

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD  
TREE/SHRUB ESTABLISHMENT**

(Ac.)

**CODE 612**

**DEFINITION**

Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration.

**PURPOSE**

Establish woody plants for:  
forest products such as timber, pulpwood, etc.  
wildlife habitat  
long-term erosion control and improvement of water quality  
treating waste  
storing carbon in biomass  
reduce energy use  
develop renewable energy systems  
improving or restoring natural diversity  
enhancing aesthetics.

**CONDITIONS WHERE PRACTICE APPLIES**

Tree/shrub establishment can be applied on any appropriately prepared site where woody plants can be grown.

Utilize other practice standards for specialized tree/shrub establishment situations, e.g., Riparian Forest Buffer (391), Alley Cropping (311), Windbreak/Shelterbelt Establishment, (380); Critical Area Planting (342), Hedgerow Planting (422).

**CRITERIA**

**General Criteria Applicable to All Purposes**

Composition of species will be adapted to site conditions and suitable for the planned purpose(s).

No plants on the Federal or state noxious weeds list shall be planted.

Planting or seeding rates will be adequate to accomplish the planned purpose for the site.

Planting dates, and care in handling and planting of the seed, cuttings or seedlings will ensure that planted materials have an acceptable rate of survival.

Only viable, high-quality and adapted planting stock or seed will be used.

A precondition for tree/shrub establishment is appropriately prepared sites. Refer to practice standard Tree/Shrub Site Preparation (490).

Adequate seed sources or advanced reproduction needs to be present or provided for when using natural regeneration to establish a stand.

Selection of planting technique and timing will be appropriate for the site and soil conditions.

The acceptability and timing of coppice regeneration shall be based on species, age and diameter.

The planting will be protected from plant and animal pests and fire. Refer to standard Integrated Pest Management (595) to assist with site-specific strategies for pest prevention, pest avoidance, pest monitoring, and pest suppression.

Each site will be evaluated to determine if mulching, supplemental water or other cultural treatments (e.g., tree protection devices,

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

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shade cards, brush mats) will be needed to assure adequate survival and growth.

Use locally adapted seed, seedlings or cuttings. Priority will be given to plant materials that have been selected and tested in tree/shrub improvement programs. All plant materials will meet a minimum standard, such as the American Nursery and Landscape Association, Forest Service, or state-approved nursery.

Tree and shrub plantings will be designed so that they do not impact the safe operation of electric and gas line transmission corridors.

**Comply with applicable federal, state, and local laws and regulations during the installation, operation and maintenance of this practice.**

**Additional Criteria for Treating Waste**

Species used to treat waste shall have fast growth characteristics, extensive root systems, high nutrient uptake capacity and tolerance of the planned effluent.

**Additional Criteria for Improving or Restoring Natural Diversity**

Composition of species selected for planting or those favored for natural regeneration will be native to the site and create a successional stage or state that can progress to the potential natural plant community.

**Additional Criteria for Storing Carbon in Biomass**

The species and plant communities that attain biomass more quickly will sequester carbon faster. The rate of carbon sequestration is enhanced as trees and/or shrubs mature and soil organic matter increases. Select plants that have higher rates of growth and potential for carbon sequestration in biomass and are adapted to the site. Plant species at the appropriate stocking rate for the site.

When using trees and shrubs for greenhouse gas reductions, prediction of carbon sequestration rates shall be made using current approved carbon sequestration modeling technology.

**Additional Criteria for Developing Renewable Energy Systems**

Select plants that can provide adequate kinds and amounts of plant biomass to supply identified bioenergy needs.

Intensity and frequency of energy biomass removals will be managed to prevent long-term negative impacts on the system.

The harvesting of energy biomass shall be accomplished in a manner that will not compromise the other intended purpose(s) and functions.

**Additional Criteria to Reduce Energy Use**

Orient trees to shade a building to reduce summer energy usage. The first priority is placement on the building's west side where the greatest daily heat gain occurs. The second priority is the east side.

Select plants with a potential height growth that will be taller than the structure or facility being protected.

Use proper plant densities to optimize the shade produced and meet energy reduction needs.

Trees planted within 30 to 50 ft of the building generally provide effective shade to windows and walls depending on tree height potential.

Keep trees at least 10 ft or further from the structure depending on mature crown spread, to avoid damage to foundations or restrict maintenance access to windows and walls.

**CONSIDERATIONS**

Priority should be given to plant materials that have been selected and tested in tree/shrub improvement programs. All plant materials should comply with minimum standards such as those as established by the American Nursery and Landscape Association, Forest Service, or state-approved nursery.

Plans for landscape and beautification plantings should consider foliage color, season and color of flowering, and mature plant height.

Consider using diverse species combinations which best meet locally native wildlife and pollinator needs.

Consider the invasive potential when selecting plant species.

When selecting species, consideration should be given to aesthetic values for recreation areas and borders along through fares or any other public access sites or viewscapes.

Spacing for beatification, recreation and restoration plantings will vary depending on objectives, and site conditions.

Tree/shrub arrangement and spacing should allow for and anticipate the need for future access lanes for purposes of stand management.

Residual chemical carryover should be evaluated prior to planting and alter species selection and/or timing of planting/seeding.

When underplanting, trees should be planted sufficiently in advance of overstory removal to ensure full establishment.

Planting can be done either by machine or by hand. Machine planting will be limited by small areas, steep topography, windfalls, rock outcrop and heavy brush or slash accumulation. Hand planting is adaptable to all areas. Any equipment that can create a suitable planting cavity can be used, e.g., shovel, auger, planting bar.

#### Transmission Requirements

Clients must be asked to review their land rights documents to determine if there are transmission land rights for a specific parcel where the planting is to be accomplished.

##### a. Electric Transmission Guidelines

If there are no restrictive easements, plantings will not be accomplished within the following distances from the edge of the transmission line:

<u>Voltage</u>	<u>Distance</u>
70 kv or less	25 feet

Trees which will grow to more than 25 feet in height will not be planted under 70kv or less lines.

For trees which will grow to more than 25 feet in height, see below:

115 kv	35 feet
230 kv	50 feet
500 kv	60 feet

b. Underground gas line clearance If there are no restrictive easements, plantings will not be accomplished within 20 feet of the center line of the transmission line

The location for each planted seedling should take advantage of every moisture conserving and heat-protecting factor available, such as: shade provided from stumps, logs, surface rocks, clods, hummocks, etc.

Harsher sites (warmer, drier) may require additional actions to ensure adequate survival. These actions include the installation of shade cards and/or mulch.

Temporary or permanent irrigation may be necessary on some areas and for some species.

When irrigation is planned, have the systems in place prior to planting. To increase survival, irrigate after planting to aid in packing the soil around the seed or roots and assure enough water to begin growth.

Rooting hormones and fertilizers have not significantly improved success compared to the cost of the materials.

Potential mortality, weed competition, and pest populations may require additional seedings initially or replanting later.

Prescribed burning may be required for natural regeneration of serotinous cone species and for site preparation for other species

All sites and all plant species may be subject to unacceptable damages due to browsing, grazing, vandalism or other human impacts. Protection may be required to hold damages to an acceptable level. Planning will include preparing estimates of the occurrence of animal populations, which have the potential of causing damage. Sightings of gopher mounds, animal trails, beaver activity, frequency of scat, and evidence of browsing on native plants will yield data that can help determine the need for plant protection. In urban areas use of signs and/or barriers may be required to reduce damage to an acceptable level

#### **Seedling Selection:**

Use published seed zone maps. Use materials from the same seed zone in which the planting is to be done.

Tree stock can generally be 1-0, if it is over 8" and vigorous. However, the harsher the site the more important for 2-0, 2-1, 1-2 stock.

On sites infected with root rots or blue stain reforest the infected area (and 100 feet beyond visibly affected trees or stumps) with species

that are immune or resistant and adapted to the site. Areas will be clearly marked to aid planting crews.

White pine blister rust: When white pines are planted no more than 80% will be white pine blister rust resistant.

Additional Considerations For:

Pole Plantings/Cuttings:

When used in highly erodible areas some method of protection should be placed in front of the pole plantings/cuttings. The toe can be very susceptible to erosive flows and scour. If rock is used to stabilize the area careful application is required. Improperly placed rock can result in erosion problems on the opposite bank and downstream.

Give careful attention to both the upstream and downstream ends of the treatment area to ensure flows do not get behind the treatment. Try to divert flows away from the endpoints by tying into existing features such as trees, rocks, etc. or consider utilizing brush or other suitable revetments.

Forest land:

Planting Dates:

Planting should be made as early possible when soil moisture conditions are sufficient. Fall (November) planting is acceptable provided adequate soil moisture is present at planting time. Avoid fall planting in areas subject to frost heaving. Areas with limited access due to substantial amounts of snow will be later than lower elevation plantings.

Sierra Nevada: Suitable planting dates generally range from December to late April.

Coast Range: December through March

South of the Tehachapi Range: December through March.

Siskiyou: February to April

Trees per Acre:

Coast Redwood Region: 300 to 360 trees per acre

Remainder of Northern California:

Option A. Standard Approach. Planting is dense. This, generally, requires a pre-commercial thinning of residual trees 15 to 30 years after planting.

Option A: 436 to 681 trees per acre.

Option B. High Management Approach (for Class 1 and 2, 3 soils only). Number of trees planted is significantly less and requires:

- a. Review the fall following the year of planting. Must be 80% or more survival. If not must be reinforcement planted to bring up to 80% survival the following spring
- b. Planned treatment to control competing vegetation 12 to 36 months after planting and a follow-up 5 years after the first treatment
- c. Anticipate pruning the lower limbs to reduce loss by fire and to improve quality when stems are 3 to 7 inches in diameter.

Option B: Trees to be planted: 260 or more trees per acre.

Or

All Areas: Stocking meeting the California Forest Practice Rules – Resource Conservation Standards for Minimum Stocking.

Southern California (Southern Region):

Site Class I, II, III (Meyer): 222 - 302 trees per acre

This may require a pre-commercial thinning of residual trees 15 to 30 years after planting.

Site Class IV, V, VI, VII (Meyer): 170 – 222 trees per acre

Requires:

- a. Review the fall following the year of planting. Must be 80% or more survival. If not, then it must be reinforcement planted to bring up to 80% survival the following spring.
- b. Planned treatment to control competing vegetation 12 to 36 months after planting and a follow-up 5 years after the first treatment
- c. Anticipate pruning the lower limbs to reduce loss by fire and to improve quality when stems are 3 to 7 inches in diameter.

All plantings to utilize mats or approved mulch material. Shade cards may be needed on South and Southwest facing slopes.

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Fuel break Planting. Between 200 and 225 trees per acre.

Reinforcement or Inter Planting: Between 120 and 225 trees per acre.

Other Plantings:

Pinyon: Between 130 and 200 trees per acre.

Other Species: Species selection and spacing information is contained in the respective MLRA Vegetative Guide in the Field Office Technical Guide.

Christmas trees at spacings no closer than 4x4 feet and no further apart than 8x8 feet. Spacing should fit the cultivation, mowing, spraying, or cultural practices required.

Spacing for Windbreak /Shelterbelt plantings are found in practice standard Windbreak/Shelterbelt Establishment (380).

Spacing for wildlife plantings are found in practice standard Wildlife Upland Habitat Management (645).

Direct Seeding:

All direct seeding of conifers and hardwoods will be by spot seeding. Direct seeding of forestland coniferous and deciduous species will require the review and approval of a NRCS forester.

Softwood Seeding:

Seeding Rates:

Rates of Pure Live Seed shall be as shown.

<u>Species</u>	<u>seeds/spot</u>
Ponderosa pine	4 to 8
Jeffrey pine	4 to 8
True Firs	10 to 15
Red fir	
Shasta red fir	
White fir	
Coastal Douglas fir	4 to 8
Inland Douglas fir	8 to 10

Timing of Seeding:

Just before or right after the first precipitation of the season.

Protective Measures:

Prior to the initiation of seeding the area to be seeded will be evaluated for the potential of seed predation. If the evaluation indicates predation will significantly impact the success

of the seeding, the seeding should be postponed until techniques are utilized to decrease predation.

Hardwood Seeding:

Blue Oak

Blue oak will not be recommended for seeding if the soils are less than 20 inches deep, has more than 35 percent clay or a hardpan within 20 inches of the surface, has an average annual rainfall of less than 16 inches, is not present, or has not been historically present in the vicinity of the proposed seeding.

Soils may contain any amount of coarse fragments and should have a high base saturation.

California Black Oak

California black oak will not be recommended for seeding where the soils have a restrictive layer within 40 inches of the surface, are not well drained, the clay content exceeds 35 percent, are compacted, on soils originating from serpentine, or where the average annual precipitation is less than 20 inches. They will do well on medium to coarse textured, deep and well-drained soils.

Do not seed where California black oak is not present or has not been historically present in the vicinity of the proposed seeding.

Canyon Live Oak

Canyon live oak may be recommended for seeding on soils derived from sedimentary, metasedimentary, granitic, serpentine, and perodite parent materials. It may be seeded in soils with a depth of 12 inches or greater and the average annual precipitation must exceed 12 inches. Canyon live oak must be present or have been historically present in the vicinity of the proposed seeding.

Oregon White Oak

Oregon white oak may be recommended for seeding on moderately deep soils of varied parent material, including serpentine. It may also be seeded on flood plains in heavy clay soils and where there is standing water or a shallow water table during a lengthy wet season. Do not seed where it is not present or has not been historically present in the vicinity of the proposed seeding.

## Valley Oak

Valley oak will not be recommended for seeding if the soil is less than 60 inches deep, has an average annual rainfall less than 12 inches, valley oak is not present or have not been historically present in the vicinity of the proposed seeding. Additionally, they will not be seeded when the elevation exceeds 5000 feet in the Coast Range and Southern California, and where the elevation exceeds 2000 feet in northern and central California.

Irrigation is not required for the establishment of valley oak. However, if irrigation is utilized the water applied must be sufficient to wet the soil profile to the depth of the water table or twelve feet, whichever is least restrictive.

### Seeding Dates

Acorns will be planted in the fall after the first major rains. The soil profile will have moisture to a depth of at least 2 feet. If there are no major rains they will be planted by the end of December.

### Seeding Rates

Acorns may be planted individually or in multiples at each planting site. For acorns to be planted individually the minimum percent acorn germination rate must exceed 95 percent.

Plant acorns on their side a minimum of one inch deep and not more than 2 inches deep. If multiple acorns are planted at a single site they must be a minimum of 4 inches apart.

### Protective Measures

Control of Competing Vegetation.

Control of competing vegetation will be accomplished within a 3-foot diameter at a minimum. A 5 to 6 foot diameter area of controlling competing vegetation is preferred. Plant competition may be removed by hand, mechanical or chemical means.<sup>1</sup> Mulches (See Practice 484 - Mulching) may be applied to the planting site to control competing vegetation and conserve moisture.

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<sup>1</sup> Chemical application recommendations and application rates will be made by a licensed applicator, farm advisor, or others licensed to do so in California.

## Predation Control

In areas where ground squirrel and/or gopher activity may impact germination and survival, acorns may be enclosed in wire mesh cylinders or baskets (0.5 to 1.0 inch mesh) buried at least 12 inches in the soil and extending at least 12 inches above the ground.

Where rabbits, deer, elk, cattle etc., are expected to pose a hazard above ground protective devices of chicken wire, rigid polypropylene, either mesh or twin walled, will be utilized to protect the emerging oak and first year seedling. Individual protective devices at least 4 feet high will be required to provide protection until the seedlings reach a point where the growing point is not readily browsed. Control may be achieved by a number of protective devices including chicken wire tree protection, rigid polypropylene - mesh tube tree protection, and rigid polypropylene - twin walled extrusion. Colors may range from white (low light conditions) to brown. Where cavity nesting birds or other wildlife entering the tubes may be a problem the tops of the tubes will be covered with a mesh sleeve to prevent entry.

## **Cultural Resources and Endangered Species**

This practice is likely to occur in areas where Cultural Resources or Endangered Species habitat may be found. Follow NRCS Planning Policy to address these concerns.

## **PLANS AND SPECIFICATIONS**

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

Plans and specifications will include the following: adapted tree species for the purposes outlined, spacing, planting methods, cultural practices, maintenance requirements, and variations in methods and species between interplanting, underplanting, and planting in open areas. Separate specifications can be prepared for each of these planting methods.

## OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

Access by vehicles or equipment during or after tree/shrub establishment shall be controlled to protect new plants and minimize erosion, compaction and other site impacts. Refer to the standard Access Control (472).

The trees and shrubs will be inspected periodically and protected from adverse impacts including insects, diseases or competing vegetation, fire and damage from livestock or wildlife.

If needed, competing vegetation will be controlled until the woody plants are established. Noxious weeds will be controlled. Refer to standard Integrated Pest Management (595).

Replanting will be required when survival is inadequate.

Supplemental water will be provided as needed.

Periodic applications of nutrients may be needed to maintain plant vigor. If nutrients are applied, refer to Nutrient Management (590).

After trees and/or shrubs are established, refer to the standards Forest Stand Improvement (666) and Tree/Shrub Pruning (660) for subsequent management

## REFERENCES

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Reforestation Practices in Southwestern Oregon and Northern California. 1992.