



Fuel Modification Plant Selection Guidelines

Introduction

Selecting and locating plants for a Fuel Modification Landscape plan is best done by first focusing on the density and arrangement of plants in relation to structures as a primary consideration. Second, but no less important is choosing zone appropriate plant species based on plant characteristics such as moisture content, resin/pitch and the production of dead litter from leaves, bark, seed pods etc. Avoid creating fuel ladders both vertically and horizontally throughout all zones (see basic fire behavior section below).

The following guidelines are intended to simplify this approach through zone specific compositions up to the property boundary.

5' Ember resistant zone

- All efforts shall be made to eliminate any combustible materials including plants, organic mulches, patio furniture etc. This zone has been found to be the most important area to address during planning and future maintenance.

Zone 1 (30' from the edge of any qualifying structure)

- Zone 1 should be planted with the least density (limited use of large woody plants) and plant selections should consist of small herbaceous or succulent plants less than 2'-3' in height or regularly irrigated and mowed lawns.
- It is best not to use woody trees, shrubs, subshrubs, perennials or masses of un-mowed grasses over 12" tall within 10 feet of the structure; especially in front of windows, which are weak points in a structure.
- Occasional accents of woody plants can be used sparingly to soften hard edges of structures if the selections are widely spaced and zone appropriate.
- Consider locating hardscape features such as walkways, patios, driveways, sport courts etc. so they abut the structure itself. Potted plants can be used to soften walls if necessary.

Zone 2 (30'-100' from the edge of any qualifying structure)

- Zone 2 can be planted with a slightly higher density than Zone 1. However, care should be taken not to create any horizontal or vertical fuel ladders.
- Screen plantings can be used to hide unsightly views. Hedging can be used provided the species of plant is acceptable and maintenance is performed regularly to minimize any accumulated leaf/twig litter.
- Zone 2 is the ideal location to introduce larger shade trees, provided they are zone appropriate and the canopies are not continuous.
- Avoid planting woody plant species larger than 2' at maturity directly beneath any tree canopy.



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Zone 3 (100'-200' from the edge of any qualifying structure; may be necessary only if an “extra hazard” has been identified by fuel modification personnel)

- Although Zone 3 is often not landscaped on many projects, it may still be subject to hazard reduction requirements (brush clearance section 325.2.2 “extra hazard”). Do not denude the property. <http://www.readyforwildfire.org/>
- If Zone 3 is to be landscaped, avoid creating a landscape that is as dense and hazardous as the unmaintained vegetation.
- A good rule of thumb is to follow the same guidelines as Zones 1 and 2 with a slight increase in density.

Adjacent to Access Roads

- Maintain apparatus access roads with a 20' wide path that remains clear to the sky.
- Along roadsides, removal of cured annual grasses and weeds is required to be performed annually. Only well maintained and irrigated plants are allowed provided they do not hinder fire apparatus access.

Basic Fire Behavior – Fuel Ladders

Before selecting and locating plants on a Fuel Modification plan a basic understanding of wildland fire behavior is the key factor in properly arranging plants. Eliminating and avoiding the creation of fuel ladders should be the main focus. Understanding that anything planted in the landscape can become receptive fuel for wildfire and the way in which it is arranged and maintained will greatly influence the intensity of the fire. The following diagrams will aide in arranging appropriate plant compositions.

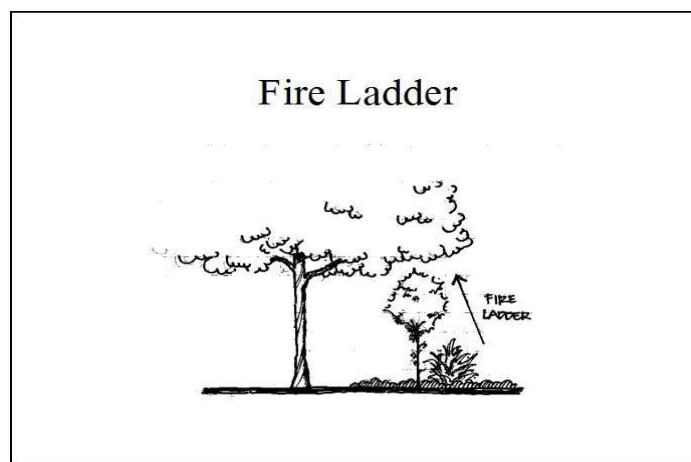


Figure 1: Fire Ladders or Fuel Ladders should be eliminated. The diagram above illustrates what not to do.



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Figure 2: The concept of fuel ladders is crucial to planning a Fire Wise landscape. No matter which plants are chosen, providing sufficient and defined separation between ground covers, shrubs and trees is the most crucial consideration in the design/plant-selection process. Do not use large shrubs or plants under tree canopies that may grow to a height greater than 2 feet at maturity. Pruning is not a long-term alternative to height appropriate plant selection.

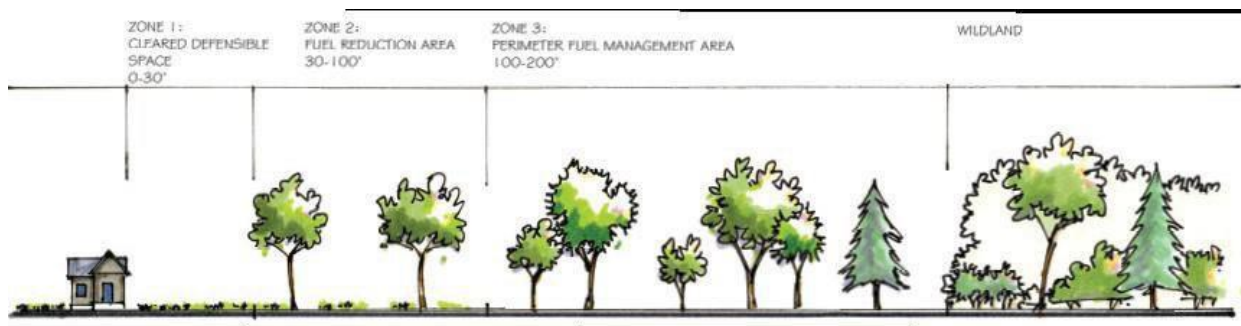


Figure 3: Note the progressive increase in density and arrangement moving away from the structure.



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Plant Placement Do's

- Do use “mass plantings” of herbaceous/succulents as ground covers even if they are not traditionally used as such. If properly selected, mass plantings can eliminate fuel ladders.
- Do plant using spacing resulting in complete coverage at maturity, rather than hastening coverage with increased density (the only exception is manufactured slopes where quicker coverage is necessary in which case species selection is critical).
- Do consider using patio trees/un-sheared shrubs with an open habit as an informal screen in Zone 1 (Example: Toyon).
- Do consider vines as an alternative to hedges on walls or fences 10' from structures and unattached to structures.
- Do select varieties of plants that are slower growing and reach manageable sizes at maturity.
- Do use plants appropriately scaled to the size of the property and structure. E.g. a single story house does not need to be shaded by a 100' tall Sweetgum.

Plant Placement Don'ts

- Don't plant hedges directly against structures; this includes espaliers of large shrubs. Hedges taller than 6' and within 10' of the structure are not allowed.
- Don't plant large shrubs and trees in large masses in Zones 1 or 2.
- Do not plant double hedge-rows.
- Don't plant at densities that result in an “instant landscape.”
- Don't plant large plant species which would require pruning to reduce overall size.
- Don't plant vines on structures. Vines become receptive fuel beds for embers (fire brands).
- Don't assume any plant is “fire proof.” All plants will burn and assuming a plant is ignition resistant can be very misleading.
- Don't use large woody species in mass plantings.

Acceptable Plant Selections for Fuel Modification

The plant list provided in the following pages is intended to be a representative sample of which types of plants are appropriate for each zone considering their size, moisture content, leaf litter production and chemical composition. This list is not a comprehensive list of plants available commercially.

Designers may choose plants that are not on this list if the plant's physical characteristics are zone appropriate. Selecting regionally appropriate plants, native species and the consideration of climate and microclimate adaptability is the responsibility of the designer.

Important note: This list is not a “pre-approved” list. Any plant listed as appropriate within the designated zone at a designated distance from a structure must still follow restrictions based on the density and arrangement principles stated above. Planting densities may be requested to be reduced, and plant selections may be asked to be removed when placed inappropriately.



Fuel Modification Plant Selection Guidelines

| Sample Fuel Modification Plant List | | | |
|---|-----------------------------|------|---------------------------------|
| Botanical Name | Common Name | Zone | Minimum distance from structure |
| Ground Cover | | | |
| Acacia redolens 'Desert Carpet'/'Low Boy' | Desert Carpet Acacia | 2 | 30 |
| Achillea tomentosa | Woolly Yarrow | 1 | |
| Ajuga reptans | Carpet Bugle | 1 | |
| Arctostaphylos (Prostrate Varieties) | Manzanita | 2 | |
| Artemisia californica (Cultivars) | Sagebrush - Prostrate Forms | 2 | 30 |
| Artemesia 'Powis Castle' | NCN | 2 | |
| Baccharis pilularis 'Pigeon Point'/'Twin Peaks' | Prostrate Coyote Brush | 2 | |
| Campanula poscharkyana | Serbian Bellflower | 1 | |
| Ceanothus gloriosus | Point Reyes Ceanothus | 2 | |
| Cerastium tomentosum | Snow-In-Summer | 1 | |
| Chamaemelum nobile | Chamomile | 1 | |
| Cistus salviifolius 'Prostratus' | Sageleaf Rockrose | 2 | |
| Coprosma kirkii | Mirror Plant | 2 | |
| Coreopsis auriculata 'Nana' | Tickseed | 1 | |
| Cotoneaster (Prostrate Varieties) | Cotoneaster | 2 | |
| Dalea greggii | Trailing Indigo Bush | 2 | |
| Delosperma alba | White Training Ice Plant | 1 | |
| Dichondra micrantha | Dichondra | 1 | |
| Drosanthemum floribundum | Rosea Ice Plant | 1 | |
| Duchesnea indica | Indian Mock Strawberry | 1 | |
| Dymondia margaretae | NCN | 1 | |
| Erigeron glaucus | Seaside Daisy | 1 | |
| E. karvinskianus | Santa Barbara Daisy | 2 | |
| Euonymus fortunei 'Colorata' | Purple-Leaf Winter Creeper | 2 | |
| Festuca cinerea(ovina'Glauca') | Blue Fescue | 1 | |
| F. rubra | Red Fescue | 1 | |
| Fragaria chiloensis | Wild Strawberry | 1 | |
| Gazania Hybrids | Trailing Gazania | 1 | |
| Geranium incanum/sanguineum | Cranesbill | 1 | |
| Glechoma hederacea | Ground Ivy | 1 | |
| Helianthemum nummularium | Sunrose | 1 | |
| Herniaria glabra | Green Carpet | 1 | |
| Heuchera species and Cultivars | Coral Bells | 1 | |
| Hypericum calycinum/coris | Aaron's Beard | 2 | |
| Iberis sempervirens | Evergreen Candytuft | 1 | |
| Iva hayesiana | Poverty Weed | 2 | 30 |
| Juniperus (Prostrate species/cultivars) | | 2 | |



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| | | | |
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| Cyrtomium falcatum | Holly Fern | 1 | |
| Davalia tricommanoides | Rabbits Foot Fern | 1 | |
| Epilobium canum | California Fuchia | 2 | |
| Helictotrichon sempervirens | Blue Oat Grass | 1 | 15 |
| Hemerocallis hybrids | Daylily | 1 | |
| Iris douglassiana | Coastal Iris | 1 | |
| Iris germanica | Bearded Iris | 1 | |
| Kalanchoe species | Kalanchoe | 1 | |
| Leymus condensatus 'Canyon Prince' | Canyon Prince Wild Rye | 1 | 20 |
| Lobelia laxiflora | | 1 | 15 |
| Pelargonium species | Geranium | 1 | |
| Penstemon species | Beard Tongue | 1 | |
| Plumeria | Plumeria | 1 | |
| Phlebodium aureum | Rabbits Foot Fern | 1 | |
| Tulbaghia violacea | Society Garlic | 1 | |
| Zephyranthes candida | Zephyr Lily | 1 | |
| | | | |
| Shrubs | | | |
| Abelia grandiflora (Prostrata) | Glossy Abelia | 1 | 10 |
| Abutilon hybridum | Flowering Maple | 1 | 10 |
| Acanthus mollis | Bear's Breech | 1 | |
| Agave species | Agave | 1 | |
| Aloe species | Aloe | 1 | |
| Alyogyne huegelii | Blue Hibiscus | 1 | 10 |
| Arbutus unedo (Dwarf Cultivars) | Dwarf Strawberry Tree | 1 | 10 |
| Arctostaphylos species | Manzanita | 2 | |
| Aucuba japonica | Japanese Aucuba | 1 | |
| Baccharis species | Various | 2 | |
| Berberis thunbergii | Japanese Barberry | 2 | |
| B. thunbergii ' prostrate cultivars' | | 1 | 10 |
| Bougainvillea sp. | Bougainvillea | 2 | |
| Buddleja davidii | Butterfly Bush | 2 | |
| Buxus microphylla japonica | Japanese Boxwood | 1 | 10 |
| Caesalpinia (Shrub Forms) | Bird of Paradise Bush | 1 | 10 |
| Camellia species | Camellia | 1 | 10 |
| Calliandra californica/erriophylla | Baja Fairy Duster | 2 | |
| Callistemon citrinus | Lemon Bottlebrush | 2 | |
| C. viminalis "Little John" | NCN | 1 | 10 |
| Calycanthus occidentalis | Western Spice Bush | 2 | |
| Carissa macrocarpa and Cultivars | Natal Plum | 1 | 10 |
| Carpenteria californica | Bush Anemone | 1 | 10 |
| Cassia artemisioides | Feathery Cassia | 1 | 30 |
| Ceanothus species | Wild Lilac | 2 | 30 |



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| <i>Cercocarpus betuloides</i> | Mountain Mahogany | 2 | 30 |
| <i>Choisya ternata</i> | Mexican orange | 2 | |
| <i>Cistus</i> species | Rockrose | 2 | |
| <i>Comarostaphylis diversifolia</i> | Summer Holly | 2 | |
| <i>Convolvulus cneorum</i> | Bush Morning Glory | 2 | |
| <i>Coprosma pumila/repens</i> | Mirror Plant | 2 | |
| <i>Cotoneaster</i> species & cultivars | Cotoneaster | 2 | |
| <i>Crassula</i> species | NCN | 1 | |
| <i>Cuphea hyssopifolia</i> | False Heather | 1 | 10 |
| <i>Cycas revoluta</i> | Sago Palm | 1 | |
| <i>Dasyliiron quadrangulatum/wheeleri</i> | Mexican Grass Tree | 1 | 10 |
| <i>Dendromecon harfordii</i> | Island Bush Poppy | 2 | |
| <i>Dietes bicolor/irioides</i> | Fortnight Lily | 1 | |
| <i>Dodonaea viscosa</i> (Purpurea) | Hopseed Bush | 2 | |
| <i>Elaeagnus pungens</i> & cultivars | Silverberry | 2 | |
| <i>Encelia californica</i> | Coast Sunflower | 2 | |
| <i>E. farinosa</i> | Brittle Bush | 2 | |
| <i>Erigonum giganteum</i> | St. Catherine's Lace | 2 | |
| <i>Escallonia</i> species | Escallonia | 1 | 10 |
| <i>Euonymus japonica</i> & cultivars | Evergreen Euonymus | 1 | 10 |
| <i>Euphorbia</i> species | | 1 | |
| <i>Euryops pectinatus</i> | NCN | 1 | |
| <i>Fatsia japonica</i> | Japanese Aralia | 1 | |
| <i>Fouquieria splendens</i> | Ocotillo | 1 | |
| <i>Fremontodendron</i> species & cultivars | Flannel Bush | 2 | |
| <i>Gardenia jasminoides</i> | Gardenia | 1 | |
| <i>Garrya elliptica</i> | Coast Silktassel | 2 | |
| <i>Grevillea</i> species & cultivars | Grevillea | 2 | |
| <i>Grewia occidentalis</i> | Lavender Starflower | 2 | |
| <i>Hakea suaveolens</i> | Sweet Hakea | 2 | |
| <i>Hebe</i> species & cultivars | Hebe | 1 | 10 |
| <i>Hesperaloe parviflora</i> | Red Yucca | 1 | |
| <i>Hibiscus rosa - sinensis</i> | Chinese Hibiscus | 1 | 10 |
| <i>Ilex</i> species | Holly | 2 | |
| <i>Juniperus</i> species | Juniper | 2 | |
| <i>Justicia brandegeana</i> | Shrimp Plant | 1 | 10 |
| <i>J. californica</i> | Chuparosa | 2 | |
| <i>Keckiella cordifolia</i> | Heart-Leaved Penstemon | 2 | |
| <i>Kniphofia uvaria</i> | Red-Hot Poker | 1 | |
| <i>Lantana Camara</i> & hybrids | Lantana | 1 | 10 |
| <i>Larrea tridentata</i> | Creosote Bush | 2 | |
| <i>Lavandula</i> species | Lavender | 1 | 10 |
| <i>Lavatera assurgentiflora/maritima</i> | California Tree Mallow | 2 | |



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| Leonotis leonrus | Lion's Tail | 2 | |
| Leptospermum scoparium & varities | New Zealand Tea Tree | 2 | |
| Leucophyllum species | | 2 | |
| Ligustrum japonicum | Wax-leaf Privet | 1 | 10 |
| Lupinus species | Lupine | 2 | |
| Mahonia aquifolium ('Compacta') | Oregon Grape | 1 | 10 |
| Gardenia jasminoides | Gardenia | 1 | |
| Garrya elliptica | Coast Silktassel | 2 | |
| Grevillea species & cultivars | Grevillea | 2 | |
| Grewia occidentalis | Lavender Starflower | 2 | |
| Hakea suaveolens | Sweet Hakea | 2 | |
| Hebe species & cultivars | Hebe | 1 | 10 |
| Hesperaloe parviflora | Red Yucca | 1 | |
| Hibiscus rosa - sinensis | Chinese Hibiscus | 1 | 10 |
| Ilex species | Holly | 2 | |
| Juniperus species | Juniper | 2 | |
| Justicia brandegeana | Shrimp Plant | 1 | 10 |
| J. californica | Chuparosa | 2 | |
| Keckiella cordifolia | Heart-Leaved Penstemon | 2 | |
| Kniphofia uvaria | Red-Hot Poker | 1 | |
| Lantana Camara & hybrids | Lantana | 1 | 10 |
| Larrea tridentata | Creosote Bush | 2 | |
| Lavandula species | Lavender | 1 | 10 |
| Lavatera assurgentiflora/maritima | California Tree Mallow | 2 | |
| Leonotis leonrus | Lion's Tail | 2 | |
| Leptospermum scoparium & varities | New Zealand Tea Tree | 2 | |
| Leucophyllum species | | 2 | |
| Ligustrum japonicum | Wax-leaf Privet | 1 | 10 |
| Lupinus species | Lupine | 2 | |
| Mahonia aquifolium ('Compacta') | Oregon Grape | 1 | 10 |
| M. fremontii | Desert Mahonia | 2 | |
| M. 'Golden Abundance' | NCN | 2 | |
| M. lomariifolia | Venetian Blind Mahonia | 1 | |
| Malosma - See Rhus | | | |
| Malva species | Mallow | 1 | 10 |
| Melaleuca nesophila | Pink Melaleuca | 1 | 10 |
| Mimulus species (Diplacus) | Monkey Flower | 1 | 10 |
| Myrica californica | Pacific Wax Myrtle | 2 | |
| Myrsine africana | African Boxwood | 1 | 10 |
| Myrtus communis 'Compacta' | Dwarf Myrtle | 1 | 10 |
| Nandina domestica (including dwarf varieties) | Heavenly Bamboo | 1 | |
| Nerium oleander | Oleander | 2 | |



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|------------------------------------|------------------------|----|----|
| Agonis flexuosa | Peppermint Tree | 2 | |
| Albizia julibrissin | Silk Tree | 2 | |
| Alnus rhombifolia | Alder | 2 | |
| Arbutus unedo ('Marina') | Strawberry Tree | 1 | 15 |
| Archontophoenix cunninghamiana | King Palm | 30 | |
| Bauhinia variegata | Purple Orchid Tree | 1 | |
| Betula pendula | European White Birch | 1 | 15 |
| Brachychiton acerifolius/populneus | Flame Tree/Bottle Tree | 2 | |
| Callistemon citrinus | Lemon Bottlebrush | 2 | |
| C. viminalis | Weeping Bottlebrush | 1 | 15 |
| Calocedrus decurrens | Incense Cedar | 2 | |
| Calodendrum capense | Cape Chestnut | 2 | |
| Cedrus deodara | Deodar Cedar | 2 | 40 |
| Ceratonia siliqua | Carob | 2 | 30 |
| Cercidium floridum/microphyllum | Blue Palo Verde | 1 | |
| Cercis occidentalis/canadensis | Western Redbud | 1 | 10 |
| Chilopsis linearis | Desert Willow | 1 | 15 |
| Chionanthus retusus | Chinese Fringe Tree | 1 | 10 |
| Chitalpa X tashkentensis | Chitalpa | 1 | 10 |
| Chorisia speciosa | Floss Silk Tree | 2 | |
| Cinnamomum camphora | Camphor Tree | 2 | 30 |
| Citrus species | Citrus | 1 | 10 |
| Cocculus laurifolius | Laurel Leaf Snail Seed | 2 | |
| Cordyline australis | Giant Dracaena | 1 | |
| Cyathea cooperi | Australian Tree Fern | 1 | |
| Dicksonia antarctica | Tazmanian Tree Fern | 1 | |
| Dracaena draco | Dragon Tree | 1 | |
| Eriobotrya deflexa/japonica | Bronze Loquat/Loquat | 1 | 10 |
| Erythrina species | Coral Tree | 2 | |
| Feijoa sellowiana | Pineapple Guava | 1 | 10 |
| Ficus species | Fig | 2 | 50 |
| Fraxinus species | Ash | 2 | 30 |
| Geijera parviflora | Australian Willow | 1 | 15 |
| Ginkgo biloba | Maidenhair Tree | 1 | 15 |
| Gleditsia triacanthos | Honey Locust | 1 | 15 |
| Grevillea robusta | Silk Oak | 2 | |
| Heteromeles arbutifolia | Toyon | 1 | 15 |
| Hymenosporum flavum | Sweetshade Tree | 1 | 15 |
| Jacaranda mimosifolia | Jacaranda | 2 | |
| Juglans californica | Black Walnut | 2 | |
| Koelreuteria bipinnata/paniculata | Chinese Flame Tree | 2 | |
| Lagerstroemia indica | Crape Myrtle | 1 | 10 |
| Laurus nobilis | Sweet Bay | 2 | |



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|--|----------------------------|---|----|
| <i>Leptospermum laevigatum</i> | Australian Tea Tree | 1 | 15 |
| <i>Liquidambar formosana</i> | Chinese Sweet Gum | 1 | 15 |
| <i>L. styraciflua</i> | American Sweet Gum | 2 | |
| <i>Liriodendron tulipifera</i> | Tulip Tree | 2 | |
| <i>Lithocarpus densiflorus</i> | Tanbark Oak | 2 | |
| <i>Lophstemon confertus</i> (Tristania) | Brisbane Box | 1 | 15 |
| <i>Lyonothamnus floribundus</i> | Catalina Ironwood | 1 | 15 |
| <i>Magnolia grandiflora</i> | Southern Magnolia | 2 | |
| <i>M. X soulangeana</i> | Saucer Magnolia | 1 | 10 |
| <i>Maytenus boaria</i> | Mayten Tree | 1 | 10 |
| <i>Melaleuca quinquenervia</i> | Cajeput Tree | 1 | 15 |
| <i>Metasequoia glypstroboides</i> | Dawn Redwood | 1 | 15 |
| <i>Metrosideros excelsus</i> | New Zealand Christmas Tree | 1 | 10 |
| <i>Morus alba</i> | White Mulberry | 2 | |
| <i>Olea europea</i> | Olive - Fruitless only | 1 | 15 |
| <i>Parkinsonia aculeata</i> | Jerusalem Thorn | 1 | 10 |
| <i>Pinus species</i> | Pine | 2 | 75 |
| <i>Pistacia chinensis</i> | Chinese Pistache | 2 | |
| <i>Pittosporum phillyraeoides</i> | Willow Pittosporum | 1 | 10 |
| <i>P. rhombifolium</i> | Queensland Pittosporum | 2 | |
| <i>Platanus racemosa</i> | California Sycamore | 2 | |
| <i>Podocarpus gracilior/macrophyllus</i> | Fern Pine/Yew Pine | 2 | |
| <i>Populus fremontii</i> | Fremont Cottonwood | 2 | 50 |
| <i>Prosopis chilensis</i> | Chilean Mesquite | 2 | |
| <i>P. glandulosa</i> | Honey Mesquite | 1 | 15 |
| <i>Prunus cerasifera 'Atropurpurea'</i> | Purple-leaf Plum | 1 | 10 |
| <i>Punica granatum</i> | Pomegranate | 2 | |
| <i>Pyrus calleryana/kawakamii</i> | Ornamental Pear | 1 | 15 |
| <i>Quercus species</i> | Oak | 2 | 30 |
| <i>Rhus lancea</i> | African Sumac | 2 | |
| <i>Robinia ambigua</i> | Locust | 2 | |
| <i>Sapium sebiferum</i> | Chinese Tallow Tree | 2 | |
| <i>Schefflera actinophylla</i> | Queensland Umbrella Tree | 1 | |
| <i>Sophora japonica</i> | Japanese Pagoda Tree | 2 | |
| <i>Stenocarpus sinuatus</i> | Firewheel Tree | 1 | 10 |
| <i>Tabebuia species</i> | Trumpet Tree | 1 | 15 |
| <i>Tipuana tipu</i> | Tipu Tree | 2 | |
| <i>Tupidanthus calyptratus</i> | Tupidanthus | 1 | |
| <i>Umbellularia californica</i> | California Bay | 2 | |
| <i>Zelkova serrata</i> | Sawleaf Zelkova | 2 | |