



## Extension Toolkit Notes

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### Propagation of Grapevines from Cuttings

Notes Compiled from—

Christensen, Pete. 1999. Making Cuttings. Publication # GV9-99. University of California Cooperative Extension, Tulare County.

<http://ce.tulare.ucdavis.edu/pubgrape/gv999.htm> (a major source for this note).

Galet, P. 2000. General viticulture. English edition. Oenoplurimedia, Chaintré, France.

Herreara, E. & La Vine, P. Vineyard Propagation from Cuttings Guide H-322. <http://www.cahe.nmsu.edu/pubs/ h/h-322.html>

#### 1. Preparation of Cuttings.

The cane wood for cuttings should be mature, medium size, round, and with internodes of moderate length. Those with long internodes and flat in cross section should be avoided. They indicate very rapid growth and a tendency for lower stored reserves. The most common length of cuttings for direct field planting is 40 to 45 centimeters. The cut at the base of the cutting should be straight across and close below a node (about 0.6 cm). The top is cut at a 45° angle, 2.5 to 5 centimeters above a node. The difference in cutting angle gives an easy identification of the top and bottom of the cutting.

Two or three cuttings can be made out of a strong, well matured cane.

Cuttings should be made within 4 to 5 days after pruning during dry weather. A 7 to 10 day delay is only acceptable during wet or foggy weather. Cuttings suspected of excessive field drying can be immersed in water for 24 to 48 hours before storage. Longer immersion may be detrimental. This technique is a poor substitute for cutting fresh wood.

Cuttings are usually put in bundles of 100 each, with the basal ends even, and are tied at each end with wire or plastic twine.

#### 2. Storage of Cuttings.

The storage method should prevent drying and ultimately enhance root initiation with warming temperatures. It is preferred to have some root initiation at the base of the cuttings when they are field planted. The early stages of root initiation can be detected by cutting into the inner bark at the base of the cutting. The root primordia will first appear as slight swellings or "pimples." They will then extend through the bark and develop to a white "rice" stage (less than 2.5 cm long). This is the best stage of planting. Cuttings should be spaced 10 cm to 15 cm apart when planted.

Further root development into the "spaghetti" stage (more than 5 to 7.5 cm long) is not advantageous. These roots are broken off during planting, thus wasting stored food reserves in the cuttings. Good stands are sometimes obtained with "spaghetti"-stage cuttings, but nurseries have experienced larger, more saleable root systems on rootings planted at the early "rice" stage. Bud break normally precedes root growth by 1 to 2 weeks during storage and conditioning. Therefore, some shoot breakage and dry-back during and after planting is often unavoidable. Usually, a secondary bud will push behind any damaged shoots. Excessively advanced cuttings with shoots over 5 to 7.5 cm long at planting also contribute to an undesirable loss of stored food reserves.

Cuttings sometimes produce a white starch-like substance called callus, mostly at the base ends. Callusing is a warm temperature response, occurring readily at 21°C to 29°C, slowly at 15°C and none at 10°C . Callusing is not necessary for root initiation or the cuttings' success. It is merely a response which can accompany root initiation when cuttings are exposed to the higher temperatures just mentioned.

#### A. Sand Pit Storage

This is the most common method. The area should be well drained and located where no water collects from rainfall run off. It is best if the pit is slightly elevated to assure water run off.

The pit is dug to about an 18 inch depth and the bundles are stacked in upside-down and against one another. Upside-down stacking is a long-standing commercial practice intended to enhance root initiation at the cuttings' base. This response has been verified by research findings.

The cuttings are then covered with 15 cm to 20 cm of sand. Some of the sand will naturally fall into the spaces between bundles, but one should not intentionally wash or force the sand down into the cuttings. This can lead to water-saturated zones which exclude air.

Use water sparingly in the pit area. Sprinkle lightly at first to assure that all the sand is moist. Occasional light sprinklings are only necessary to re-wet the surface sand when it dries down an inch or so. Many more problems are encountered with over-watering than under-watering, especially when the vines are covered with medium to fine textured soils. The saturated soil excludes air; root and shoot initiation stops, and souring occurs.

### **3. Root initiation, bud break, and callusing:**

The sand pit serves three main functions:

- to keep the cuttings moist,
- to keep them dormant until late winter,
- to provide gradual warming for root initiation and bud break in the Spring.

The temperature of a sand pit will typically be approximately 12°C during midwinter (in Tulare County, California). By early March it will begin warming to approximately 14°C and to approximately 16°C by late March to early April. Visible signs of root initiation and bud break will begin in mid to late March under these temperature conditions, provided the cuttings have been in sand storage for at least 6 weeks.

This storage gradually conditions the cuttings towards root initiation and bud break, even at the 12°C to 14°C range. Thus, the duration of storage also influences the time of root initiation and can be used to hasten or delay the time of planting.

For example, cuttings made before mid-January may have good root initiation by March 15-20; February cuttings may take until late March to early April to reach the same stage of development; and root initiation in March cuttings may be delayed until mid-April. Weather extremes can cause a 3 to 4 week spread in the optimum planting stage from year to year. The stored cuttings should be examined weekly for root initiation as the planting time is approached.

The rate of development can also be influenced by manipulating pit temperature. Shading the area, covering the cuttings with a loam soil, and keeping the surface firm and damp will slow the warming

process. The warmest conditions would be a sand pit fully exposed to sunlight and with the surface 2.5 cm to 5 cm fluffed with a rake or covered with plastic.

Clear or black plastic sheeting can aid warming, but clear plastic is the most effective. Clear plastic creates a greenhouse-effect, allowing the sun's rays to penetrate and warm the air and soil underneath while limiting the loss of heat from upward radiation.

Callusing is not common in sand pit storage unless the cuttings are held until late April or May when pit temperatures near 21°C or if plastic sheeting is used for warming.

#### A. Cold Storage

Avoid cold storage if possible. Never plant immediately out of cold storage as the cuttings will be fully dormant. This exposes them to drying in the field while they wait for 3 to 4 weeks for root initiation and bud break.

If cold storage is necessary as for delayed plantings, the cuttings should then go through a conditioning process before planting. Either place them in moist sawdust at 21°C -27°C for 2 to 3 weeks or a sand pit for 3 to 5 weeks before planting. Make sure some root initiation is showing.

#### B. Using Rooting Hormones

The plant hormone (growth regulator) IBA (indolebutyric acid) is widely used in commercial nursery production to aid root initiation, especially in ornamental cuttings. However, it has limited value in the rooting of dormant grape cuttings in California. Generally, our commercial grape varieties root readily with normal care and with little or no additional benefit from IBA treatment. However, IBA treatment could be considered with the more difficult to root nematode-resistant rootstocks Saltcreek and Dogridge. A hastening and increasing of root initiation from IBA has been demonstrated in such rootstocks.

### 4. Nursery Plantings.

Preparation of the vineyard site should be coordinated as closely as possible with the conditioning of the cuttings.

The date of planting in the spring does not appear to be an important factor in sandy to medium textured soils, providing the cuttings are properly conditioned. However, in heavy soils-loams and clay loams-it may be desirable to time root initiation to a mid-April planting. This allows time for these colder soils to warm to a more optimum temperature for root development by planting time.

#### A. Planting Method

Cuttings are most easily planted by pushing them into a slot loosened with a subsoiler shank. If necessary, a long spade can be used to open the loose soil enough for cutting placement. The soil is then firmed by stepping on both sides of the cutting. This keeps it in place during settling-in with water. They should be checked again soon after the first irrigation to see that they are all still in place.

Other methods include hand planting with a shovel or planting into holes jetted out with water. Care should be taken when backfilling the narrow water-jetted holes to avoid leaving air pockets.

Planting holes should never be made with a pointed steel bar. The compacted sides of the hole will restrict root growth.

Cuttings are typically planted with 10 cm to 12.5 cm of top showing above ground level. This allows for some soil to be thrown back to the plant in later cultivations with 5 cm to 7.5 cm of the cuttings or two nodes still showing.

#### B. Irrigation

Avoid drying of the cuttings during planting and irrigate them in as soon as possible. One or 2 irrigations down the vine row are always necessary to settle the soil around the cuttings and remove air pockets.

Most growers prefer to cultivate lightly and throw some loose soil back towards the cuttings after the initial irrigation(s). This helps warm the soil and reduce soil drying and cracking around the cuttings.

The next few irrigations can be applied in furrows 15 cm to 20 cm from each side of the plants. By late summer these can be moved out to 30 cm or more, depending on the wetting characteristics of the soil.

Avoid over- and under-watering. It is best to wait about 3 to 4 weeks to irrigate again after the cuttings are first settled-in unless the soil cracks badly or the weather is very warm and dry. Over-watering at this time can slow early root development by lowering soil temperatures and oxygen.

By early summer the cuttings can be on a regular irrigation schedule, ranging from 7 to 10 days on sandy soils to 12 to 21 days on finer textured soils. The objective is to maintain continued active shoot growth until late summer. Intentionally stressing the plants to "force" deeper root penetration is not recommended. It will temporarily stop vine growth and can stunt their development.

Avoid standing water. This can be minimized by proper land planning and ripping prior to planting and by quickly draining low spots after irrigations.

#### C. Fertilization

Nitrogen fertilizer is often not needed the first growing season except on sandy soils. If so, one application in late June to mid-July is sufficient, except in coarse sands where two applications 4 to 5 weeks apart may be needed. Hand placing or side-dressing ammonium nitrate in furrows about 12 inches from the plants is recommended. Sixty to 36 kg of ammonium nitrate per acre, or 56 g to 71 g per vine, is a safe effective rate. Caution should be used when applying an all-ammonium fertilizer such as ammonium sulfate or anhydrous ammonia. Vine burn sometimes occurs with their close placement in sandy soils.

### 5. Pest and Weed Problems

Rabbits, squirrels, caterpillars, and spider mites are the most damaging pests to the foliage of young vines. The vulnerability of cuttings makes it extremely important to protect the foliage from these and other vineyard pests.

Weeds are very competitive with young vines. Perennial weeds, such as Bermuda grass, Johnson grass, and bindweed, should be eradicated before planting. The emergence of annual weeds, especially grasses, can be greatly minimized by treating the vineyard site before planting with a pre-emergence herbicide such as Treflan, Surflan, or Devrinol. Follow label recommendations.