



4 year old vineyard planted using the methods in this guide

Guide To

Propagating Grape Vines Using Two Bud Cuttings

Prepared in conjunction with the Northeast SARE grant

FNE16-849: Propagating Grapevines in Cell Plug Trays and using a Water-wheel Transplanter in Establishing a Vineyard

By Richard Lamoy



Introduction

Before beginning the process of propagating grape vines you will need to decide what variety you wish to work with. Are you familiar with it and all its characteristics? If not you will need to research what type of grapes you want to multiply. That is beyond the scope of this guide and you will need to consult with experts such as Cornell or your local Extension office. If you are familiar with a grape variety you like and want to grow more of them, you will need to decide if you would like to buy vines (either potted plants or bare root vines) or grow your own. There are many ways to grow your own vines and one of those ways is covered here in this booklet about “propagating your own grape vines using small two bud cuttings”.

This guide only covers vine propagation using own rooted vines, not grafted, so in general is more suited to using with hybrids. The following sections break down the methods I have created for growing and planting the healthy vines in a new vineyard.

- **Vine selection**

When choosing vines of the variety you want to use for propagating (making a new vine out of the original vine) select only disease free and virus free vines. To help ensure the vines are virus free without expensive testing purchase some virus free vines which will form a “mother vineyard” and later serve as a source for virus free bud wood. Many of the high quality nurseries have planted new virus free vines as their mother vines from which the new vines are multiplied. You may also get cuttings locally from a vineyard planted from virus free certified stock but be as cautious about your source as is possible. If you aren’t sure they use virus free stock simply ask them. If a vineyard has planted certified virus free vines and practices good sanitation, disease and insect control, the chances of it being a virus and disease free source of propagation material increases.

A source for a bit more information is at the following link from Cornell

[Clean Plant Slides](#)

Also please be sure to honor Trademarked varieties and pay all Royalties, etc due to the developers of those varieties. Many old varieties are past the period where these fees need to be paid but a lot of the newer varieties have those charges to provide incentives and funds for further research and development.

For some more information on that please see the following two pages written by my Technical Advisor for this grant, Anna Wallis who at the time was with the Cornell Cooperative Extension Eastern New York Horticultural Team.



Protecting Plant Material with Licensing and Patents

What growers need to know before propagating cold climate grape vines

Anna Wallis – 4/26/16

When new varieties are released from breeding programs it is very exciting. These varieties can offer characteristics from novel flavors and improved growth habit, to disease resistance and climate adaptation (cold climate grapes!). These improvements have a direct impact on growers, making production more economical in many ways. They may reduce the hours required for management, lower pesticide inputs, or improve the quality of the final product.

However, it takes a tremendous amount of work to create these new cultivars. Typically, years of an individual's time and often it is their livelihood and life's work. In addition, it may take a significant amount of resources from an institution to support the breeding program.

In the past, some breeding programs have released new varieties into the public domain. This is especially true of public research programs that were well-funded by state government. However, as funding has dwindled (and it continues to decline), it has become necessary for breeders to seek alternative funding sources and mechanisms in order to sustain their programs. This includes writing grant proposals to various public and private agencies as well as obtaining royalties through patents.

Here is a summary of the grape breeding programs at Cornell University and the University of Minnesota, two public breeding programs currently responsible for the production of many cool and cold climate grape varieties.

The Cornell Grape Breeding Program

Cornell protects all of its recently released varieties either through Plant Patents or under bailment agreements– which is a form of protection based on Cornell's ownership of the varieties.

Licenses are required in the United States for the grape varieties: Arandell, Aromella, Corot noir, Geneva Red, Marquis, Noiret, or Valvin Muscat. For more information about the varieties, please go to

<http://www.ctl.cornell.edu/plants/plant-varieties.php?plant=Grapes>.

- Propagating vines **for use only in your vineyard** requires a **Plant Variety Use Restriction Agreement** provided by a licensed nursery at the time of purchase.
- Propagating vines **for sale to third parties** requires a **commercial license**. Please contact the Center for Technology Licensing at Cornell University for a license.

The royalty rates vary by variety, and there are (for most varieties) lower prices for in-state vs. out-of-state growers, in recognition of the partial support received from the state of New York. The royalty range is \$0.85-\$1.20 per vine.

For the most part, the industry has been more than honest and the breeders are grateful for that. It takes many thousands of dollars to develop and produce new varieties, and those that benefit from Cornell or other protected varieties should help support the programs that produced them.

The University of Minnesota Grape Breeding Program

Many of the varieties produced by the UMN breeding programs are also protected by patents. Currently, licenses are required for asexually propagating La Crescent, Frontenac gris, Marquette and Itasca grape vines. More information is available on their website: <http://mnhardy.umn.edu/commercial-growers/license>

If you wish to propagate La Crescent, Frontenac gris, Marquette and Itasca grape vines, then you require a license from the University of Minnesota. This requirement applies if you want to propagate even one vine. Each of these varieties have been issued Plant Patents by the United States Patent and Trademark Office. Plant Variety Protection (PVP) has been applied for in Canada for each variety as well.

- Propagating vines ***for use only in your vineyard*** requires a ***vineyard non-distribution license***.
- Propagating vines ***for sale to third parties*** requires a ***plant variety material license***.

Both license types can be easily obtained for each of the four varieties in either the United States or Canada by simply completing an Express license application.

UMN Contact Information:

Thomas K. Hutton
Technology Marketing Manager
Office for Technology Commercialization
University of Minnesota

Cornell Contact Information:

Jessica Lyga
Technology Licensing Officer
Center for Technology Licensing
Cornell University

Both breeding programs emphasize that the royalty income has been extremely helpful in continuing the progress they have made and assuring a continuing series of new cultivars for the future.

Thank you for your cooperation!

- **Selecting bud wood**

Since this program uses two bud cuttings planted into fairly small shallow plug cells we wish to keep the internodal spacing of the cuttings we use between 3 and 4 inches when possible.



Make sure that the shoots selected have hardened off well and most buds are viable (haven't been frozen severely).



Bronze color indicate well hardened shoots



Light Brown ends indicate poor hardening of those ends

- **Prepare Shoots for Cuttings**

Once you have selected good shoots with proper internodal spacing and viable buds use *bypass* pruning shears (as opposed to anvil-type) and make a cut just below the bud where the shoot is about a quarter inch across. If the shoot is very long cut it into manageable lengths of 4 feet or so. Keep gathering them into bundles which may be tied for easier handling later and be sure to label them.



Bypass Pruner



Labeled Bundled Shoots of 25 with moist towels

- **Storing if necessary**

Unless you are going to cut the two bud cuttings for immediate use collect and bundle the shoots and store them until ready. For the shoots and buds to remain viable they must be stored properly. Keep them cool as near freezing as you can get them and be sure to keep the ends moist. For short term storage you can wrap some moistened paper towels around the end. For a bit longer storage you can put the bundles in large trash bags and put some snow in them, tie the bags and keep in a cool storage building.

The whole process of growing the vines ready for field planting is about 3 months so you will want to begin making the cuttings about 3 months before the average last frost day.

When you are ready to prepare the cuttings take the shoots out of storage but be sure to keep the ends moist. I like to work on a white plastic table so you can keep things generally cleaner than an old wooden workbench.

- **Making the Cuttings**

The goal of making good cuttings for rooting and eventually growing a nice healthy little vine begins with making a cutting with simply two nodes with viable buds. The lower node end (raised area on shoot where the buds form) will give rise to the roots for the

vine and the upper node will become the upper green shoots and growth of the vine. Holding the shoot, which will be about the diameter of a pencil, make a flat cut just below or close to the bud. This will become the root end. Leave that bud and one more above it and make a 45 degree cut about an inch or so above that. This is your 2 bud cutting to be callused and later planted. I like to take those cuttings as I make them and drop them in a bucket of water with a weak chlorine solution (about a tablespoon of chlorine bleach per gallon). That will help hydrate the cutting and also kills bacteria and fungi that may be on the cuttings. Re-grab the shoot you just took the cutting off from and make another flat cut at the bud above the 45 you made before. That is the bottom of the next cutting. Repeat the process until there are no more viable sections to the shoot. Sometimes if there is a long node spacing of about 5 to 6 inches you can work around that trying to keep your cuttings in



3 to 5 inch maximum size (3 to 4 is ideal).

- **Callusing**

Once you have prepared the cuttings you need to get them to form calluses from which arise the small roots. To get the best callus formation the nodes at the bottom of the cutting (flat end) needs to be warmed to about 80 to 85 degrees Fahrenheit for about 10 days. If you expose the whole cutting to that temperature it will force the upper bud to open and begin growing before the roots have formed. That will give the appearance of the vine growing and the unsuspecting grower will be disappointed when the newly forming vine collapses. That is due to the lack of root system to take up enough water to replace what the vine is using for growth and transpiration.

The use of a heat mat with a thermostatic control will help warm the bottom if the cuttings are placed in something and put on that. Keep the rest of the room cool (about 50 degrees or less if possible) to slow the cutting from trying to push the upper bud to soon.



Heat mat with cuttings stuck in a couple inches of moist soil.



Callousing cuttings in cell plugs- 8-10 per plug

The goal of the callusing process is to lead to raised thickened bumpy looking calluses sort of like when your hands and feet get calluses on them. These raised bumps give rise to the small young root system. It is at this stage or soon after that the cuttings may be placed individually into the cells of the cell plug tray (described below).



After 10 days or so the calluses form.



This is the beginning of the root system.

Planting trays and plant growing media

Once the calluses have formed, trying to not let them go much further, fill the cell plug trays with a good light well drained soil mixture. I use a commercial mixture of peat with other soil amendments to provide a nice light airy growing medium. The cell plugs I use hold 38 vines in a standard flat (10-20 size) and have drainage holes in the bottom to prevent the plugs from staying too soggy. Fill the cells full of soil and wet down before planting with the calloused cuttings. I use warm water or place on heat mats a couple hours before planting to warm the soil up to about 80 degrees F. This helps the roots form more quickly. **Be sure to label all the flats as they are planted with waterproof ink on plastic or wooden marking tags.** If you are doing quite a few flats and have access to a greenhouse you may plant them in there if it is

heated to at least prevent freezing at night. The dark colored flats and soil will heat up nicely in the sun which helps the roots form more quickly. The air temperature at this point may be warmer since by the time the buds open now, the small roots have formed.



38
Cells

Cell Plug Insert



50

1020 Heavyweight carrying flat



Cuttings planted into the cells –in greenhouse



Planted one week - see roots

- **Growing on to planting size in trays**

Allow the small vines to grow while providing light watering as needed. On really bright hot days you may need to water two or three times a day. Ventilate the greenhouse to let the temperatures remain below 90 or so since if it gets above that much, it will slow growth.



Approximately two weeks after rooting the vines in the cells. Notice label tags.



The vines have been growing for a month or so at this stage.



This is the size I like to get the vines to so they may be hardened off in preparation for field planting. They are about 12 to 16 inches at this point.

- **Hardening the little vines off**

Once the vines have reached the desired size for planting it is a good idea to move them outside where they can be “hardened off”. This allows the vine time to acclimate to the cooler temperatures than it has been growing in and also adjust to windier and possibly drier conditions. I place the flats on level ground where they will remain for a week or two to harden off. You can hold back water just a bit to slow down the growth. When you see a little wilting going on they are being stressed which will toughen them up. You may water them slightly after this. Be sure to soak them down at least once a day because the root balls in the small soil plug are pretty small. If the soil gets completely dry you may need to soak them a few times to rehydrate the soil.



Vines set outside to be hardened off before planting.

- Field preparation

Ideally before planting your new vineyard you have taken time in studying available fields for proper water and air drainage both in and above the soil. Choose sites where the air can move down slope during cold air events so it doesn't pocket in the field and cause cold injury especially from frost and freezes. You need a well drained site with some slope for surface drainage and a moderate to very well drained soil profile. Avoid heavy clay sites as the roots will drown in standing water and can't penetrate a heavy hardpan of clay. Try to work the field a year in advance to properly kill competing vegetation and break up the soil. If that just isn't possible you can use a contact herbicide to kill the current vegetation. Although many don't want to use it, Roundup (glyphosate) will kill the weeds and grasses both above and below the soil surface. This must be done at least a month ahead of planting (preferably more) to allow time for the spray to translocate downward into the roots and kill them. Till the soil to work in the vegetative matter either through a moldboard plow and later harrows or use a large tiller. Go back every few days and till it again until the soil is well worked up without any large clumps of grasses and weeds.



Soil being prepared for planting. It still needs working a couple more passes.

Once the soil has been worked to my satisfaction I go along and mark out the field before planting. If I am using plastic or paper mulch I will lay that after marking the rows out to the spacing I want. In my case I want 10 foot spacing and the tractor is 5 feet center to center of the tires. I flag the field to give a visual aid for driving towards and make one pass. I then drive back in the same track but advancing over one so it moves over 5 feet. Two passes and I have 10 foot spacing.



The new vineyard rows have been marked. Skipping one set of tracks puts me at 10 foot spacing.

- **Mulch for weed control**

One of the most important things in a newly planted vineyard is weed control to cut down on competition for plant nutrients and water. By keeping the mulch there it reduces the weeds close to the vine and also raises the soil temperature which helps with early root establishment and vine growth. If I am laying either the paper or plastic mulch before planting I apply it next by driving down the pre-marked rows every 10 feet. Care must be taken to avoid running over the mulch with the tractor tires as that will rip it or make holes in it to let the sun in and the weeds to grow. I typically leave it on for at least a year and often several years as it cuts down on requirements for sprays. This helps the vines establish since many herbicides can't be used on newly established vines as that kills the hair roots.



- **Planter selection**

The machine incorporated in this planting method uses a relatively inexpensive Water-wheel transplanter to punch holes in the mulch (or soil if not using the mulch). It then puts about a cup of water in each hole before one or two passengers feed one of the plugs with a vine into that hole. The wheels come with different spacing lugs that make the holes. If you use one you have and the holes are too close, just put the vine into the appropriate hole. For example the machine I use makes holes 17.5 inches apart. By placing the vine in every fourth hole, it spaces the vines 70 inches apart (very close to my desired spacing of 6 feet). By adding one more hole, it would be a bit more than 7 feet apart.

These planters can be purchased new as single row for around \$2000 give or take a few hundred depending on options. They may also be used on many vegetable farms so check with neighbors and see if one might be available for rental.

Rain-Flo Model 1600 Planter



- Planting vines

After danger of frost has passed, since these are growing vines, transport the vines you intend to plant to the vineyard site. Be sure to bring the flats of the variety you want and double check all the labels. Mistakes can happen so I would suggest you only transport a single variety at a time.



Once in the field load up the planter, which has been pre-filled with water, and position the planter in the center of the mulch. Flags will make it easier to line up and spot the desired beginning of the row.



Water Wheel transplanter loaded and ready to plant vines shown on the cover page



As the machine moves forward the water wheel punches the plastic mulch or bare soil making a small hole. The water runs while moving and puts about a cup of water in each hole. The rider on the machine (either one or two can be used) takes single vines and pushes the soil plug with vine into the muddy hole. Once the vines are planted into the plastic or bare ground go back through and straighten up or uncover any vines necessary (sometimes the shorter vines will be covered with the plastic if the wind is blowing). If needed place a couple small stones near the vine to keep the plastic down on the soil which prevents the vine from getting covered again.



Dry during planting – notice the light soil.

After receiving nice rain after planting

- **Growing on first season**

As the vines grow I keep the soil cultivated between the rows for the first year at least until after I can place the trellis posts. I usually wait until the second spring to further work the mid row and seed with some sort of cover crop (generally fescue in my case). Keep the hole in the

plastic mulch near the vine free of weeds. Also control any disease and insects and consider using grow tubes if you have high animal pressure from rabbits and deer.

- Staking vines

To get straighter vines they can be given some sort of support such as bamboo stakes or some growers use 5 foot lengths of half inch conduit pipe. I prefer bamboo since it is inexpensive and biodegradable. As the vines grow just fasten them to the stakes loosely. There are tape guns you can get or use small rubber tie bands.



End of the first growing season showing bamboo stakes and tape fastening



- Trellising

You will need to provide some sort of trellising system for your vines. I plant and then later put in the posts, anchors and wiring. It is beyond the scope of this simple guide to get into specifics of types of trellis, advantages and disadvantages of each kind and training systems of the vines. For the vineyards I have shown here I used cedar posts both for end posts, anchors and in-line posts. The vine spacing is around 6 feet and the posts are set 24 feet apart with 4 vines between posts. I use 2 wires set at 3 feet and 6 feet. The wires are fastened to the posts with large fence staples, wrapped around the end posts and fastened with a gripple fastener at each end. It works well to use rubber ties to fasten the bamboo poles to the lower wire. I then use some sisal twine between the wire at the pole and the top wire. This allows the vine to be trained fairly straight to the top wire.

I use a small tracked bobcat type walk behind skid steer to dig post holes but they can be done with a shovel or a post pounder. If this can be done shortly after planting the trellising system can be put into place the first year enhancing the whole training of the young vines. I haven't been able to get it done the first year and have had to go as long as the third spring before. Always try to get it done as soon as possible.





First year of training onto Top Wire Cordon training system



Year 5 – Marquette Grapes in the vineyard from the cover page.

- **General Comments**

Using this system with the cell plugs and transplanter it is possible to get the new vineyard into limited production either the third or fourth growing season with full production a year later. These vineyards use Top Wire Cordon (high wire cordon) with fairly vigorous cold climate hybrids since I am located in upper New York State just below Quebec. My oldest vineyard planted using this system is seven years old and a few vines have died from being girdled by mice a few years ago. So far they have been able to be replaced by bringing up a replacement shoot from below the girdling damage. One nursery owner expressed concerns with my method shown here as he is afraid that the roots will heave upward since there is so little buried stem at planting. I have seen zero evidence of this so far but want to express here that could be a slight possibility.

This guide has been prepared with the financial support of the **USDA NESARE** program. It is meant to be a general guide to show you an alternative method for propagating grapevines for commercial expansion. It gives you a summary of a system I have developed over my lifetime as an Agronomist and Farmer. This is not intended to be a specific recommendation or preferred practice but simply a less expensive alternative to buying ready to plant vines. I am not recommending any supplier of vines or planting equipment or supplies over any other.

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