direct seeding woody plants

in the landscape

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It is possible to establish many trees and shrubs by seeding them directly in the location they are to grow in the landscape, Plants established by this method usually require only minimal maintenance, even in areas receiving little or no summer rainfall. The plants develop with top and root in an equilibrium determined by the environment. Direct-seeding can considerably reduce planting and maintenance costs as compared to starting with nursery grown plants, particularly if there is little or no irrigation after planting. In favorable sites or with more intensive care, many species will grow as wel l from seed as will nursery-grown transplants.

Direct-seeding is particularly adapted to extensive landscaping that involves large areas which may receive little or no maintenance, like highway and utility rights of way, around reservoirs, and in recreation areas and urban open spaces. It is also possible to successfully direct-seed plants in more intensive landscapes if the seeded areas are protected from human hazards.

Seeds can be planted by broadcasting, by seeding in furrows, or by seeding in small holes. Although widely used for grasses, broadcast seeding of woody species—even with the addition of fertilizer and a surface mulch—has only been successful in a relatively few instances. While range seeding equipment can be adapted for planting woody species, the resulting rows of plants are not aesthetically pleasing and the plants are closer together than desirable for most landscapes. Although not yet mechanized, spot seeding has been effective, economically feasible, and applicable indiffering terrains.

This leaflet discusses the steps for spot seeding woody plants and includes a list of species tested to date that have good potential for success (see table 1.)

SELECTING WOODY SPECIES

To be satisfactory, a species must germinate, grow, and survive under the range of environmental conditions existing at the planting site. Vigorous species are best because they can more effectively compete with weeds. A species does not have to be native to the area to do well; it may germinate and grow satisfactorily in an environment in which it may not be able to produce viable seeds. In this case, even though the plants may grow well, the species is not able to re-seed itself at that site.

By creating a favorable micro-environment during the critical germination and seedling stages of the life cycle, it is possible to increase the variety of plants that can be used at a given site. Many species have been successfully established by direct-seeding without irrigation. (See table 1 and figure 1).

TABLE 1. Species Adapted to Several Areas of California and Suited for Direct Seeding. (Examples are given where seedlings were established without irrigation, the type of seed dormancy and seed treatment, and the time of seeding.)

	SCIENTIFIC NAME	COMMON NAME	DORMANCY[1] TREATMENT[2]	AREAS ADAPTED-- EXAMPLES[3]
1	*Acacia decora*	Graceful wattle	**S** – 1,2	Southern Coast, Southern Central Valley-- (Avila Beach)
2.	*Acacia melanoxylon*	Blackwood acacia	**S** – 1,2	Coast, Central Valley-- (Pt. Reyes)
3.	*Aesculus californica*	California buckeye	N – 2	Foothills, Sacramento Valley, Coast — (American Canyon)
4.	*Atriplex lentiformis*	Quail bush	N – 3	Central Valley — (Tracy)
5.	*Atriplex semibaccata*	Australian saltbush	N – 3	Central Valley--(Los Banos)
6.	*Baccharis pilularis*	Coyote bush	N – 2	Coast, Valley, Foothills — (American Canyon)
7.	*Calycanthus occidentalis*	Western spice bush	N – 2	Coast, Upper Foothills-- (Pt. Reyes)
8.	*Ceanothus arboreus*	Feltleaf ceanothus	**S** – 1,2	Coast, Sacramento Valley — (Davis)
9.	*Ceanothus cuneatus*	Buck brush	E,S – 1,2	Foothills, Central Valley — (Davis)
10.	*Ceanothus foliosus*	Wavyleaf ceanothus	E,S – 1,2	Foothills -- (Black Butte)
11.	*Ceanothus impressus*	Santa Barbara ceanothus	E,S – 1,2	Southern Coast--(Avila Beach)
12.	*Ceanothus leucodermis*	Whitethorn	E,S – 1,2	Foothills, Sacramento Valley--(Davis)
13.	*Ceanothus megacarpus*	Bigpod ceanothus	**S** – 1,2	Southern Coast Range, Central Valley — (Davis)
14.	*Ceanothus sorediatus*	Jim brush	E,S – 1,2	Foothills, Sacramento Valley — (Davis)
15.	*Ceanothus thyrsiflorus*	Blueblossom	S – 1,2	Coast, Sacramento Valley — (American Canyon)
16.	*Cercis occidentalis*	California redbud	E,S – 1,2	Foothills, Central Valley — (Black Butte)
17.	*Cercocarpus betuloides*	Mountain-mahogany	N – 2	Foothills, Sacramento Valley -- (Davis)
18.	*Chaenomeles lagenaria*	Flowering quince	E – 2	Foothills, Sacramento Valley--(Davis)
19.	*Eriogonum arborescens*	Giant buckwheat	N – 2	Southern Coast, Coast Range, Sacramento Valley — (American Canyon)
20.	*Eucalyptus globulus* 'Compacta'	Dwarf blue gum	N – 3	Coast, Central Valley — (Fairfield)
21.	*Eucalyptus lehmannii*	Bushy yate	N – 3	Central and Southern Coast-- (Avila Beach)
22.	*Eucalyptus nicholi*	Nichol's willow peppermint	N – 3	Coast, Sacramento Valley--(Avila Beach)
23.	*Eucalyptus viminalis*	Manna gum	N – 3	Sacramento Valley--(Davis)
24.	*Fraxinus velutina*	Arizona ash	**E – 2**	Sacramento Valley — (Davis)
25.	*Fremontodendron californicum*	Flannel bush	E,S – 1,2	Central Valley--(Los Banos)

26. *Heteromeles arbutifolia*	Toyon	**E – 2**	Coast, Valley, Foothills-- (Los Banos)
27. *Isomeris arborea*	Bladder-pod	**N – 2**	Desert, Central Valley-- (Los Banos)
28. *Juglans hindsii*	California black walnut	**E – 2**	Foothills, Coastal and Central Valley — (Lake Mendocino)
29. *Lithocarpus densiflora*	Tanbark-oak	**E – 2**	Central and Northern Coast — (Lake Mendocino)
30. *Lupinus albifrons*	White-leaf lupine	**S – 1,2**	Foothills, Sacramento Valley — (Black Butte)
31. *Lupinus arboreus*	Tree lupine	**S – 1,2**	Coast, Sacramento Valley-- (Avila Beach)
32. *Pinus coulteri*	Coulter pine	**N – 2**	Foothills, Sacramento Valley — (Black Butte)
33. *Pinus halepensis*	Aleppo pine	**N – 2**	Central Valley--(Los Banos)
34. *Prunus ilicifolia*	Holly leaf cherry	**N – 2**	Coast, Central Valley-- (Davis)
35. *Prunus lyonii*	Catalina cherry	**N – 2**	Coast, Central Valley — (American Canyon)
36. *Prunus nana*	Dwarf almond	**E–** 2	Sacramento Valley — (Davis)
37. *Quercus agrifolia*	Coast live oak	**N – 2**	Coast, Sacramento Valley — (Lake Mendocino)
38. *Quercus douglasii*	Blue oak	**N – 2**	Foothills, Coast, Valley — (Black Butte)
39. *Quercus dumosa*	Scrub oak	**N – 2**	Foothills, Sacramento Valley — (Davis)
40. *Quercus durata*	Leather-leaf oak	**E – 2**	Foothills — (Black Butte)
41. *Quercus kelloggii*	California black oak	**E – 2**	Upper Foothills, Coast Range — (Lake Mendocino)
42. *Quercus lobata*	Valley oak	**N – 2**	Central Valley, Coastal Valley — (Lake Mendocino)
43. *Quercus suber*	Cork oak	**N – 2**	Sacramento Valley, Coastal Valley — (Redding)
44. *Rhamnus californica* subspp. *tomentella*	Chaparral coffeeberry	**E – 2**	Foothills, Sacramento Valley — (Black Butte)
45. *Robinia pseudoacacia*	Black locust	**S – 1,2**	Central Valley, Foothills-- (Bakersfield)
46. *Rosa rugosa*	Rugosa rose	**E – 2**	Sacramento Valley — (Davis)
47. *Salvia leucophylla*	Purple sage	**N – 2**	Foothills, Sacramento Valley -- (San Fernando)
48. *Sambucus caerulea*	Blue elderberry	**E – 2**	Sacramento Valley, Coast — (Davis)
49. *Schinus molle*	California pepper tree	**N – 2**	Central Valley--(Los Banos)
50. *Simmondsia chinensis*	Goat nut	**N – 2**	Desert, Central Valley — (Bakersfield)

[1] **Type of dormancy: E – embryo; S – seed coat; N – no dormancy.**

[2] **Seed treatment, or time of seeding: 1 – hot water soak; 2 – fall seeding required or preferable; 3 – late winter or spring seeding preferable.**

[3] **General areas are designated where species hove been successfully established or ore native. Aspect, and climatic and soil conditions may vary a great deal within areas and, thus, limit success. The examples in parentheses are specific locations where seeding was successful without irrigation. For additional guidelines, explore the possibilities of native and introduced species growing near the site.**

FIGURE 1. Establishment of direct-seeded plants without irrigation.

a) Four-month-old seedlings of bushy yate (*Eucalyptus lehmannii*) seeded without supplemental irrigation at an excavated site near Avila Beach, California. Note that the ground is hard and rocky, with no other plants present.

b) Two-year-old seedling of flannel bush *(Fremontodendron californicum)* established without irrigation in highway median near Los Banos, California.

SEED AVAILABILITY

The California Division of Forestry publishes a list of seed dealers (1). The U.S. Forest Service also publishes the names of seed dealers and a list of planting stock available in the United States (6).

Some dealers will collect, on contract, seed not normally carried if they are given sufficient time to locate fruiting plants. You can also collect seed locally, wherever desired species with a viable seed crop can be found and if permission to collect the seed is first obtained.

SEED TREATMENT

Seeds of some species have no dormancy and readily germinate whenever moisture, temperature, oxygen, and light are favorable. However, germination can be delayed or even prevented by seed coat or embryo dormancies, chemical inhibition, or a combination of these conditions. (See table 1.)

If planted in late fall or early winter, it is only necessary to treat those seeds having seed coat dormancy. Winter soil temperatures and moisture in most locations will overcome embryo and chemical inhibition. However, if you seed in the spring, any existing dormancy conditions must be overcome before planting.

Several treatments have been devised to overcome seed dormancy. Dormancy due to impermeable seed coats may be broken by mechanical scarification, soaking in hot water (170° to 212° F.) for a few seconds to several minutes, or soaking in concentrated sulfuric acid for varying lengths of time.

Embryo dormancy can be broken by stratification (storage in a moist medium like sand) at 32° to 50° F. for 1 to 3 months, or by treatment with various chemicals.

Dormancy due to various inhibitors may be overcome by leaching with water, treating with certain chemicals, or by exposing the seed to red light (6400 to 6700 Å).

Satisfactory treatments for many species are not known. Specific treatments are cited in the References. (see numbers 2, 3, 4, 5, and 7.)

TIME OF SEEDING

Plant seeds when conditions will be favorable for both germination and seedling growth after emergence. In areas with low to moderate rainfall, seeding in the fall has been successful for many species.

In the spring, seed species that readily germinate but that cannot withstand low winter temperatures after emergence, or species that require warm temperatures for germination. Spring rains or irrigation may be needed for plants seeded at this time. Irrigation also extends the length of time during which you can seed.

SUGGESTED PLANTING PROCEDURE

- Use a hand pick or trowel to dig a 4-inch deep hole.

  In most situations, a small seeding hole, without extensive soil preparation, is sufficient (see figure 2). If the soil is compacted, pulverize it with a shovel or soil auger so the roots can more easily penetrate the surface soil. Firm the loosened soil before planting.

  On rocky surfaces, locate the seeding hole in a depression or crevice that

offers a pocket of soil or fine rock fragments with one or more fissures in the rock for rooting.

On slopes, construct pockets with a slight backslope so the seeding hole is less likely to be covered by loose soil from above (see figure 3). The backslope reduces erosion and accumulates water so it is available to the seedling.

- Place 1 gram (0.03 ounce) of nitrogen to act as a slow-release fertilizer (table 2) in the bottom of the hole. Many California soils also require sulfur, If sulfur is not a component of the nitrogen fertilizer, add 0.07 ounce (1/4 teaspoon) of potassium sulfate which contains 0.3 gram (0.01 ounce) of sulfur.
- Replace and firm the soil in the hole. Leave a slight depression, depending on the size of the seeds to be planted (see table 3).
- Depending on size and expected germination, place three to twenty seeds in the planting depression. Cover the seeds with pulverized soil according to seed size, and firm the soil (see table 3).
- Remove any excess soil so it will not wash or blow into the seeding hole.

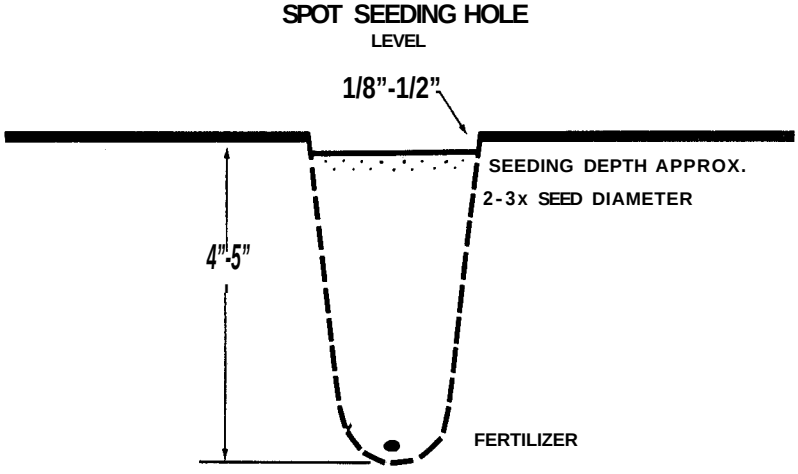


FIGURE 2. **Spot planting of seeds in a hole. This provides for good fertilizer placement, seeding depth, and depression for water accumulation.**

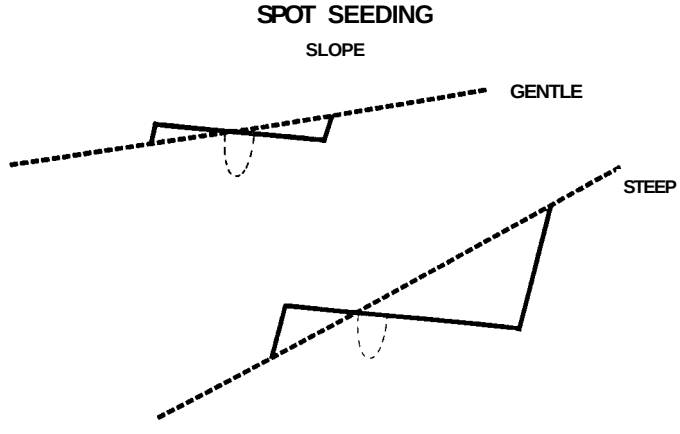


FIGURE 3. **Form a pocket on slopes to accumulate moisture and to prevent any loose soil from covering the seeding hole.**

TABLE 2. Slow-Release Fertilizers To Give One Gram (0.03 ounce) of Nitrogen.

FERTILIZER*	N-P-K†	AMOUNT FOR ONE GRAM NITROGEN			SULFUR CONTENT
		Weight		Volume	
		(grams)	(ounce)	(teaspoons)	(grams)
MagAmp®	7–40–6	15	0.5	3	0.0
Osmocote®	18–9–9	5	0.16	1	0.09

*Organic materials, like fish meal, blood meal, and hoof and horn, might be suitable. Urea-formaldehyde does not always give good response on sterile subsoils.

† N-P-K: nitrogen expressed as percent N; phosphorus as P_2O_5; and potassium as K_2O

®Registered trade name.

TABLE 3. Number of Seeds Per Hole, Depth of Seeding Depression, Soil Depth Over Seed, and Depth of Depression for Moisture Accumulation.

SEED DIAMETER	SEEDS‡ PER HOLE	DEPTH OF SEEDING DEPRESSION BELOW SURFACE	DEPTH OF SOIL OVER SEED	DEPTH OF DEPRESSION FOR WATER
(inch)	(number)	(inch)	(inch)	(inch)
< 1/16	20	1/4 to 3/8	1/8	1/8 to 1/4
1/16 to 1/8	10	3/8 to 1/2	1/8 to 1/4	1/4
1/8 to 1/4	5	1/2 to 3/4	1/4 to 3/8	1/4 to 3/8
1/4 to 1/2	3	7/8 to 1	1/2	3/8 to 1/2

‡ Based on approximately 50 percent germinability.

WEED CONTROL

It is essential to control weeds until the seedlings can successfully compete for moisture and sunlight. Contact herbicides or mulching can provide adequate control.

Contact Herbicides

Apply a contact herbicide (e.g., oil or paraquat*) after seeding, but before seedling emergence and when the weeds are less than 3 inches high. When applying contact herbicides, carefully read and follow the manufacturer's recommendations and safety precautions given on the container label. Spray in a circle 3 to 4 feet in diameter around each seed spot. If seedlings have emerged, invert an empty can over them before spraying.

A second application may be needed if new weeds emerge. Two applications will usually give adequate control for the entire growing season on nonirrigated plantings.

Hand weed around the seedlings that have emerged. Be careful not to disturb the seedlings when pulling out the weeds.

*Restricted material; permit required. Follow safe handling precautions for category I chemicals.

Mulches

A mulch can not only control weeds, but it can also moderate soil temperatures and reduce moisture loss. The mulch must not interfere with seed germination and seedling growth, yet, it should prevent weed emergence. A good mulch can be effective for several years.

Mulch material should remain in place during wind and rain, and should be slow to decompose, permeable to air and water, easy to handle, and inexpensive. Two common types of mulches used are coarse organic matter and sheet material,

Coarse organic matter. Place materials, such as wood chips, coarse bark (1/4- to 1/2-inch pieces), 2 to 3 1/2 inches deep in a circle 3 feet in diameter around the seedling. If irrigation is available, place materials in a basin about 24 or 30 inches in diameter (see figure 4).

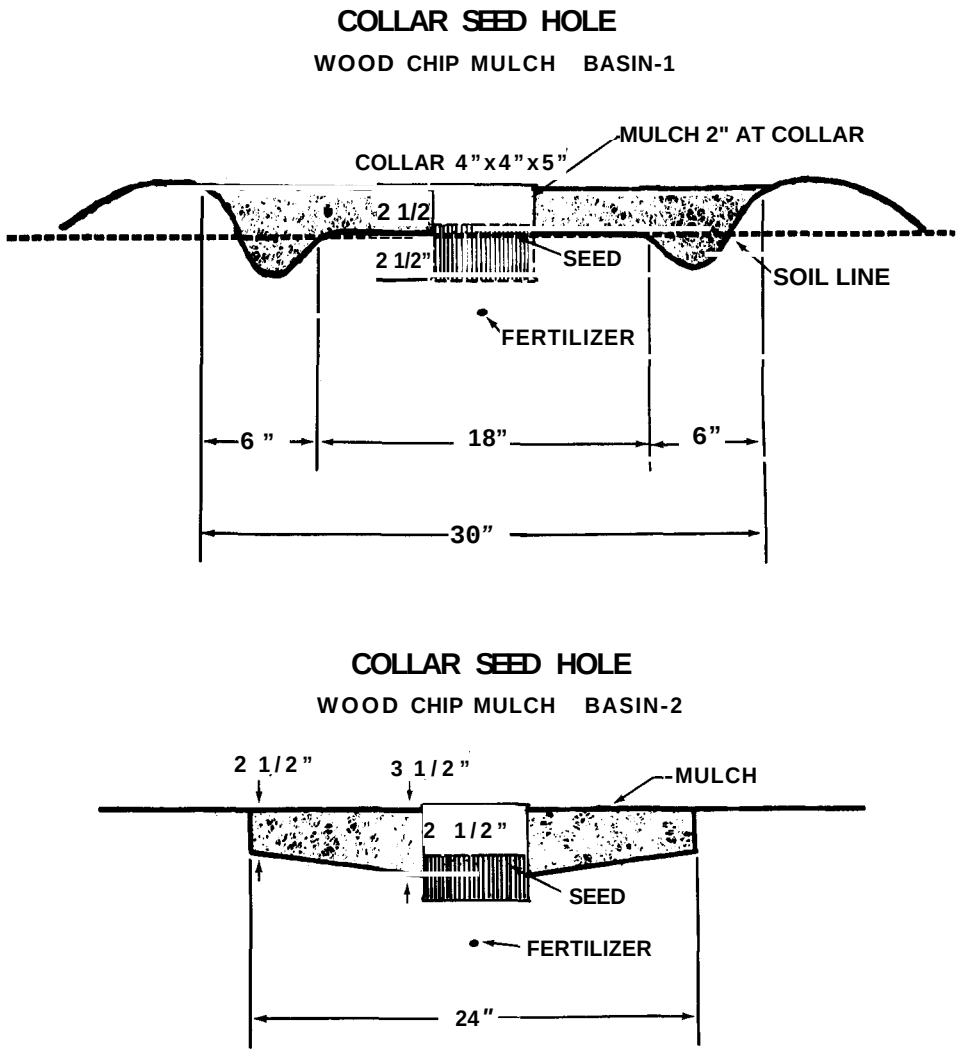


FIGURE 4. Two methods of planting reed in a collar and controlling weeds by mulching. The collar prevents mulch from covering the seeding hole, encourages germination by increasing soil temperature, and provides a technique for watering the seed spot for germination and initial growth.

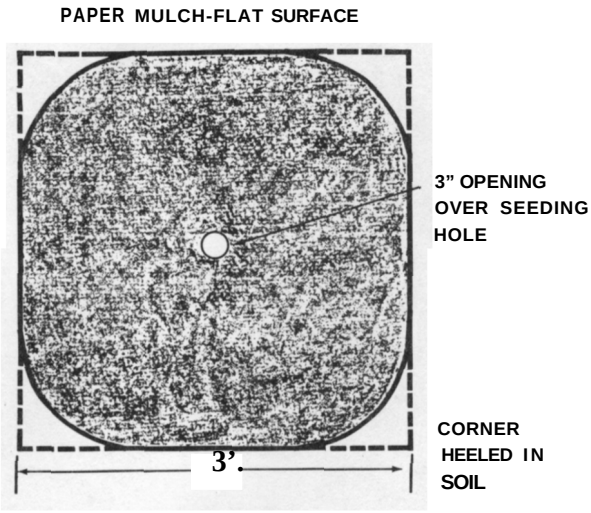


FIGURE 5. Top view of a sheet mulch used to control weeds. Corners are heeled in to stabilize mulch and to help prevent tearing by winds.

After mulching, you can enlarge the weed-free area by spraying on and outside the basin berm with a preemergence herbicide, such as simazine (Princep®) or trifluralin (Treflan®).

Use a collar to prevent the mulch from covering the seed spot. Tin cans, size 2 1/2, make sturdy collars; ½-gallon milk cartons or 4-inch diameter asphalt or heavy kraft paper cylinders also work well. After putting the collar in place, plant the seeds (see figure 4).

The collar increases the soil temperature of the seed spot and encourages germination. The collar can also be used to confine any water applied to the seed hole. Be extremely careful not to wash the seed out of the soil or to deeply bury the seed.

Remove metal collars after 1 year for re-use and to prevent future girdling of the plant.

Sheet materials. These are commercially available in a variety of widths. They include uncoated and polycoated mulching paper, black polyethylene film, asphalt roofing paper and kraft building paper. A suitable material should have sufficient strength to resist tearing by wind. Choice might also be influenced by the removal or breakdown rate of the material.

Sheet mulch is easier to store and handle than the coarse organic mulch material. Water mostly enters the soil at the mulch edges and through holes in the material.

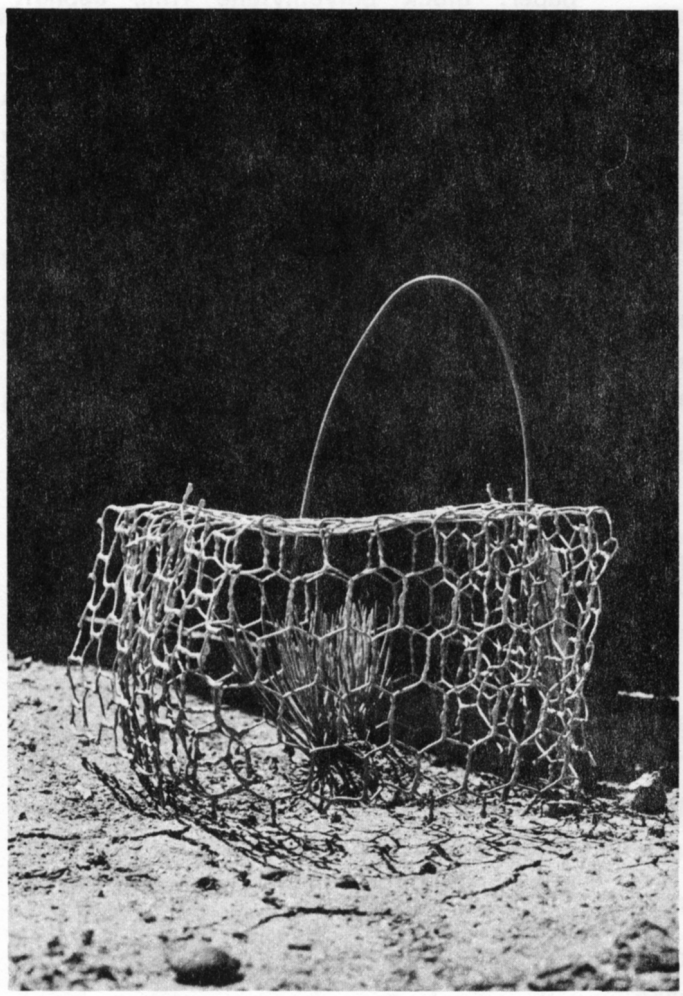
Prepare seed holes and plant as discussed on page 5. Lay a 3-foot square of sheet mulch on the ground. Make a 3-inch hole in the center of the sheet for the seed hole. Open slits in the ground to anchor the corners of the mulch. (See figure 5.) At very windy sites, cover all the edges with soil. However, place the soil so little or none will wash into the seed hole and cover the seed too deeply. You may need to hand weed to keep the hole in the mulch free of weeds until the seedlings become established.

SEED AND SEEDLING PROTECTION

Sometimes small wire cages are necessary to protect seeds and seedlings from rodents and birds. A small cage of ½-inch mesh hardware cloth may be sufficient for seeds and small seedlings. (See figure 6a.) Keep the cage over the seed spot from the time of seeding until the plants are 3 to 5 inches tall.

Use a large cylinder of wire (e.g., hog wire) when the seedlings begin to grow vigorously to protect them from rodents and browsing animals. The wire cylinder can be left in place for several years to protect the trunk and low foliage (see figure 6b).

Both of these wire protectors are re-usable.



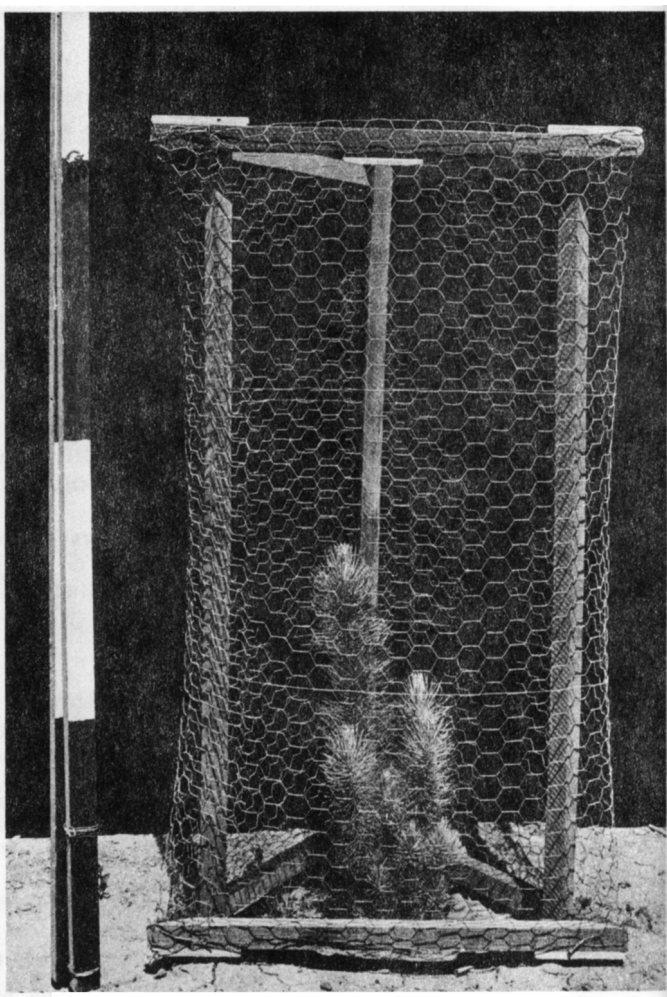


Figure 6. Seed and plant protection.

a) Young pine seeds and seedlings protected by a ½-inch mesh chicken wire cage (2½" x 4" x 4").

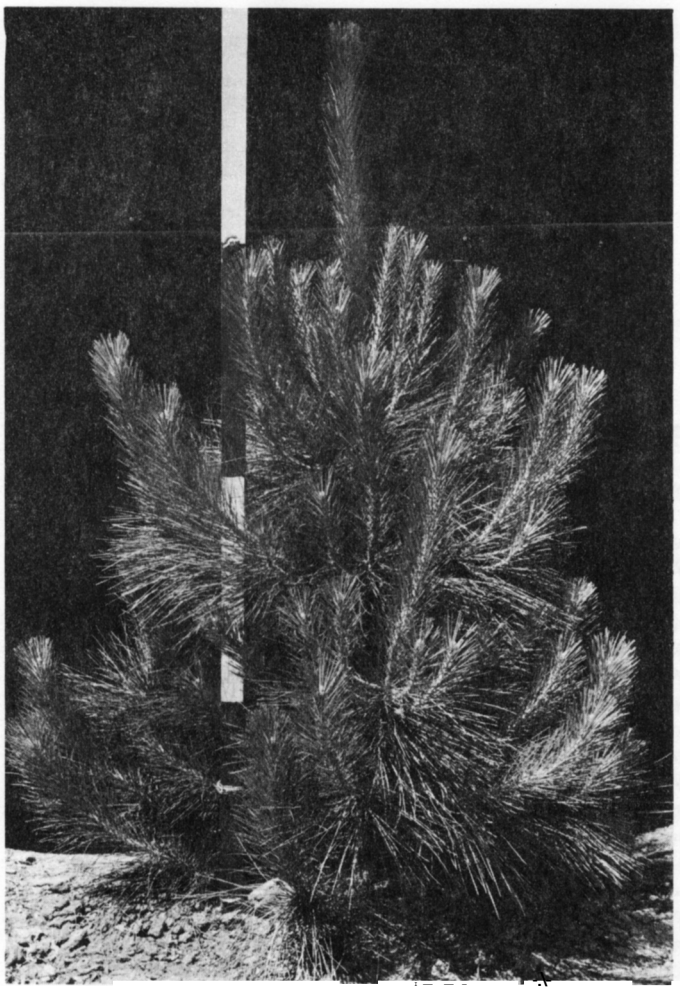
b) A pine seedling protected by a 15-inch diameter hog wire cylinder 3 feet high.

IRRIGATION

Whether or not to irrigate depends on the plant species, climatic and soil conditions, availability of water and labor, and how quickly growth is needed to produce a landscape effect. Although the species listed in table 1 have been grown without irrigation, most of them will grow more rapidly if irrigated. Seedling emergence and survival are increased by irrigation, particularly on sandy soils and in regions with low annual rainfall and hot summer temperatures.

Experience indicates that adapted plants grow well without irrigation on deep, well-drained soils in areas receiving 12 inches or more of rain well distributed throughout the winter and early spring. However, plant survival and growth are greatly improved by irrigation in areas with less than 10 inches of rainfall and hot summer temperatures, or on shallow sandy soils.

If the seeds are to be irrigated, a metal or paper collar, as described for use with organic mulch, will confine the water to the seed spot. After the fertilizer has been put in the seed hole, insert the collar into the soil until about 2 inches remain above the surface. Replace and firm the soil in prep-



c) This 4-year-old pine does not require protection.

aration for placing the seed. Cover and firm the soil over the seed. Carefully fill the collar twice with water at seeding time. Normal winter and spring rains should keep the soil moist until late spring. If there is prolonged winter or spring drought, apply supplemental water in the collar to keep the soil moist where the seedling is growing.

Begin monthly irrigations in May or when the first plants begin to wilt. (Not all plants wilt perceptibly.) Fill each collar three times at each irrigation--about 1.5 quarts. For the more rapidly growing plants, it may be necessary to water more often or to use a basin which will hold more water at each irrigation. (See figure 4.) An 18-inch basin, filled 3 inches deep. will hold about 4.5 gallons of water; a 24-inch basin, 8 gallons; and a 30-inch basin, 12 gallons. The larger basins are only needed for exceptionally rapid-growing plants.

Unless continued vigorous growth is important, cease irrigating after the first year. However, if a very low rainfall winter season is experienced after the first year, a spring irrigation may improve plant growth and survival. By spring, the soil should be moist throughout the root zone, either from rain or irrigation.

THINNING PLANTS

More than one plant growing in a seed hole usually presents no problem. Two or more small seedlings in a hole tend to protect each other and to provide insurance against future hazards. One plant will usually dominate and outgrow the others.

Trees thinned to one per hole will develop more rapidly and more symmetrically. Before the second growing season, cut off, level with the ground, the trunks of the trees to be removed. Pulling out trees, roots and all, can disturb the roots of the tree to be left.

FERTILIZATION

During the winter following the first growing season, apply two to five times the amount of nitrogen applied at seeding to encourage vigorous growth. Put the nitrogen in two 5-inch-deep holes, each 4 inches from the seed spot, or if that is difficult, spread it on the soil surface in a band 4 to 12 inches wide around the seed spot. Weeds will be less of a problem if the fertilizer is placed in holes.

PLANT
PESTICIDE USE WARNING — READ THE LABEL

Pesticides are poisonous and must be used with caution. READ the label CAREFULLY BEFORE opening a container. Precautions and directions MUST be followed exactly. Special protective equipment as indicated must be used.

STORAGE: Keep all pesticides in original containers only. Store separately in a locked shed or area. Keep all pesticides out of the reach of children, unauthorized personnel, pets and livestock. DO NOT STORE with foods, feeds or fertilizers. Post warning signs on pesticide storage areas.

USE: The suggestions given in this publication are based upon best current information. Follow directions: measure accurately to avoid residues exceeding tolerances, use exact amounts as indicated on the label or lesser amounts given in this publication. Use a pesticide only on crops, plants or animals shown on the label.

CONTAINER DISPOSAL: Consult your County Agricultural Commissioner for correct procedures for rinsing and disposing of empty containers. Do not transport pesticides in vehicles with foods, feeds, clothing, or other materials, and never in a closed cab with the vehicle driver.

RESPONSIBILITY: The grower is legally responsible for proper use of pesticides including drift to other crops or properties, and for excessive residues. Pesticides should not be applied over streams, rivers, ponds, lakes, run-off irrigation or other aquatic areas except where specific use for that purpose is intended.

BENEFICIAL INSECTS: Many pesticides are highly toxic to honey bees and other beneficial insects. The farmer, the beekeeper and the pest control industry should cooperate closely to keep losses of beneficial species to a minimum.

PROCESSED CROPS: Some processors will not accept a crop treated with certain chemicals. If your crop is going to a processor, be sure to check with the processor before making a pesticide application.

POSTING TREATED FIELDS: When worker safety reentry intervals are established be sure to keep workers out and post the treated areas with signs when required indicating the safe reentry date.

PERMIT REQUIREMENTS: Many pesticides require a permit from the County Agricultural Commissioner before possession or use. When such compounds are recommended in this publication, they are marked with an asterisk (*).

PLANT INJURY: Certain chemicals may cause injury or give less than optimum pest control if used at the wrong stage of plant development; in certain soil types; when temperatures are too high or too low; the wrong formulation is used; and excessive rates or incompatible materials are used.

PERSONAL SAFETY: Follow label directions exactly. Avoid splashing, spilling, leaks, spray drift or clothing contamination Do NOT eat, smoke, drink, or chew while using pesticides. Provide for emergency medical care in advance.

To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.

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OPPORTUNITIES

Interest is increasing in creating more pleasant and livable environments, in conserving heating and cooling energy, and in helping improve and maintain ecological balances in developed and natural areas. Young people feel the importance of these endeavors and that they can participate in programs focused on these matters to improve our urban, rural, and natural areas. The Department of Environmental Horticulture offers courses within the Plant Science curriculum which may provide the expertise to gain employment in the several fields associated with enhancing our landscapes with plants. Areas of specialization offered are floriculture, nursery management, landscape horticulture, and service functions of allied industries.

Floriculture. The propagation and production of flower crops and foliage plants for the home, landscape, field, and greenhouse.

Nursery management. Field- and container-production of plants for the landscape, including propagation by seed and vegetative means (including tissue culture) under controlled conditions of the greenhouse and laboratory.

Landscape horticulture. Landscape construction and plant installation in the residential and public sector. Maintenance of landscape plants including turfgrass, bedding plants, ground cover plants, vines, shrubs, and trees in public and private grounds. Urban forestry, a title given to managing trees in urban areas, is within the realm of landscape horticulture.

Service functions. These are in related fields of pest control, consultation, management, teaching, sales, and writing.

The Department offers an undergraduate program leading to a Bachelor of Science degree. The curriculum covers a variety of subjects allied to the student's chosen field, including botany, chemistry, economics, entomology, genetics, meteorology, physics, plant pathology, soils, and water management. The student also has the option of selecting electives in specific areas of interest.

The faculty engages in research closely related to the courses taught. Some of their research fields are: arboriculture, genetics, plant nursery production, taxonomy of landscape plants, turfgrass, soil-plant relations, physiology of flowering, floriculture crop production, postharvest handling of flowers and nursery crops, chemical control of growth and development, and biomass production and conversion for energy.

The faculty of the University believes that the proper combination of research and teaching allows the professor to teach from first hand research experience.

For more information, contact the Department of Environmental Horticulture, University of California, Davis, California 95616.

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