

After the properly prepared cuttings are carefully inserted in the medium, the entire bench is covered with polyethylene and sealed with laths. If plastic is not used, mist is necessary. Experimentation with lights — fluorescent, red, and Gro-lux, has indicated no great differences or advantage in rooting. Rooting normally occurs in three to five weeks.

As soon as adequate roots have formed, plants are transferred to individual pots, hardened off, and sunk in a cold frame with shade overhead. They are left out all winter. A mulch is unnecessary. The important thing is to have the plants rooted as early as possible to permit them to make some new growth before the dormancy period. Plants which do not continue to grow and develop some new growth after being potted will not break dormancy in the spring.

To summarize — if cuttings are taken as early as possible, are properly prepared, and are set out in sufficient time to make some new growth before they go dormant in the fall, 80 to 90 percent will root, and 60 percent of those rooted will grow through the first year after potting.

MODERATOR CLARKE: Thank you very much. Our next speaker is a horticulturist at the Santa Barbara Botanic Garden located at Santa Barbara, California. Mr. Dara Emery will speak on some native plants of the Santa Barbara area and their propagation. Mr. Emery.

THE PROPAGATION OF SOME NATIVE CALIFORNIA PLANTS

DARA E. EMERY

*Santa Barbara Botanic Garden
Santa Barbara, California*

The Santa Barbara Botanic Garden is devoted exclusively to native California plants. The propagation unit at the garden consists of a small glass house, a lathhouse with a hotbed inside, and an intermittent mist unit with bottom heat located outside in nearly full sun. A modified U.C. mix is used for seed flats and pots. The canning soil, sterilized, is variable depending on what is obtainable. Cuttings, after being prepared are totally immersed in a malathion-Captan solution and, in most cases, the basal portion is dusted with Rootone. Because of our highly mineralized water, cuttings in the mist unit not rooted by 2½ to 3 months have very little chance of rooting and by 4 months are dumped. As soon as cuttings are rooted in the mist unit they are potted in plastic pots and placed in a hotbed with extra shade for two weeks to harden-off. The following eight native California species have presented propagation problems of one type or another.

Tree anemone, *Carpenteria californica*; this is an attractive evergreen shrub which grows 4 to 7 feet tall and as much across. Its foliage is dark green, and the flowers, borne in

large clusters, look very much like large single white camellias. The flowering period is June to August.

Carpenteria seed is very small and the viability is quite variable. First germination occurs in about three weeks. The emerging seedlings are very susceptible to damping-off, especially if the stand is dense. All the usual procedures to prevent damping-off should be followed carefully with this species. Once the seedlings are well established there are no other cultural problems. Tree anemone can be easily and more quickly propagated from tip cuttings taken in spring using bottom heat with or without intermittent mist.

California wild lilac, *Ceanothus* species, are mostly evergreens. They vary in size from attractive dense mats and ground covers to large shrubs or small trees. Most species under garden conditions are apt to be short-lived — four to eight years — in southern California. Their very rapid growth and profuse blossoming traits, however, more than compensate for the short life span. Flower color varies from white to blue to purple.

Most all ceanothus seed requires a hot water treatment for prompt germination and, depending on the species, cold stratification also. The seed germinates readily but can only be spotted-off satisfactorily immediately after germination, when the radicles are about an inch long. This can be within two weeks of first germination. Germination is quite uniform and the percentage germination usually high. Because of the spotting-off timing problem, the seed is best sown a few each to small rose-type Jiffy Pots. Then, if the spotting-off is not done in time, the best seedling per pot can be saved and the rest culled. Ceanothus hybrids and many of the species can be propagated readily from soft tip cuttings using bottom heat, with or without intermittent mist.

Southern fremontia, *Fremontodendron mexicanum*, is an evergreen shrub that grows 8 to 15 feet tall. Its leaves are glossy dark green above and covered with stiff brown pubescence beneath. The large, deep-yellow flowers are borne in great profusion in spring.

Southern fremontia seed, after being given the hot water treatment, germinates readily. It should be sown two or three per small rose-type Jiffy Pot, as the seedlings do not spot-off satisfactorily. First germination occurs in two to three weeks. The big problem with this plant is to keep it alive in containers once it has reached planting-out size. The sterilized canning mix should be very well drained and the plants grown on the dry side. Whenever possible container plants should be disposed of and planted out before the nights turn cool in the fall, as they are particularly susceptible to root rot at that time. Cutting propagation is possible using tip cuttings in spring with bottom heat and intermittent mist, though the percentage of cuttings that root may be small.

Douglas iris, *Iris douglasiana*, forms compact plants up

to one foot tall and two to three feet wide. The relatively dense, arching foliage is medium to dark green, and the non-bearded flowers are 2 to 3 inches in diameter and borne two to three per stem. They vary in color from white to purple. The flowering period is May to June.

Untreated seed has rather specific temperature requirements. If sown between September 1 and 15, first germination occurs in 30 days; but if sown October 1 to 15, first germination starts in 90 days. Seed sown in the spring after three months of cold stratification also starts to germinate in about 30 days. Germination is uniform and of high percentage. Once germinated the seedlings are easy to handle. Douglas iris can also be propagated from divisions taken in spring during the active growth period.

Silver lupine, *Lupinus albifrons*, an evergreen mound-shaped shrub grows 2 to 6 feet tall and has dense silvery blue foliage. The typical pea type flowers are very fragrant and usually bluish-purple in color, but occasionally white or wine-red flowered forms appear. This lupine is apt to be short-lived under garden conditions but compensates by being a very rapid grower.

Seed propagation is not difficult. The seed should be knicked or given a hot water treatment. The use of a legume inoculant is also helpful. Seed are best sown in small rose-type Jiffy Pots, one or two seeds per pot. First germination occurs in one to two weeks. If necessary the seedlings can be easily spotted-off immediately after germination. Cutting propagation is usually unsatisfactory; however, stem cuttings taken in early December, stuck in coarse vermiculite with bottom heat and intermittent mist (outside unit), root reasonably well. Once rooted the plants grow well in containers.

Island ironwood, *Lyonothamnus floribundus* var. *asplenifolius*, is an attractive evergreen tree 25 to 50 feet tall with reddish-brown exfoliating bark. The handsome medium-green leaves are pinnately compound. Small white flowers are borne in large terminal clusters in May or June.

Seed propagation of this tree has two problems — viable seed for those who collect it and weak stems for those who grow it. Production of viable seed is quite variable from year to year even on the same tree, and the seed is quite small and difficult to separate from the chaff. Spring sown seed, under lathhouse conditions, will start to germinate in about two weeks. The seedlings have very weak stems and when watered are very easily knocked over. The subsequent growth will turn up again but the stems are then malformed. The seedlings can be spotted-off in early spring when the maximum daily temperature is from 60° to 70° F. If the maximum temperature is higher, the newly spotted-off seedlings can be placed under intermittent mist without bottom heat for two weeks or so until they are well established. These procedures will minimize stem malformation. Until the liners are about six inches tall

the stems are still subject to lodging and special care is necessary in watering. Cutting propagation has been unsuccessful.

Cleveland sage, *Salvia clevelandii*, is a short-lived evergreen to semi-deciduous shrub. It forms a 2 to 4 foot mound and has gray-green aromatic foliage. The $\frac{3}{4}$ to $1\frac{1}{4}$ inch long flowers are deep blue in color or sometimes whitish. They are borne in whorls one to several per stem. The flowering period is May to August.

To obtain maximum germination of untreated seed the sowing time is important. The best time in Santa Barbara is December or early January. Seed sown then in the lathhouse will give good germination starting in thirty days. Once germinated, the seedlings, if spotted-off in April or May, are easy to handle. Seed sown later or during the warm part of the year germinate poorly. Cleveland sage can be quickly and easily propagated in early spring from soft tip cuttings using bottom heat.

Evergreen or California huckleberry, *Vaccinium ovatum*, in our area forms a 4 to 8 foot shrub. It has leathery dark green leaves and axillary clusters of small pink or white urn-shaped flowers. The flowering period is March to May. The small bluish-black berries are edible.

Propagation of this vaccinium has been a problem as our water is highly mineralized with a pH of 8.4. Fresh or stored seed sown in the lathhouse in early fall on milled sphagnum moss germinates well. First germination occurs in about 90 days. We use a potting mix of equal parts #30 washed sand and Canadian peat moss with no fertilizer added and either plastic pots or Jiffy Pots.

Tip cuttings taken in January and rooted in fresh, fine-grade pine shavings with bottom heat and intermittent mist root well — 80 to 100%. Rooted cuttings are potted in 3-inch plastic pots, later shifted to 4-inch plastic or Jiffy Pots, and then to one-gallon cans. Shifting the plants from 3-inch pots to gallon cans has given poor results. The potting mix used is the same as for the seedlings — equal parts #30 washed sand and Canadian peat moss with no fertilizer added. The gallon can mix is our regular canning mix plus one-third to one-half peat moss.

MODERATOR CLARKE: Our next speaker, Dr. J. H. Crossley, Canada Department of Agriculture, Saanichton, B.C., Canada, was unable to be here. However, his paper will be published in the Proceedings but will not be read this morning.