Ratings of rooting systems (left) were best, good, and fair. Almost all types of vine wood yielded good root systems and resulted in vigorous plants.

Propagating California wild grape

James A. Robbins □ David W. Burger

Easy to start from cuttings, the vine is useful in landscape plantings

California native plants are being used increasingly in landscape and revegetation projects, but little information is available on how to propagate them. California wild grape, *Vitis californica* Benth., is one such plant that would be useful in the revegetation of steep slopes and embankments. This vigorous, deciduous, woody vine, which grows along streams throughout the Coast Ranges, Central Valley, and Sierra Nevada foothills, can cover large areas in a short time. Flowers produced in May and June, although not showy, are very fragrant, and the leaves, which resemble a typical grape leaf, offer a pleasing spectrum of colors in the fall from lemon-yellow to orange-pink and maroon. The vine lends itself to training on an arbor, providing shade in the summer. Although relatively drought tolerant, the California wild grape benefits from moderate watering.

A great deal of information exists on the vegetative propagation of other grape species, but none is available on the California wild grape. Hardwood cuttings of the European grape, *Vitis vinifera,* readily form adventitious roots. Cuttings from some American grape species and their hybrids, however, often require special treatment to induce rooting.

Other researchers have found that rooting of hardwood grape cuttings is influenced by such factors as date of collection, storage conditions, and type of cane wood. We conducted a study to investigate the effect of chemical pretreatment, wood type, and rooting medium on the rooting of dormant hardwood cuttings of the California wild grape.

Rooting study

We collected propagation material in mid-March 1985 from wild vines growing along the northern shore of Folsom Lake near Newcastle, California. Dormant canes of one- to two-year-old wood (6 to 10 yards long) taken from several plants were cut into stem segments 4 to 10 inches long with two to four nodes per segment. Although no buds were expanding at that time, sap was flowing freely in the stems. The segments were transported to Davis in an ice chest and stored in a cold room at 43°F (6°C) for three days.

Before preparing and treating the cuttings, we graded the stem wood into seven classes according to stem diameter, stem length, and type of wood (table 1). Although this grouping is artificial, these categories correlated well with the position of wood on the original canes. Thinnest wood (grade A) would be associated with the terminal part of the canes, thickest wood (grade G) with the older wood closer to the base of the cane. We prepared the cuttings by making a fresh transverse cut above the uppermost node and a slant cut below the bottommost node.

TABLE 1. Characteristics of wood grades used for preparing cuttings of the California wild grape

Wood grade	Bark type	Nodes/ stem segment	Mean stem segment diam.	Mean stem segment length
		number	*mm*	*cm*
A	Smooth	2-4	4	12
B	Smooth	2-3	5	13
C	Pubescent	2-3	6	14
D	Shredding	2-3	7	15
E	Shredding	2	8	17
F	Shredding	2	9	19
G	Shredding	2	10	21

Treatments included two soil media and four pretreatment solutions. The two media were peat:vermiculite (1:1 by volume) and very coarse sand. We used manganese sulfate ($MnSO_4$) as one of the pretreatment solutions, because research in the past had shown that it increased the rooting of several grape varieties. We also tested two forms of the auxin IBA — the acid and the potassium salt (K-IBA). Auxin is the class of plant hormones most often associated with increased rooting of cuttings. A number of researchers have investigated the effect of synthetic auxins on the rooting of grape varieties with variable results; some varieties have responded favorably and others not at all.

The four treatment solutions with the peat:vermiculite medium were 10 mM manganese sulfate, 0.8 mM indole-3-butyric acid (potassium salt, K-IBA), 1 mM indole-3-butyric acid (IBA), and deionized water. Cuttings rooted in sand were treated with 10 mM manganese sulfate. The solvent for all chemicals was deionized water, except for the IBA, which was dissolved in 50 percent ethanol.

After soaking the basal 2 inches of the cuttings in the treatment solutions for 24 hours, we rinsed them in deionized water, then inserted the basal 2½ inches into the rooting media in wooden flats. The flats were misted with deionzed water (2½ seconds every 2½ minutes, dawn to dusk) in a mist bench with bottom heat of 77°F (25°C). Greenhouse temperatures were 75°F (24°C) (day) and 64°F (18°C) (night).

On three dates, we removed cuttings and evaluated them for rooting percentage and quality of the root system. In judging quality, we considered both the number and length of roots produced. Using a numerical value for each quality rating (best=3, good=2, fair=1) and the number of cuttings in each category, we calculated a general quality rating. Multiplying this value by the rooting percentage yielded an overall cutting rating. Cuttings that had rooted were not returned to the flats.

Results

Our results indicate that California wild grape is easy to propagate. Quality root systems and high rooting percentages can be achieved with little effort.

Of the cuttings treated with manganese sulfate and rooted for 24 days in peat:vermiculite, grades A, C, and G had the highest rooting percentages (fig. 1). After an additional 33 days of rooting, grades C and D gave the highest percentages. All wood grades except G had substantially better rooting percentages after the additional 33 days.

The rooting percentage after 57 days appeared to be slightly better on the medium grade woods (C, D, E, F), indicating a small gradient in rooting ability depending on the location between vine base and apex from which cutting material was collected.

Based on the overall rating at all sampling times, grade C wood is the best source for cutting material. Cuttings pretreated with deionized water for 24 hours had similar rooting percentages and overall ratings to those treated with manganese sulfate.

K-IBA was no better or worse as a chemical pretreatment for wild grape than manganese sulfate or water. A 50 percent ethanol solution of IBA was clearly phytotoxic, killing all cuttings within 24 days of treatment.

The rooting medium significantly affected rooting percentages and the type of root system produced (general rating). All cuttings (grade C wood) in coarse sand rooted in 24 days, but only 60 percent of those in peat:vermiculite had rooted by this time (fig. 2). Although rooting was faster in sand, the roots produced were finer and less numerous than those in peat:vermiculite. We obtained similar rooting results for the other wood grades evaluated. Therefore, if propagation bench space is not limited, a better root system would be obtained by using peat:vermiculite and allowing cuttings to root for at least 57 days.

Conclusions

Based on these results, we can make several recommendations for the vegetative propagation of California wild grape:

Cuttings should be collected in late winter or early spring (March, April) to avoid problems with bud dormancy. Material collected for our experiments broke buds within days of being placed in the mist beds. It has been shown that, for several grape varieties, the time of season at which cuttings are made does not affect root formation but does affect bud break.

Almost all types of vine wood will yield fairly good quality root systems and high rooting percentages.

Chemical pretreatment does not appear to be required for good rooting when cuttings are collected in late winter.

The rooting medium influences the type of root system and speed at which it is produced. Choice of rooting medium should be based on specific needs.

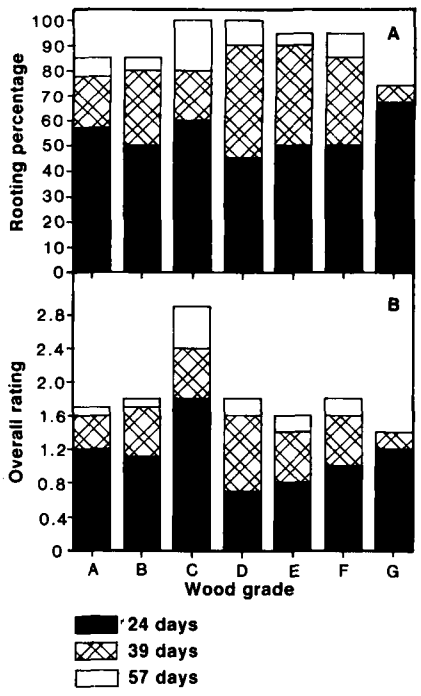

Fig. 1. Medium-grade wood had the highest rooting percentages (A) and best overall rating (B) after 57 days.

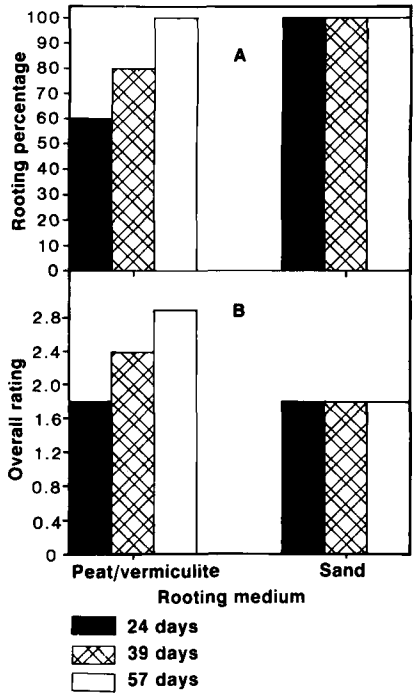

Fig. 2. Rooting medium significantly affected rooting percentages (A) and type of root system produced (overall rating, B).

James A. Robbins is Post-Graduate Researcher and David W. Burger is Assistant Professor, Department of Environmental Horticulture, University of California, Davis. *This research was supported by a grant for environmental research from The Pacific Gas and Electric Company.*