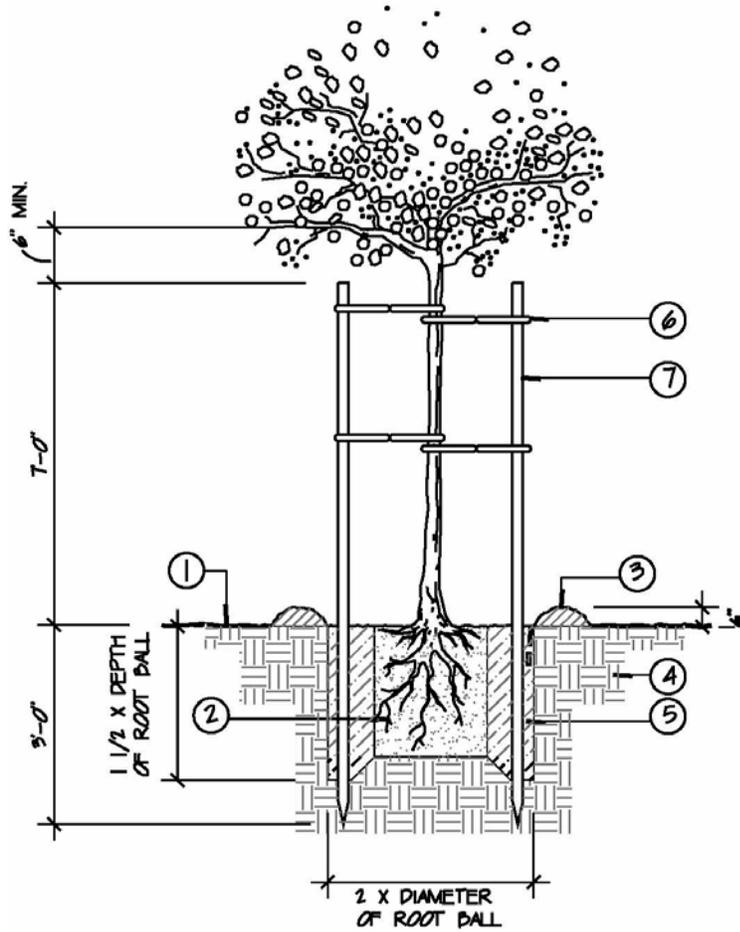
### **Salt Content and pH of the Amendment**

Always beware of salts in soil amendments. High salt content and high pH are common problems in Colorado soils. Therefore, avoid amendments that are high in salts or that have a high pH. Amendments high in salts and/or pH include wood ash, Colorado mountain peat and composted manures. An amendment with up to 10 mmhos/cm total salts is acceptable if well mixed into low-salt soils (less than 1 mmhos/cm). Amendments with a salt content greater than 10 mmhos/cm are questionable. Choose a low-salt amendment for soils testing high in salts.

Sphagnum peat and compost made from purely plant sources are low in salts and are good choices for amending Colorado soils. Ask for an analysis of the organic amendments that you are considering, and choose your amendments wisely. If no analysis is available, test a small amount of the amendment before purchasing a large quantity.

<sup>1</sup>J.G. Davis, Colorado State University Extension soil specialist and associate professor, soil and crop sciences; and C.R. Wilson, Extension horticulture agent, Denver County. 6/00. Reviewed 5/05.

## **EXAMPLE OF TYPICAL STAKING/GUYING OF TREE** DETAIL



## KEY

- ① FINISH GRADE
- ② ROOTBALL
- ③ TEMPORARY 6" WATERING BASIN
- ④ NATIVE SOIL
- ⑤ BACKFILL MIX (PER PLANTING SPECIFICATIONS)
- ⑥ TREE TIES (MIN. 4 REQUIRED) SECURE TO POLE W/GALV. NAIL.
- ⑦ 2" DIA. TREATED LODGEPOLE PINE STAKE

### NOTE:

- STAKES SHALL NOT PIERCE ROOTBALL AND SHALL EXTEND INTO UNDISTURBED SOIL.
- PLACE PRE-MANU. TIES ACCORDING TO MANU. RECOMMENDATIONS.