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**MICHIGAN 4-H VITICULTURE**

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**LET'S  
GROW  
GRAPES**

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**PARTICIPANT NOTEBOOK**

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# Introduction

## Why Grow Grapes?

- Grapes are grown in all 50 states.
- In Michigan, grapes provide over 46,000 jobs (WineAmerica, 2022).
- Grapes are one of the fastest growing commodities in Michigan.

*Let's Grow Grapes: Michigan 4-H Viticulture* is an introduction to the grape industry, focusing on growing grapes and exploring careers in *viticulture* (the science and practice of cultivating grapes). The purpose of the 4-H Viticulture Project is to create an interest and provide an opportunity for 4-H youth, ages 12 to 19, to engage with industry professionals in the grape industry.

While learning about grapes, you may want to know more about this growing industry. Take time to research more about growing and processing grapes into a variety of products.

You may also want to learn more about careers not highlighted in *Let's Grow Grapes*. There are many careers in the grape industry including marketing, supply chain management, engineering, teaching, hospitality, food science, and more. You may find one that's right for you.

This Participant Notebook contains general questions and worksheet pages that interrelate to all 13 lessons and encourage engagement to increase your understanding of viticulture. It also contains an appendix, which includes the Careers section, Grape Fast Facts, Recipes, a Glossary, a list of Animated Videos, and an activity "Growing Grapes in Containers."

When you participate in the *Let's Grow Grapes* project, you will:

- Enhance science, technology, engineering, and math (STEM) through viticulture.
- Explore careers in viticulture and the grape and wine industry.
- Engage in hands-on experiential learning activities involving viticulture and the grape and wine industry.

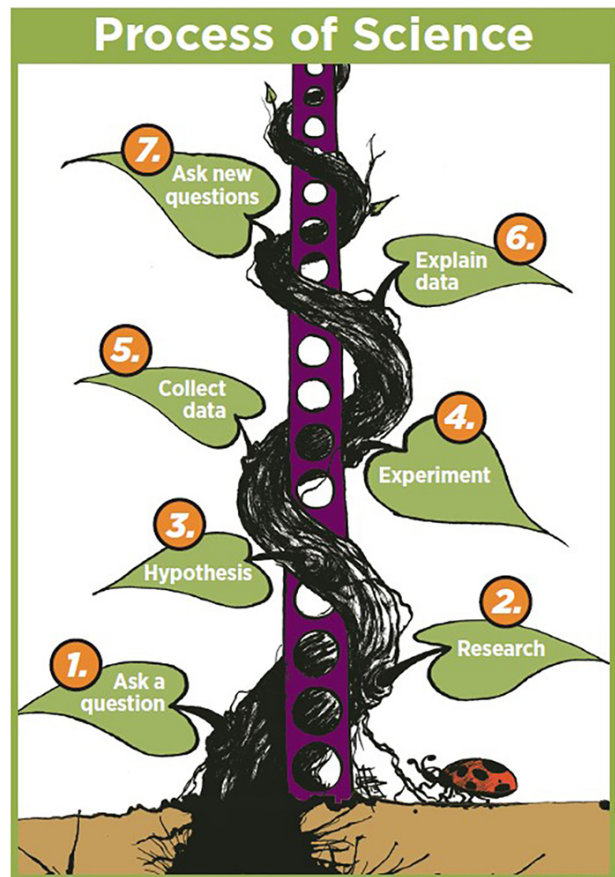


Illustration courtesy of Patrick Bird

## Experiential Learning

4-H uses a "learn by doing" methodology called experiential learning, which is evident in the Michigan 4-H Process of Science model.

- 1. Ask a Question:** Youth ask questions based on an experience or observation.
- 2. Research:** Youth explore and gather information through discussions, observations, books, or online resources to develop potential answers to their question.
- 3. Hypothesis:** Youth develop a potential answer to the questions they'd like to explore.
- 4. Experiment:** Youth test their hypothesis through experimentation and discussion with experts.
- 5. Collect Data:** Youth analyze and evaluate the data and information they collect.
- 6. Explain Data:** Youth share the results of their experiment with others, what they think it means, and how their new understanding might be used in different situations.
- 7. Ask a New Question:** Youth explore new questions and ideas that came up while exploring answers to their original question.





## 4-H Pledge

I pledge

My HEAD to clearer thinking,

My HEART to greater loyalty,

My HANDS to larger service and

My HEALTH to better living,

For my club, my community, my country, and my world.



## Reference

WineAmerica. (2022). *What's wine worth? 2022 Michigan economic impact study*. National Association of American Wineries. <https://bit.ly/46Zq6lZ>



1-1

# How Did Winemaking Evolve in Michigan?

## GENERAL QUESTIONS

Date: \_\_\_\_\_

1. When were grapes first established in Michigan?

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2. Name one person who helped establish vineyards in Michigan.

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3. How did the Detroit River aid in the establishment of winemaking in Michigan?

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4. Explain what AVAs are.

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5. What government agency regulates AVAs?

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6. Why are there so many vineyards planted near Lake Michigan's lakeshore?

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7. List at least one career related to winemaking or agritourism.

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1-2

## How Did Winemaking Evolve in Michigan? History of the Wine and Grape Industry Articles

### The history of Michigan's wine and grape industry – Part 1

By Dixie Sandborn

**T**he Great Lakes state can attribute its rich agricultural history to its geographic location. Michigan's unique shape, rich soil distribution, the formation of the Great Lakes, and thousands of miles of shoreline are all due to glacial movement thousands of years ago. These unique features, along with hard-working agriculturalists and entrepreneurs, make the number of Michigan's diverse agricultural commodities second only to California.

One of these agricultural commodities is grapes, which are grown for both juice and wine. Grapes have a long and interesting history in Michigan. Surprisingly, the first vineyards were started by farmers in Monroe County in southeast Michigan. Prior to the establishment of these vineyards, French explorers discovered wild grapevines along the Detroit River as early as 1679. The first known grapevines to be planted in Michigan were planted at Fort Pontchartrain du Detroit (later the name was shortened to Fort Detroit in 1751) by Commander Antoine de la Moth Cadillac in 1702. In a letter written to dignitaries in France, Commander Cadillac reported the fort's progress, which included details on the planting of a vineyard.

French exploration continued throughout the area using a river as their roadway. In 1792, they named this river the Raisin River due to the abundance of wild grapes found along the river's banks. The Raisin River flows nearly 139 miles through five counties before emptying into Lake Erie. During this time, it was popular for the local people to gather and ferment the wild grapes from the river's bank, producing wine for their personal consumption.

Joseph M. Sterling, a resident of Monroe County who had learned winemaking in Europe, was the first pioneer to establish a wine company. In 1868, Point Aux Peaux wine company was established and later grew to include 100 acres of grapes in Monroe County. He encouraged other local farmers to grow grapes throughout the area and by the late 1800s, this region produced over half of the state's wine. The wine produced was sold locally and shipped to Chicago, New York and Philadelphia. Sterling State Park in Monroe County is named after this famous

viticulturalist and winemaker's son, William C. Sterling.

Although Monroe County was the home of Michigan's first commercial winery, wine and grape juice were produced in other places by individuals throughout Michigan. Vineyards were planted in west Michigan, close to Lake Michigan's temperate shoreline to meet the demands of the growing juice and wine industries. Because of the temperate climate, west Michigan became known as the Fruit Belt.

As grape growing and wine making was expanding, the United States passed the 18th Amendment, prohibition, in the early 1900s. Prohibition made it illegal to produce, transport and sell beverages containing alcohol. Even though prohibition did not make consuming alcoholic beverages illegal, many vineyards and wineries went out of business.

During prohibition, bootleggers were bringing beer, wine and spirits to southeast Michigan from Canada via the Detroit River. The Detroit River was a smuggler's dream. It is less than a mile across in many places, is 28 miles long and has thousands of coves and great hiding places along its shore and among the islands scattered throughout the river. During prohibition, 75% of the alcohol supply came into the United States from Canada via the Detroit River, Lake St. Clair and the St. Clair River.

This article was published on the Michigan State University website on December 4, 2023, at <https://www.canr.msu.edu/news/history-of-michigans-wine-and-grape-industry-part-1>



## The history of Michigan's wine and grape industry – Part 2

By Dixie Sandborn

For a more detailed look at the fascinating history of vineyards and winemaking, I suggest checking out the book *The History of Michigan Wines – 150 Years of Winemaking Along the Great Lakes* by Lorri Hathaway and Sharon Kegerreis. This book details Michigan wine industry's triumphs and tribulations. It gives a glimpse into one of Michigan's important agricultural commodities. Grapes add millions of dollars to Michigan's economy. Juice, jelly and wine, as well as agritourism and related industries, benefit from grapes, thanks to those early pioneers, farmers and entrepreneurs who planted vineyards throughout Michigan.

During the 1800s, as the wine industry was becoming well-established in southeast Michigan, vineyards were being planted throughout the state. When fresh grapes from local vineyards were not available, dehydrated grape bricks and fresh grapes were purchased from California to supply the growing demand for wine in the region.

Numerous vineyards were planted with Concord and Niagara grapes in southwest Michigan for both juice and home winemaking. Concord grapes growing in this region caught the attention of Dr. Thomas Bramwell Welch and his son Charles Welch from Vinland, New Jersey. The Welch's first pasteurized Concord grape juice in 1869 as an alternative to fermented wine for church communion services. Welch's Grape Juice was originally marketed as Dr. Welch's Unfermented Wine, Pure Grape Juice. The Welch's unfermented juice became a success after the World's Fair in Chicago, Illinois, in 1893. In 1919, a Welch's plant was established in Lawton, Michigan, in Van Buren County, to help supply the nation's thirst for unfermented grape juice.

The Welch's encouraged growers to plant vineyards throughout the region. In 1918, a grape jam was invented called Grapelade and sent to the U.S. Army service members fighting in World War I. With the growing love for grape jam, Welch's grape jelly made its debut in 1923. Welch's is a farmer-owned cooperative and grows grapes in four regions around the Great Lakes. Southwest Michigan is home to many of those farmers. Historically in Michigan, most of the grapes grown have been table grapes used for juice and jelly.

Northern Michigan near Grand Traverse Bay, as well as the Leelanau and Old Mission Peninsulas, proved to be a very suitable place to grow viniferous grape varieties from Europe. This is largely because of the unique microclimate and lake effect resulting from their proximity to Lake Michigan. Farmers in Grand Traverse and Leelanau counties were planting vineyards along with cherries, apples and other fruits. Soon this area became known as wine country. To learn more about the history of individual vineyards, check out *The History of Michigan Wines* book.

In 1855, Michigan Agricultural College, now known as Michigan State University, was established to improve agricultural practices around the state. Horticulture became an independent department in the college in 1883 under the leadership of Liberty Hyde Bailey. Michigan's first agriculture experiment station was established in South Haven, Michigan, in 1889. The experiment station was located at the farm of Theodatus T. Lyon. He had extensive plantings of various fruit cultivars, including 87 varieties of grapes.

The experiment station was instrumental during the late 1990s through today in researching cold hardy grape varieties developed for the wine industry. Leading the research and development of these varieties is the University of Minnesota, along with Cornell and other universities. Cold hardy grapes grow in a broader geographic area and can withstand the harsh winters of the upper Midwest and Northeast United States.

With the growing availability of cold hardy grape varieties, commercial vineyards can be established and sustained in non-traditional grape-growing areas. Vineyards and wineries are popping up throughout Michigan. From the U.P. to Detroit, you can find locally grown grapes supplying wineries to make a great selection of local wines. This is exciting as cold hardy grape varieties add a pathway for new and small farmer sustainability in the expansion of grapes as a leading commodity in agricultural industries.

This article was published on the Michigan State University website on December 4, 2023, at <https://www.canr.msu.edu/news/history-of-michigans-wine-and-grape-industry-part-2>







# Michigan Viticulture: How Did Winemaking Evolve in Michigan? WORKSHEET



Figure 1-3a. Map of Michigan counties. Credit: GISGeography.

Use this first map of Michigan counties (Figure 1-3a) and the map of Michigan's American Viticultural Areas (AVAs) (Figure 1-4) to color code the AVA sites.

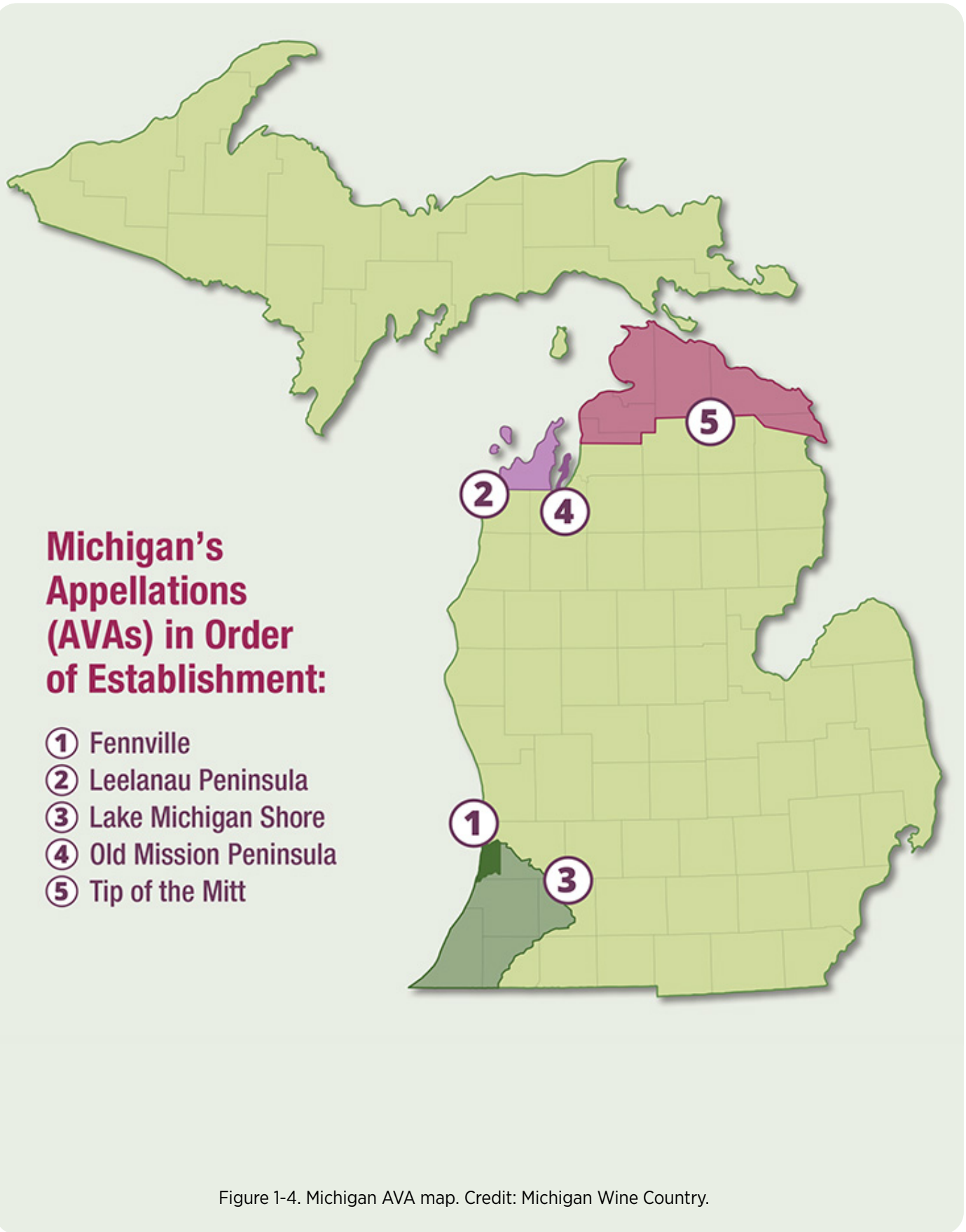


Figure 1-4. Michigan AVA map. Credit: Michigan Wine Country.



Figure 1-3b. Map of Michigan counties. Credit: GISGeography

Use this second map of Michigan counties (Figure 1-3b) to color the counties where historically grapes have been grown.





# Digging Deep: What Type of Soil Is in the Vineyard? WORKSHEET

Date: \_\_\_\_\_

### General

List three characteristics of soil you think are important for grapevines.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Water Infiltration Test Part 1 – Unsaturated Soil

Soil profile observations:

1. What is the soil texture?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Are there distinct and visible layers of soil in each hole?

\_\_\_\_\_  
\_\_\_\_\_

3. What colors do you see?

\_\_\_\_\_  
\_\_\_\_\_

4. Are there rocks or gravel present?

\_\_\_\_\_  
\_\_\_\_\_

5. Sketch the soil profiles for each hole dug. Note your observations next to your sketch. Extra space has been supplied.

Large empty box for Soil Profile #1 sketch and observations.

Soil Profile #1  
Include sketch and observations.

Large empty box for Soil Profile #2 sketch and observations.

Soil Profile #2  
Include sketch and observations.

Large empty box for Soil Profile #3 sketch and observations.

Soil Profile #3  
Include sketch and observations.





**Water Infiltration Test Part 2 – Saturated Soil**

1. How long did it take for the water to infiltrate the soil for each hole? Use the following table to enter your data.

**Soil Infiltration**

Hole #	Predominant soil type	Time of infiltration #1	Time of infiltration #2

2. Use the following table to determine the predominant soil types based on the rate at which water soaks into the soils.

**Water Infiltration Rates by Soil Type**

Soil type	Sand	Silt	Clay
<b>Rate</b>	2.5 inches/hour or 4 hours total for the water to drain out of the hole	½ inches/hour or 12 hours total for the water to drain out of the hole	1/3 inches/hour or 18 hours total for the water to drain out of the hole





**Soil Texture by Feel Test**

Use one bag of soil collected from the surface (1-3 inches) of each hole. Put a small handful on a piece of white paper for contrast. Record your observations In the "Soil Observation" table that follows. Then answer these questions:

1. How does it feel? \_\_\_\_\_
2. What is the color? \_\_\_\_\_
3. Can you see individual particles?\_\_\_\_\_
4. Compare vineyard samples to purchased topsoil, potting soil, and beach sand.
5. Take a small handful of vineyard soil and squeeze it into a ball. Answer the following questions:
  - Does the soil hold together when you release your fist?\_\_\_\_\_
  - Does water come out like you are squeezing a sponge, or is it dry? \_\_\_\_\_
  - What does it smell like? \_\_\_\_\_

**Soil Observation**

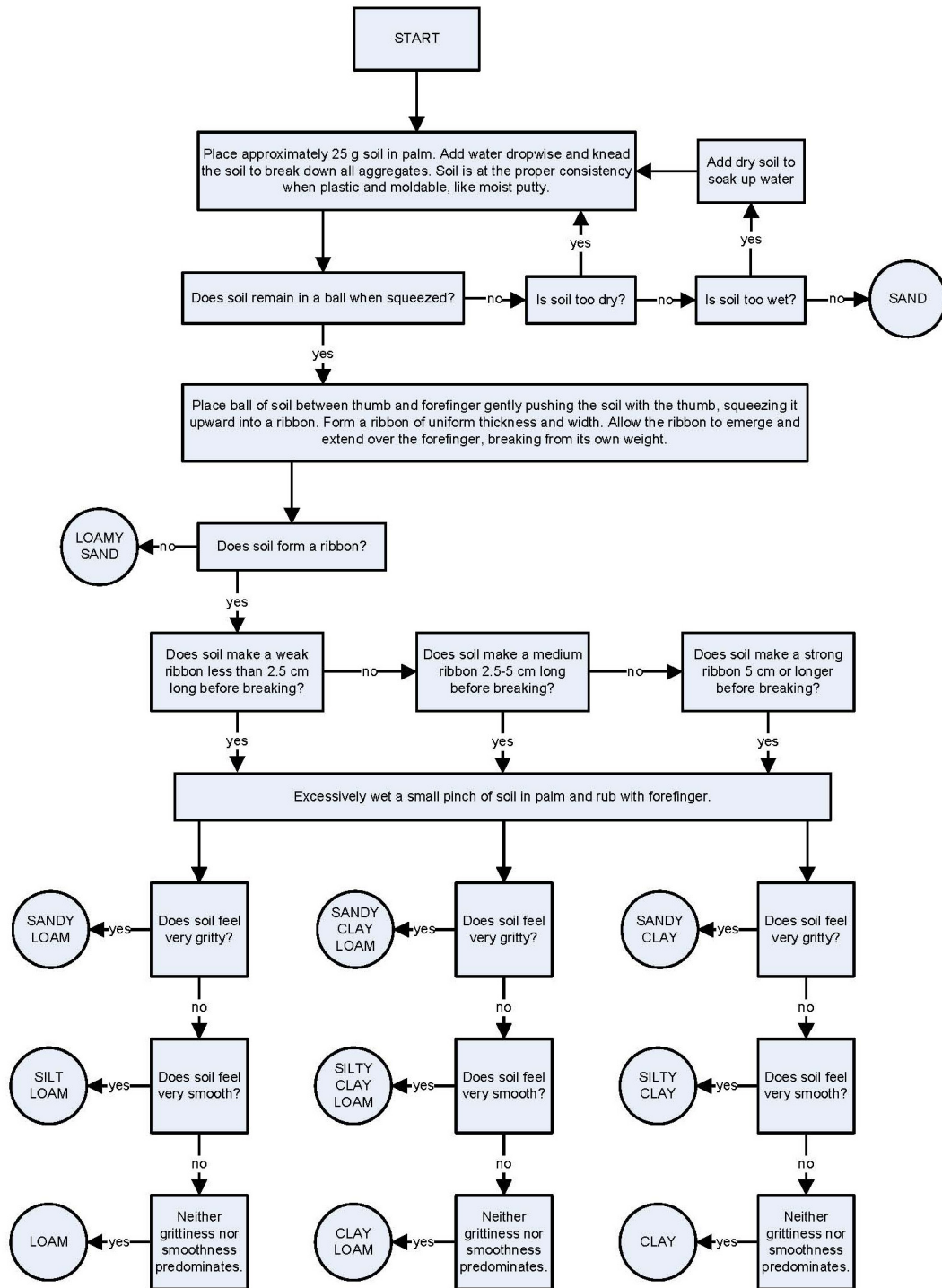
Hole #	Predominant soil type	Soil texture by feel observations	Soil shake observations





Guide to Texture by Feel

Modified from S.J. Thien, 1979. A flow diagram for teaching texture by feel analysis. Journal of Agronomic Education. 8:54-55.



Texture class is one of the first things determined when a soil is examined. It is related to weathering and parent material. The differences in horizons may be due to the differences in texture of their respective parent materials.

Figure 2-2. Soil Texture by Feel Key. Credit: U.S. Department of Agriculture, Natural Resources Conservation Service.

<https://www.nrcs.usda.gov/sites/default/files/2022-11/texture-by-feel.pdf>

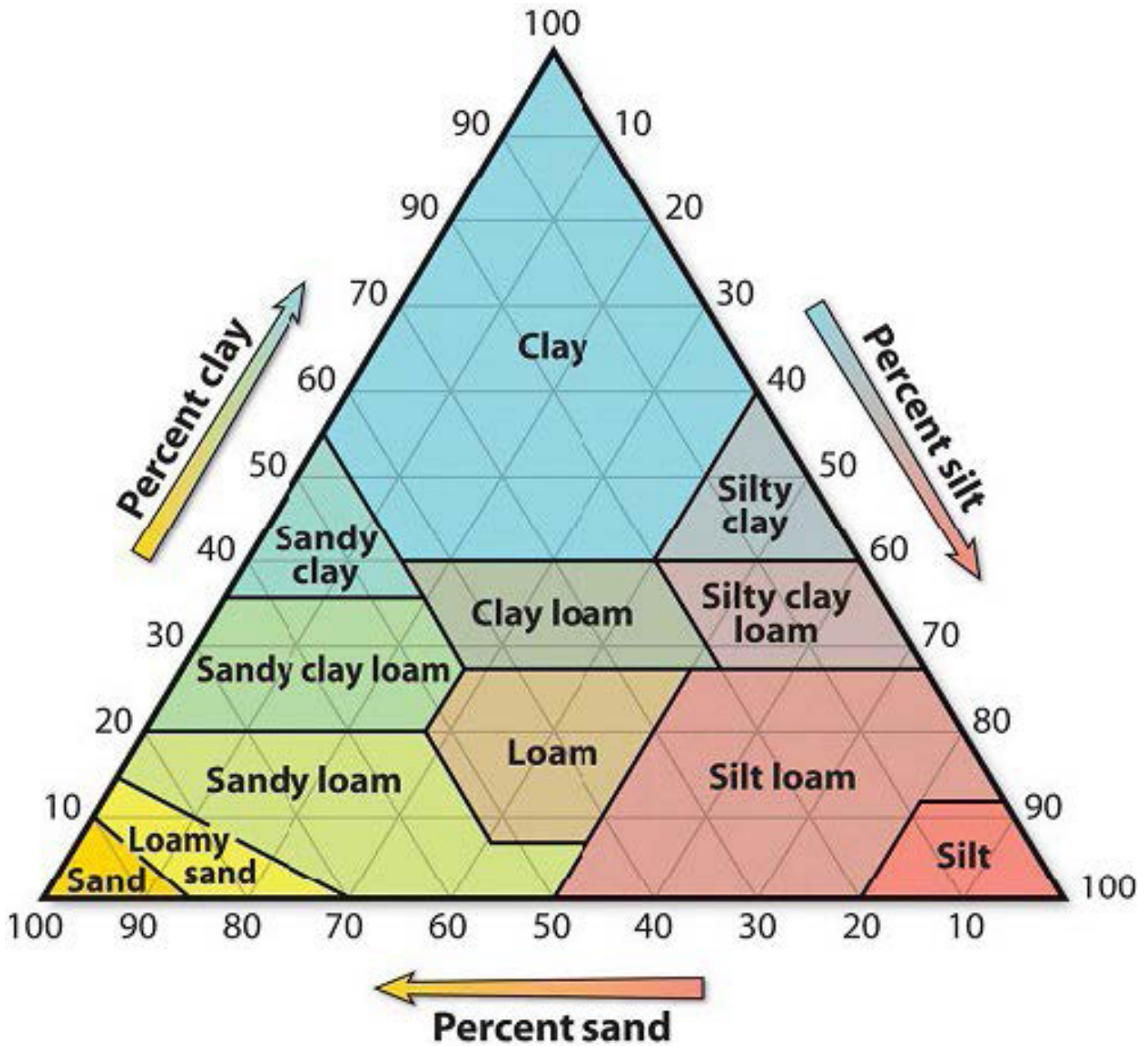


Figure 2-3. USDA textural triangle showing the percentages of clay, silt, and sand in the 12 basic texture classes.

Source: Soil Science Division Staff. 2017. Soil survey manual. C. Ditzler, K. Scheffe, and H.C. Monger (eds.). USDA Handbook 18. Government Printing Office, Washington, D.C. (page 125).

<https://www.nrcs.usda.gov/sites/default/files/2022-09/The-Soil-Survey-Manual.pdf>





**Soil Shake Test**

Put one cup of the vineyard soil collected from the surface (1-3 inches) of a hole you dug into a clear quart jar. (Optional: Repeat for each hole.) Do the same thing with the store-bought potting soil, topsoil, and beach sand. Fill each jar with water, leaving one inch at the top. Close the lid tightly. Answer these questions:

1. What has changed?

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2. Compare the different samples.

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Shake up the jar. Answer the following questions:

1. What has changed?

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2. Is the water cloudy?

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3. What settles to the bottom?

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4. What floats to the top?

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Compare and contrast the different samples from your vineyard soil samples. Record observations in the previous "Soil Observation" table.

Let stand for at least one hour.

After the soil has settled, you should have several layers of soil in your jar.

- The bottom layer is gravel – larger visible rock particles.
- The next layer from the bottom is sand – coarse grains.
- The third layer is silt – fine grains of rock.
- The next layer is clay – very fine grains that are slimy and slippery.
- The last layer is humus or organic matter – a dark layer of fine particles mixed with water created when plants, leaves, sticks, and insects die and decompose. You may see organic matter floating on the top of the water.
- Calculate the percent sand, percent silt, percent clay for the vineyard soil, by measuring the total amount of each material on the bottom of the jar. A definitive line should have formed between the layers. Record the percentage for each in your project notebook on the same page as the profile for each hole.

1. Compare these results with your Soil Texture by Feel results.

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2. Did you see a correlation between the type of soil and the infiltration rates?

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**Careers**

1. List at least one career involved in the care of grapevines especially related to soils.

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2. Would you like to know more about this career?

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3-1

# Canopy Exploration: What Affects Canopy Health? WORKSHEET

Date: \_\_\_\_\_

1. After observing the vineyard canopy, answer the following:

What is the general health of the canopy?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Why is it important to have a healthy canopy?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Describe any signs of leaf discoloration you see:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Note the berry ripeness:

\_\_\_\_\_  
\_\_\_\_\_

Describe any signs of insects:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Describe any signs of diseases:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What is one characteristic of an insect pest or disease you observed?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. How would you become an ampelographer?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What is the importance of ampelography?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Name 6 parts of a grapevine.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. List at least one career involved in the care of grapevines.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Would you like to know more about this career?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_





3-2

# Canopy Exploration: What Affects Canopy Health?

## FIGURES

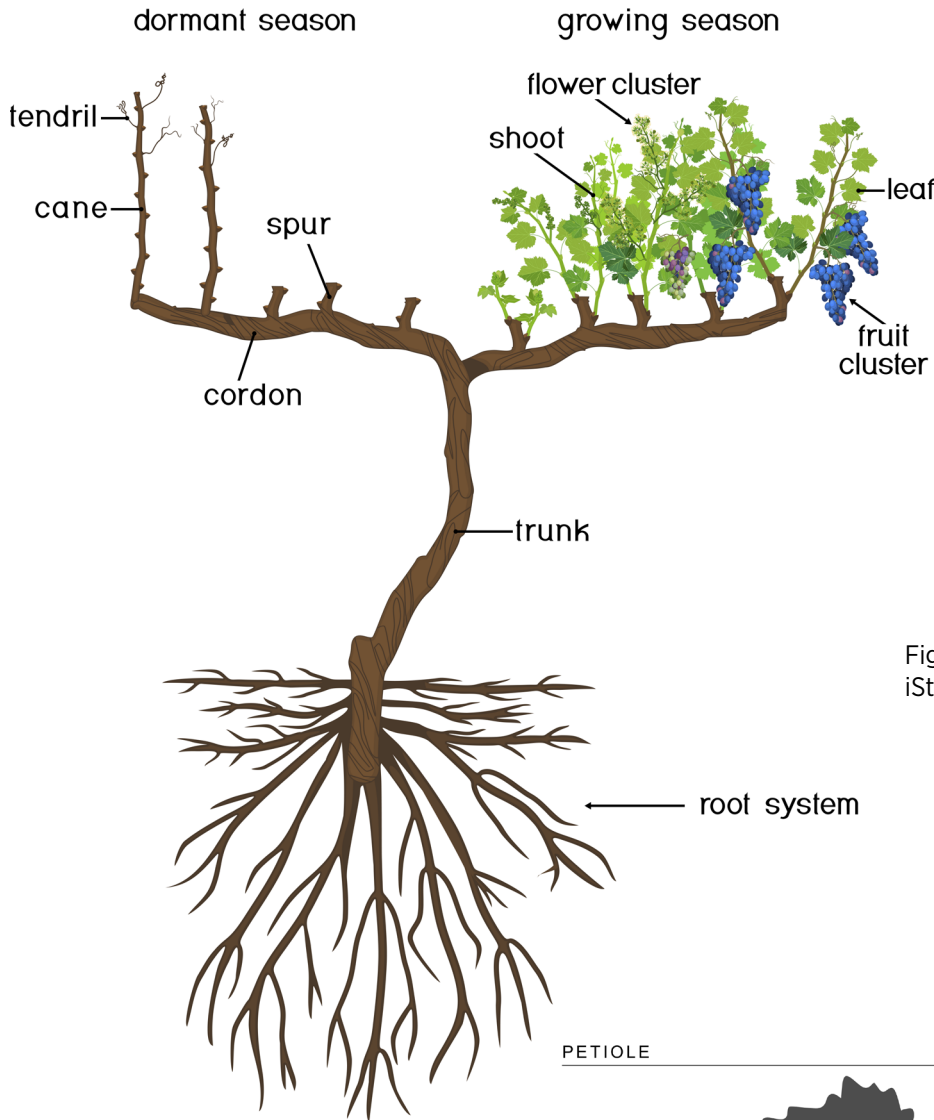


Figure 3-1. Diagram of grapevine. iStock credit: mariafaya

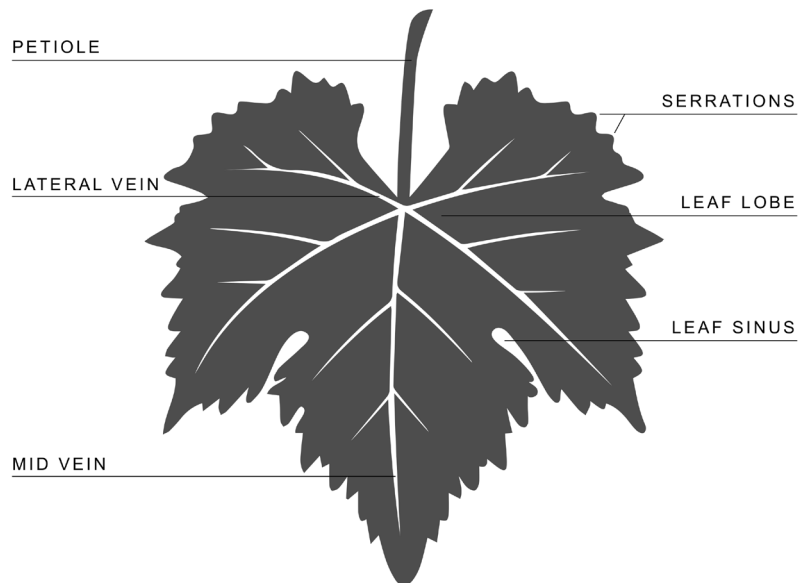


Figure 3-2. Grape leaf diagram. Created by KJMDigital





# Canopy Exploration: What Affects Canopy Health?

## LEAF RUBBINGS

Create leaf rubbings of at least three different varieties on the following pages. Label each rubbing. Using the leaves and rubbings, compare the size, blade, serrations, color, and vein pattern. Note observations.

Leaf rubbing 1: Variety \_\_\_\_\_



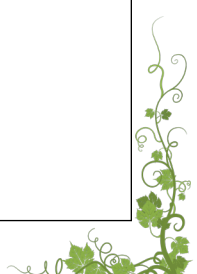
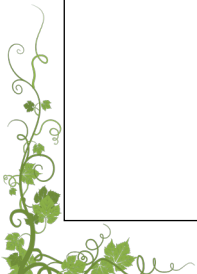


Leaf rubbing 2: Variety \_\_\_\_\_





Leaf rubbing 3: Variety \_\_\_\_\_





# Pruning Dormant Grape Vines: When and Why Should Grapevines Be Pruned?

## GENERAL QUESTIONS

Date: \_\_\_\_\_

1. Explain why pruning is important:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Explain when pruning should take place and why that is important:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Why are trellis systems important in the vineyard?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Name two different types of trellising systems.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. What kind of trellis system(s) are used in the vineyard you visited, and what varieties of grapes were growing on the trellises?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. List at least one career involved in the care of grapevines.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Would you like to know more about this career?

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\_\_\_\_\_  
\_\_\_\_\_





# Pruning Dormant Grape Vines: When and Why Should Grapevines Be Pruned?

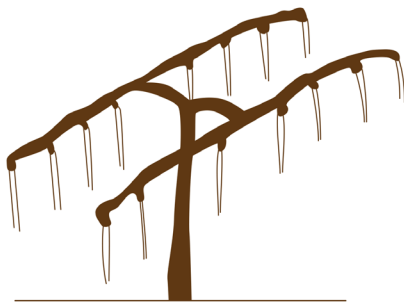
## FIGURES



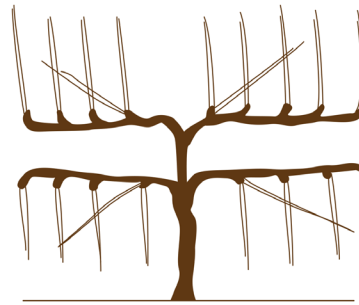
double cordon



high wire



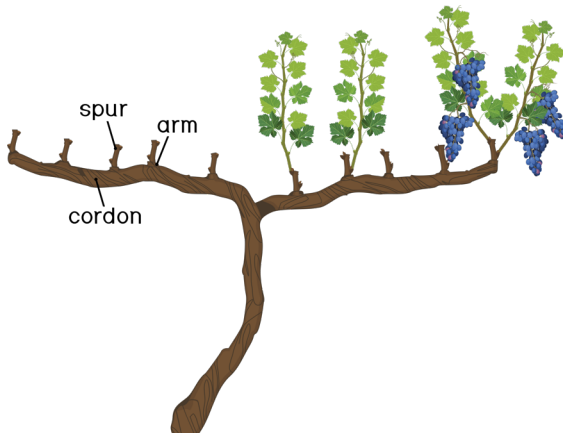
geneva double curtain



scott henry

Figure 4-1. Examples of trellis systems. Created by KJMdigital

## spur pruning



## cane pruning

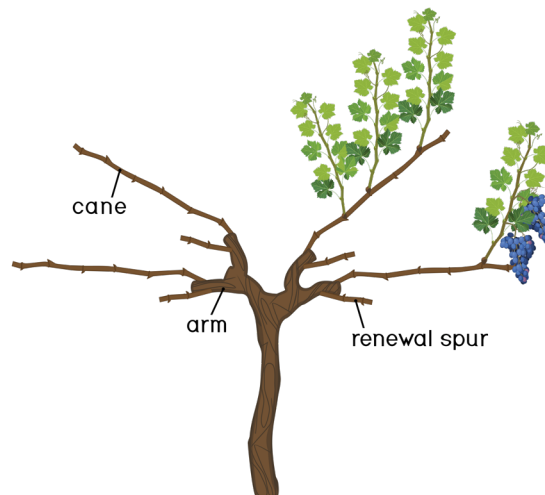


Figure 4-2. Diagram of spur pruning and cane pruning. iStock credit: mariflaya





# Grape Chemistry: Are the Grapes Ready for Harvest?

## WORKSHEET

Date: \_\_\_\_\_

### Assessing grapes by taste:

Record your observations on Table 5-1 "Assessing Grapes by Taste" provided.

1. Take a sample berry and place it in your mouth. Do *not* chew it.
  - Feel the surface of the grape with your tongue.
  - Using your teeth and tongue, carefully bite into the skin of the grape and slip the pulp out of the skin.
    - ◇ Did the skins easily slip off the grape pulp?
    - ◇ Is the skin sweet or tart?
    - ◇ Did you notice anything else about the skin?
    - ◇ Is the juice sweet or tart?
    - ◇ What is the texture of the pulp?
  - Does the grape have seeds? Gently remove the seeds.
    - ◇ What color are the seeds?
    - ◇ How do the seeds taste?
2. Repeat with another variety of grape (or same variety from another area of the vineyard).
3. Compare and rank by taste, 1 to 5. Number 1 will be the least sweet; number 5, the sweetest.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

- Discuss with a partner how you ranked the varieties.
  - ◇ Which variety do you think has the most sugar?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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 \_\_\_\_\_  
 \_\_\_\_\_  
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  - ◇ Did your partner rank them the same?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_





Table 5-1. Assessing Grapes by Taste

Variety					
Did the skins easily slip off the grape pulp?					
Is the skin sweet or tart?					
Did you notice anything else about the skin?					
Is the juice sweet or tart?					
What is the texture of the pulp?					
Do the grapes have seeds?					
What color are the seeds?					
How do the seeds taste?					

Add other notes or comments about tasting the grapes and seeds.

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**Table 5-2. Assessing Grapes by Chemistry**

Variety					
Brix reading					
pH					

Are your grapes ready to harvest? Explain why or why not.

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# Grape Chemistry: Are the Grapes Ready for Harvest?

## FIGURES

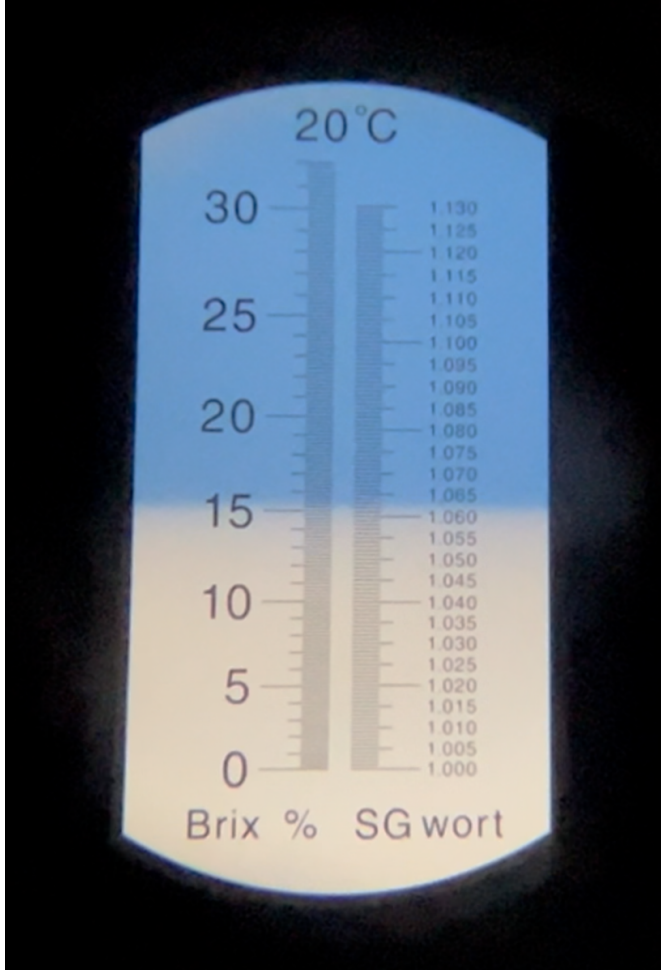


Figure 5-2. Photo of refractometer scale.  
Photo credit: Hayley Wineland.

The correct reading of Brix for the refractometer is 15.2. This is the point where the blue meets the white. (See Figure 5-2).

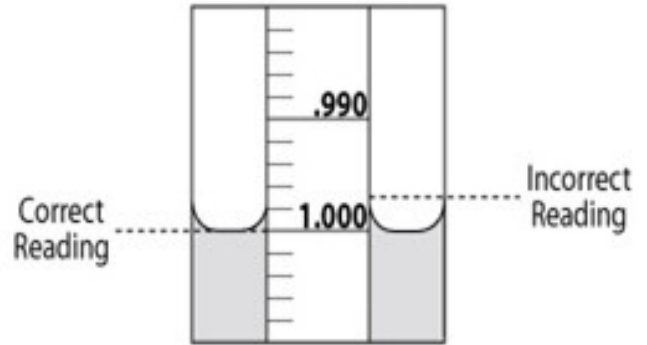


Figure 5-3. A hydrometer reading. Created by KJMdigital.

The correct hydrometer reading for Figure 5-3 is 1.000.





# Spring in the Vineyard General Questions

Date: \_\_\_\_\_

1. After observing the vineyard, note items that are unique to spring in the vineyard.

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2. List jobs or tasks that need to be done in the spring in the vineyard.

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3. List one task that is only performed in the spring in the vineyard.

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4. Identify the key careers that are needed for jobs or tasks identified in question 2.

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Any other notes or comments:

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6-2

# Careers in the Vineyard Interview Questions

1. Name of interviewee

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2. What is your job title?

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3. When and how did you discover you were interested in a viticulture career?

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4. What was your educational pathway to this career?

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5. How did you learn this position was available, and how did you apply for it?

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6. Where would you look today to find positions available in a vineyard?

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7. What are the three main responsibilities of your job?

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8. What is the most rewarding part of your job?

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9. What are three challenges to doing your job?

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10. Would you recommend a career in viticulture?

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11. Why do you like coming to work every day?

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Any other notes or comments:

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6-3

# Seasonal Scenarios for Spring

## Spring in the Vineyard Scenario 1

### Pruning

It is a balmy 20 °F and snow is in the forecast. The apprentice, Derrick, has just completed his online course in spring viticulture. He is going to demonstrate to his mentor his knowledge of pruning Marquette, a red grape developed by the University of Minnesota. The winery he works for makes an award-winning Rosé from these grapes, so Derrick wants to make sure that his pruning decisions take into account the desired cropping levels of 3 tons per acre. As he prepares for a day in the vineyard, he sharpens his tools, dresses in several warm layers, and fills his thermos with coffee.

**Directions:**

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

**Questions:**

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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 \_\_\_\_\_  
 \_\_\_\_\_
2. What vineyard careers are represented by the people in the vineyard?  
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3. What is each person doing in this vineyard scenario?  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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6. What evidence is provided that tells you about the current season in the vineyard?  
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# Spring in the Vineyard Scenario 2

## Soil Sampling and Amendments

A vineyard consultant, Dave walks a future vineyard site with the owner discussing potential plans for later this spring. A crew operating backhoes follow behind them ready to dig soil pits. Dave would like to assess the soil horizon and collect soil samples on the 35-acre site. Based on the micronutrients and macronutrients, he will make suggestions on soil amendments, cover crops, and the grape varieties including rootstock he recommends to plant. Dave is hoping that he can convince the reluctant owner to use organic agricultural practices from the onset. He believes that with proper variety selection, trellis systems, rootstock, compost applications, active scouting, good integrated pest management practices, and precisely timed sprays that he can manage this vineyard organically.

### Directions:

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

### Questions:

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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2. What vineyard careers are represented by the people in the vineyard?  
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3. What is each person doing in this vineyard scenario?  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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6. What evidence is provided that tells you about the current season in the vineyard?  
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# Spring in the Vineyard Scenario 3

## Planting a New Vineyard

On a sunny day in the early spring, a group of friends gather to help their creative, entrepreneurial, hobby-farming friend, Dr. John, plant a new vineyard. He keeps a large garden and 2 acres of heirloom apples, pears, and apricots as well as three horses and two alpacas. He enjoys entertaining under his grape-covered pergola next to his large duck pond. Last fall, Dr. John met with a vineyard consultant, visited a local winery to talk with a winemaker, and mapped out a plan to add 1 acre of Marquette grape vines to his 10-acre farm. The 630 dormant bareroot vines were shipped from a grape breeder in upstate New York on May 12 and have been sitting in large buckets of water rehydrating in the barn. Dr. John and his friends plant the vines into the predrilled holes. It has been very wet this spring. Covered in mud, they struggle to move vehicles, even the gator, through the waterlogged soil. It takes an exceptionally long time to plant each vine. When they are finally done, they celebrate, muddy, by a bonfire.

### Directions:

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

### Questions:

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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2. What vineyard careers are represented by the people in the vineyard?  
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3. What is each person doing in this vineyard scenario?  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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6. What evidence is provided that tells you about the current season in the vineyard?  
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# Summer in the Vineyard General Questions

Date: \_\_\_\_\_

1. After observing the vineyard, note items that are unique to summer in the vineyard.

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2. List jobs or tasks that need to be done in the summer in the vineyard.

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3. List one task that is only performed in the summer in the vineyard.

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4. Identify the key careers that are needed for jobs or tasks identified in question 2.

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Any other notes or comments:

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# Careers in the Vineyard Interview Questions

1. Name of interviewee  
\_\_\_\_\_
2. What is your job title?  
\_\_\_\_\_
3. When and how did you discover you were interested in a viticulture career?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. What was your educational pathway to this career?  
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\_\_\_\_\_
5. How did you learn this position was available, and how did you apply for it?  
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\_\_\_\_\_  
\_\_\_\_\_
6. Where would you look today to find positions available in a vineyard?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. What are the three main responsibilities of your job?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. What is the most rewarding part of your job?  
\_\_\_\_\_  
\_\_\_\_\_
9. What are three challenges to doing your job?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
10. Would you recommend a career in viticulture?  
\_\_\_\_\_  
\_\_\_\_\_
11. Why do you like coming to work every day?  
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\_\_\_\_\_  
\_\_\_\_\_

Any other notes or comments:

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7-3

# Seasonal Scenarios for Summer

## Summer in the Vineyard Scenario 1

### Weather and Pests

Brian, a vineyard owner and winemaker, is in the vineyard with his dog Waves. He is using a spinning jenny to assist in stringing the third and top trellis wire to the steel vineyard posts in a 3-year-old planting. Brian will use this third wire to continue to train the vines. It is important to train young vines at this time of year.

It has been a hot and humid summer, so he is spending the afternoon lifting and tucking young vines in an upright position so that he can spray for powdery and downy mildew. The Old Mission AVA (American Viticultural Area) is suitable for growing Pinot Grigio; however, the high humidity of the summer has intensified the need to spray.

#### Directions:

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

#### Questions:

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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 \_\_\_\_\_
2. What vineyard careers are represented by the people in the vineyard?  
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3. What is each person doing in this vineyard scenario?  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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 \_\_\_\_\_
6. What evidence is provided that tells you about the current season in the vineyard?  
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 \_\_\_\_\_





# Summer in the Vineyard Scenario 2

## Hedging and Canopy Management After Hail

Piper is the vineyard manager for a large fruit farming company. On August 2, several of the farms she manages were hit by a rare damaging hailstorm. After the storm, she inspects the damage to the canopy, canes, and berries in one of the vineyards caused by 1-inch to 2-inch diameter ice balls. After surveying the extensive damage in the Riesling block, she has instructed the vineyard crew how to use hand pruners to remove the severely damaged leaves and any clusters that have visible signs of hail damage. She will come through with a follow-up spray to eliminate any fungal pathogens that may take advantage of the bruised and battered fruit. Damage will be reassessed weekly until harvest because even a small bruise can turn into a full-scale rot in a short period of time when certain conditions are met. Piper estimates that at least half of the crop was damaged during this one event. It may impact the vines' ability to fully ripen the remaining grapes and negatively impact next year's crop. Her next call will be to her crop insurance provider.

### Directions:

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

### Questions:

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
 \_\_\_\_\_  
 \_\_\_\_\_  
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2. What vineyard careers are represented by the people in the vineyard?  
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3. What is each person doing in this vineyard scenario?  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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6. What evidence is provided that tells you about the current season in the vineyard?  
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# Fall in the Vineyard General Questions

Date: \_\_\_\_\_

1. After observing the vineyard, note items that are unique to fall in the vineyard.

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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. List jobs or tasks that need to be done in the fall in the vineyard.

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\_\_\_\_\_  
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3. List one task that is only performed in the fall in the vineyard.

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4. Identify the key careers that are needed for jobs or tasks identified in question 2.

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Any other notes or comments:

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# Careers in the Vineyard Interview Questions

- 1. Name of interviewee  
\_\_\_\_\_
- 2. What is your job title?  
\_\_\_\_\_  
\_\_\_\_\_
- 3. When and how did you discover you were interested in a viticulture career?  
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- 4. What was your educational pathway to this career?  
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- 5. How did you learn this position was available, and how did you apply for it?  
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- 6. Where would you look today to find positions available in a vineyard?  
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- 7. What are the three main responsibilities of your job?  
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- 8. What is the most rewarding part of your job?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 9. What are three challenges to doing your job?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 10. Would you recommend a career in viticulture?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 11. Why do you like coming to work every day?  
\_\_\_\_\_  
\_\_\_\_\_  
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Any other notes or comments:

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# Seasonal Scenarios for Fall

## Fall in the Vineyard Scenario 1

### Late Season Leaf Removal

Peter is the farm and vineyard manager for a 100-acre Centennial farm. On the farm, they grow grapes, apples, cherries, and other fruits. Peter manages a large crew of temporary, seasonal, nonimmigrant skilled farm workers from Honduras, referred to as H2A workers. Section 218 of the Immigration and Nationality Act authorizes the lawful admission into the United States of temporary, nonimmigrant workers (H-2A workers) to perform agricultural labor or services of a temporary or seasonal nature. Today, he will be directing the workers in late season leaf removal around the fruiting zone of the high value Cabernet Franc that has just gone through *véraison*. *Véraison* is the stage of development when berries begin to soften and change color. Peter and the workers will be removing leaves that block sunlight from reaching the clusters of grapes. Both light exposure and temperature influence the amount of sugar and acid produced in the grapes.

**Directions:**

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

**Questions:**

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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 \_\_\_\_\_
2. What vineyard careers are represented by the people in the vineyard?  
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3. What is each person doing in this vineyard scenario?  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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6. What evidence is provided that tells you about the current season in the vineyard?  
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## Fall in the Vineyard Scenario 2

### Netting and Other Pest Protection

Janelle smiles as she drives the tractor down the narrow vineyard row on a hazy late fall afternoon. She chats with Dylan, the harvest intern behind her. Dylan feeds the end of the second bag of bird netting through the eye of the net machine. Marco and Jimi pull the nets over and down the sides of each vine as the tractor slowly moves forward. It is a team effort to cover each 250-foot row with nets. The nets protect the vines from the local wildlife: birds, deer, and raccoons. Birds, particularly the non-native invasive starling, can destroy an entire crop in an extraordinarily short period of time. Janelle explains to Dylan that when you are in the migratory path of the starling, you must use nets to protect the grapes. The nets will remain over the vines until the grapes are harvested. Janelle explains that when all the other picking is done on the farm, hopefully before the snow, Dylan will need to return and help bag and store the nets until next year.

**Directions:**

- 1. With a partner, read the vineyard scenario.
- 2. With a partner, discuss and answer the questions.

**Questions:**

- 1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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 \_\_\_\_\_
- 2. What vineyard careers are represented by the people in the vineyard?  
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- 3. What is each person doing in this vineyard scenario?  
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- 4. Are they using special equipment for what they are doing in the vineyard?  
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- 5. Why is what they are doing important for the success of the vineyard?  
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- 6. What evidence is provided that tells you about the current season in the vineyard?  
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# Winter in the Vineyard General Questions

Date: \_\_\_\_\_

1. After observing the vineyard, note items that are unique to winter in the vineyard.

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2. List jobs or tasks that need to be done in the winter in the vineyard.

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3. List one task that is only performed in the winter in the vineyard.

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4. Identify the key careers that are needed for jobs or tasks identified in question 2.

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Any other notes or comments:

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# Careers in the Vineyard Interview Questions

1. Name of interviewee  
\_\_\_\_\_  
\_\_\_\_\_
2. What is your job title?  
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3. When and how did you discover you were interested in a viticulture career?  
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4. What was your educational pathway to this career?  
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5. How did you learn this position was available, and how did you apply for it?  
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6. Where would you look today to find positions available in a vineyard?  
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7. What are the three main responsibilities of your job?  
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8. What is the most rewarding part of your job?  
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9. What are three challenges to doing your job?  
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10. Would you recommend a career in viticulture?  
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11. Why do you like coming to work every day?  
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Any other notes or comments:

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# Seasonal Scenarios for Winter

## Winter in the Vineyard Scenario 1

### Harvesting Grapes for Ice Wine

A Lake Michigan Shore American Viticultural Area grape grower has been patiently waiting for the really cold weather to arrive. He gambled and left 2 acres of Seyval Blanc hanging on the vine for ice wine. He has been waiting for the air temperature to drop below freezing, to 14 ° F for at least 24 hours, until the berries freeze. According to the U.S. Alcohol and Tobacco Tax and Trade Bureau, natural freezing is the required standard for ice wines. Finally, at 4 a.m., he and his team head out to the snow-covered frozen vineyard to hand-harvest the frozen berries. The heavy lugs are loaded onto a large ice-fishing sled and pulled out of the vineyard by snowmobile. It is a windy and cold December morning to be trudging back and forth in the heavy snow. After the grapes have been moved up to the cellar and loaded into the press, it takes hours for the juice to start flowing with the sweetest juice of this year's harvest. After testing the juice with a refractometer, the grower proudly determines that the juice is 36 ° Brix, twice as much sugar as the Seyval Blanc grapes picked in the row over 3 months ago. He is pleased with the delicious flavor of the juice and with his decision to leave 2 acres for ice wine.

**Directions:**

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

**Questions:**

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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 \_\_\_\_\_  
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 \_\_\_\_\_
2. What vineyard careers are represented by the people in the vineyard?  
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 \_\_\_\_\_  
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3. What is each person doing in this vineyard scenario?  
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 \_\_\_\_\_  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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6. What evidence is provided that tells you about the current season in the vineyard?  
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## Winter in the Vineyard Scenario 2

### Dormancy and Assessing Winter Injury

After an exceedingly long week of cold weather caused by a polar vortex reaching down from Canada, vineyard manager Stanley is worried about the vines. He cross-country skis through deep drifts of snow, stopping every so often to inspect a vine. He removes a long shoot and inspects the *cambium*, or woody tissues nearest to the trunk, as well as the dormant buds. Stanley determines that there has been some damage to the vine from the sustained -20 ° F temperatures, but it is too early to tell how much damage has been done. He digs the snow out from around the base of a vine. He wants to determine if the graft union of the 5-year-old Pinot Blanc has been damaged by voles. This has been a problem in the past. Seeing none, he skis on to inspect the lower block of Traminette that was planted this year.

**Directions:**

1. With a partner, read the vineyard scenario.
2. With a partner, discuss and answer the questions.

**Questions:**

1. Who and what is in the vineyard (people, animals, insects, fungi)?  
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2. What vineyard careers are represented by the people in the vineyard?  
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3. What is each person doing in this vineyard scenario?  
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4. Are they using special equipment for what they are doing in the vineyard?  
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5. Why is what they are doing important for the success of the vineyard?  
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6. What evidence is provided that tells you about the current season in the vineyard?  
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# Vineyard Mapping: Where Should You Plant the Grapes? Part 1

## GENERAL QUESTIONS

Date: \_\_\_\_\_

1. Using the map(s) you located on Google Earth, list a few of the existing landscape or farm features.

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2. What new things did you learn about your vineyard or proposed vineyard site from the online map(s)?

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3. What did the USDA web soil survey tell you about the soil at the vineyard or proposed site?

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4. What USDA hardiness zone is the proposed site?

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5. How are hardiness zones established?

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6. List one career that is important when mapping a vineyard.

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# Vineyard Mapping: Where Should You Plant the Grapes? Part 1 FIGURES

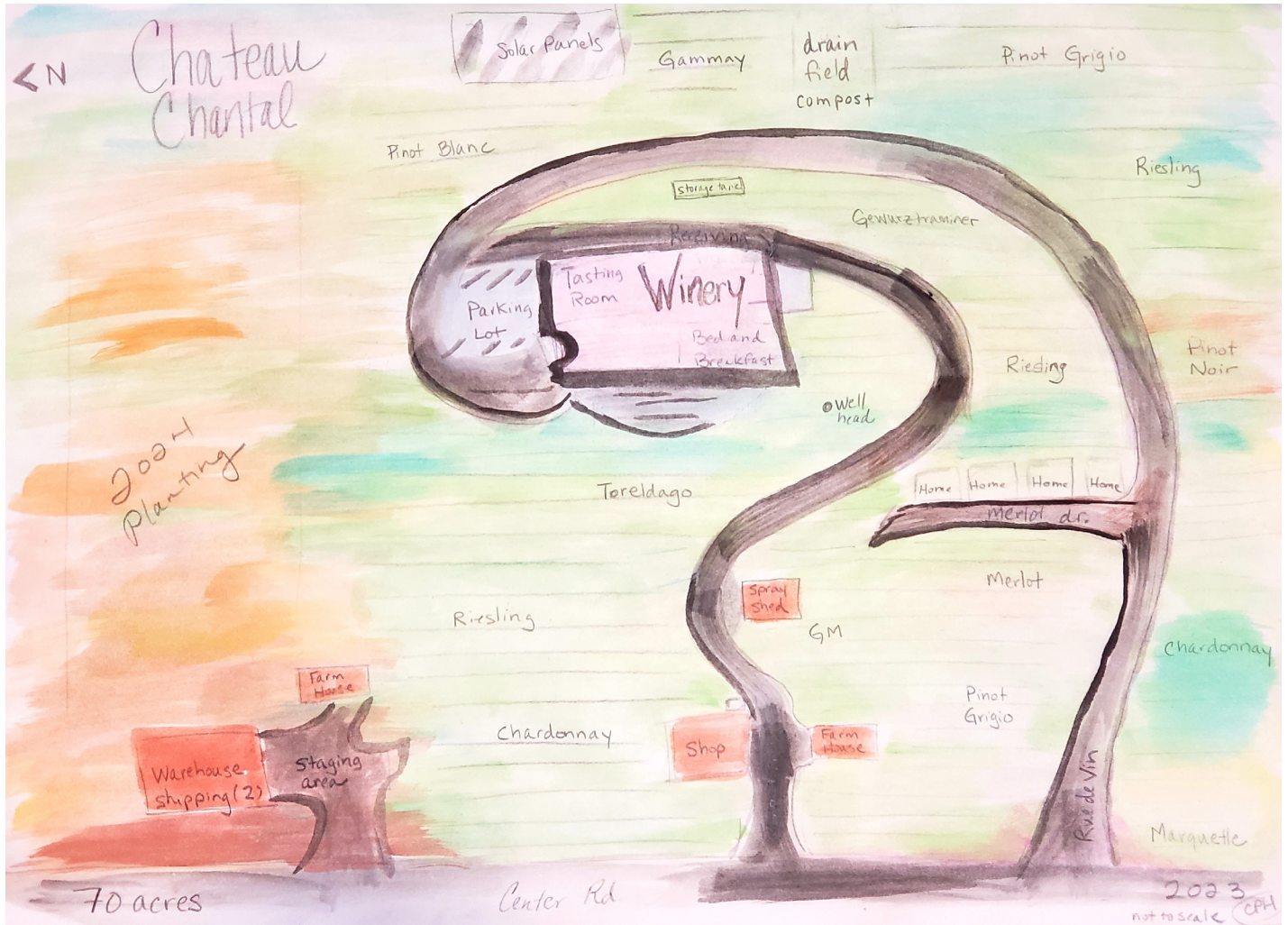


Figure 10-1. Chateau Chantal vineyard site map, Traverse City, Michigan. Drawing credit: Cristin Popelier Hosmer

You will use Figure 10-1 as an example when you draw a map of the vineyard, or proposed vineyard, on large paper.

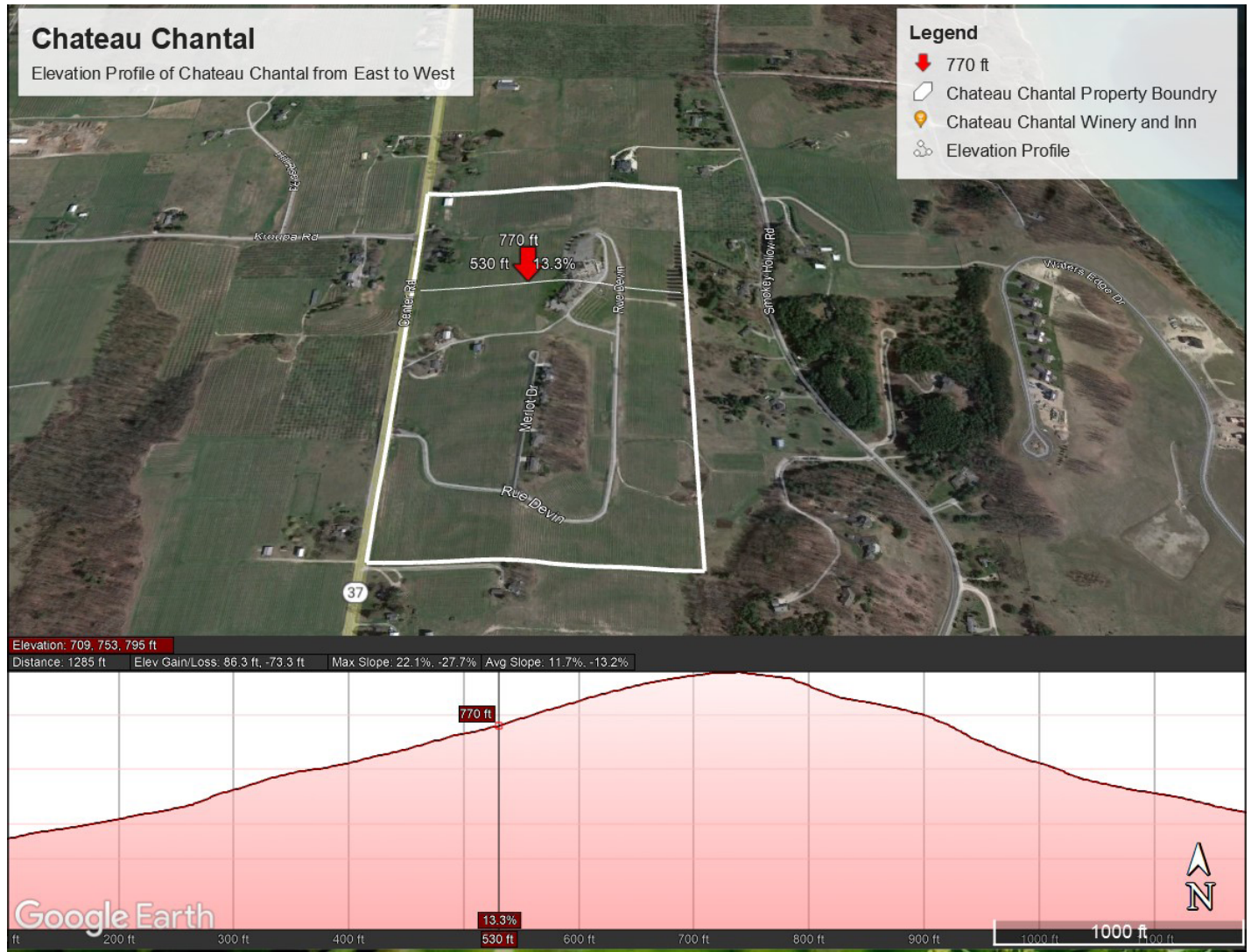


Figure 10-2. Chateau Chantal elevation profile. Credit: Google Earth.

Selecting the ideal location to establish a vineyard in Michigan requires careful consideration. Potential growers should understand the climate and the land including the *topography*, slope, orientation, and types of soil. (See Figure 10-2.)





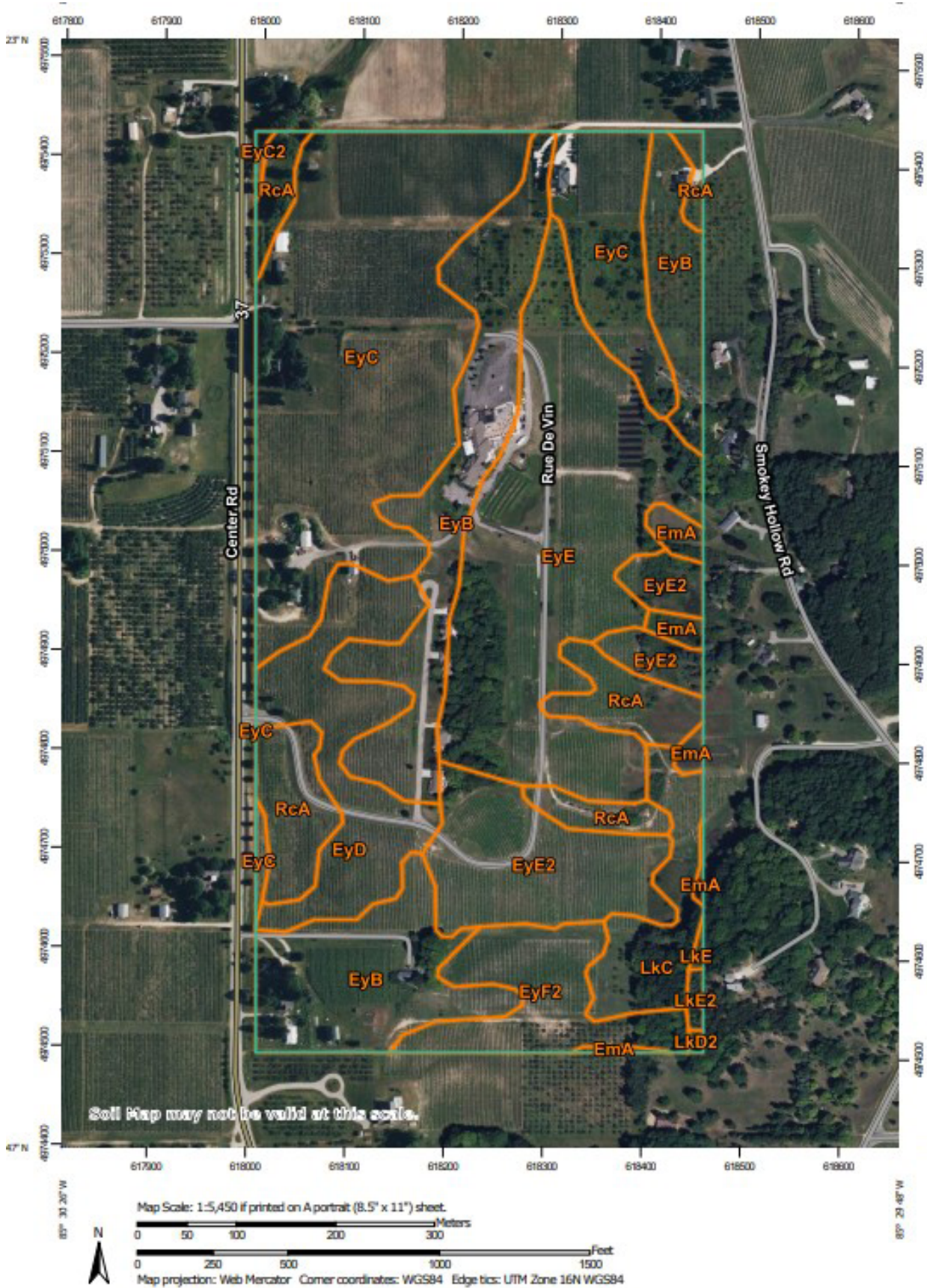


Figure 10-3a. USDA soil survey map of Chateau Chantal vineyards, Traverse City, Michigan. Credit: USDA Natural Resources Conservation Service.



### MAP LEGEND

#### Area of Interest (AOI)

Area of Interest (AOI)

#### Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

#### Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot

- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

#### Water Features

Streams and Canals

#### Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

#### Background

Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale. Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grand Traverse County, Michigan  
Survey Area Data: Version 16, Aug 26, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 2, 2020—Nov 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure 10-3b. Map legend and information to accompany USDA soil sample map Figure 10-3a. Credit: USDA Natural Resources Conservation Service.





## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EmA	East Lake-Mancelona loamy sands, 0 to 2 percent slopes	1.4	1.4%
EyB	Emmet sandy loam, 2 to 6 percent slopes	20.7	19.8%
EyC	Emmet sandy loam, 6 to 12 percent slopes	28.4	27.2%
EyC2	Emmet sandy loam, 6 to 12 percent slopes, moderately eroded	0.1	0.1%
EyD	Emmet sandy loam, 12 to 18 percent slopes	7.8	7.5%
EyE	Emmet sandy loam, 18 to 25 percent slopes	19.9	19.0%
EyE2	Emmet sandy loam, 18 to 25 percent slopes, moderately eroded	9.1	8.7%
EyF2	Emmet sandy loam, 25 to 45 percent slopes, moderately eroded	5.2	5.0%
LkC	Leelanau-Kalkaska loamy sands, 6 to 12 percent slopes	3.9	3.7%
LkD2	Leelanau-Kalkaska loamy sands, 12 to 18 percent slopes, moderately eroded	0.1	0.1%
LkE	Leelanau-Kalkaska loamy sands, 18 to 25 percent slopes	0.1	0.1%
LkE2	Leelanau-Kalkaska loamy sands, 18 to 25 percent slopes, moderately eroded	0.2	0.2%
RcA	Richter loams, 0 to 2 percent slopes, overwash	7.5	7.2%
<b>Totals for Area of Interest</b>		<b>104.5</b>	<b>100.0%</b>

Figure 10-3c. Map unit legend to accompany USDA soil sample map Figure 10-3a. Credit: USDA Natural Resources Conservation Service.

Examine figures 10-3a, b, and c. The map (Figure 10-3a) and the accompanying legend and information (Figure 10-3b) as well as the map unit legend (Figure 10-3c) were created by Cristin Popelier Hosmer, proprietor of Alchemae Craft Beverage and adjunct professor at Michigan State University, using the USDA Web Soil Survey: <https://websoilsurvey.nrcs.usda.gov/app/>.

These types of maps are used by farmers including viticulturists when planning new crop blocks. They give farmers important information about the many types of soil that might exist on one farm. The map (Figure 10-3a) shows that there are 13 individual soil types and shows the elevations specific to this particular vineyard.



11-1

# Vineyard Mapping: Where Should You Plant the Grapes? Part 2

## GENERAL QUESTIONS

1. Explain what makes a good site for a vineyard.

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2. What did you learn that surprised you about planning a vineyard site?

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3. After ground truthing your map, did you add any features? What were they?

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4. List one career that is important when mapping a vineyard.

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12-1

# Vineyard Site Selection and Establishment: Will Grapes Thrive Here? GENERAL QUESTIONS

1. List three things to consider when preparing to establish a vineyard:

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2. What varieties of grapes will you plant in your proposed vineyard? How many will you plant of each variety? (per acre)

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3. Are you planning more than one crop block?

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4. On the following page, draft a rough layout for your crop block. If planting more than one crop block, use additional pages.

Each crop block should include:

- Appropriate headlands
- Row orientation
- Trellis system needed for the selected variety
- Row spacing – number of rows
- Vine spacing – number of plants per row





# Vineyard Site Selection and Establishment: Will Grapes Thrive Here? CROP BLOCKS

Draw your crop block(s) here.





Map your final crop blocks here.

A large, empty rectangular box with a thin black border, intended for mapping final crop blocks.





# Vineyard Site Selection and Establishment: Will Grapes Thrive Here?

## FINANCIAL INSTITUTION PROPOSAL AND CAREER QUESTION

1. Write a proposal to a financial institution to secure a loan for your proposed vineyard or new crop block. When seeking approval for a loan, a grower might include this information:

- Varieties
- Trellis system
- Spacing (row and vine)
- Total number of vines to be planted
  - ◇ Microclimate(s)
  - ◇ USDA hardiness zone
  - ◇ Growing degree days
  - ◇ Topography for cold air drainage
  - ◇ Soil type
  - ◇ Water source for first-year irrigation

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2. List one career important for vineyard site selection and establishment.

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# Integrated Pest Management: Why Is Pest Management Important? GENERAL QUESTIONS

Date: \_\_\_\_\_

1. List three insect pests you found in the vineyard.

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\_\_\_\_\_  
\_\_\_\_\_

2. Explain common controls you might use to manage the insect pests listed.

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\_\_\_\_\_  
\_\_\_\_\_

3. List any beneficial insects you saw in the vineyard.

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\_\_\_\_\_  
\_\_\_\_\_

4. List three diseases you found in the vineyard.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Explain common controls you might use to manage the diseases listed.

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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Explain why pesticide safety is important.

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\_\_\_\_\_  
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7. What are some safety measures you can practice while using pesticides?

\_\_\_\_\_  
\_\_\_\_\_

8. Are there alternative management measures you could use instead of pesticides?

\_\_\_\_\_  
\_\_\_\_\_

9. Compare the insect pests or diseases found with other participants. If they found other insect pests or diseases, list them.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. List one career important to pest management in the vineyard.

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\_\_\_\_\_

Additional notes:

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\_\_\_\_\_  
\_\_\_\_\_  
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# What is IPM?

**Integrated Pest Management** is a science-based approach that combines a variety of techniques. By studying their life cycles and how pests interact with the environment, IPM professionals can manage pests with the most current methods to improve management, lower costs, and reduce risks to people and the environment.

**IPM tools include:**

- Alter surroundings
- Add beneficial insects/organisms
- Grow plants that resist pests
- Disrupt development of pest
- Prevention of pest problem developing
- Disrupt insect behaviors
- Use pesticides

## 1 IDENTIFY/MONITOR

Determine the causal agent and its abundance (contact your local extension agent for help).

## 2 EVALUATE

The results from monitoring will help to answer the questions: Is the pest causing damage? Do we need to act? As pest numbers increase toward the economic threshold further treatments may be necessary.

## 3 PREVENT

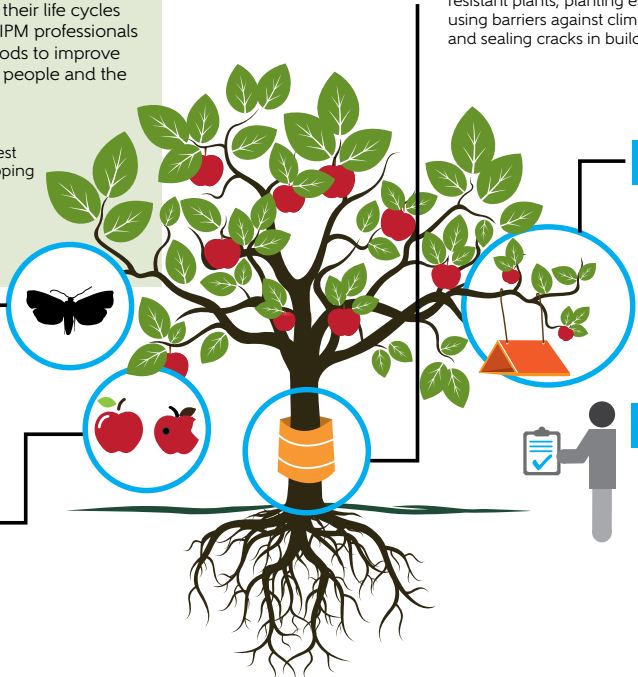
Some pest problems can be prevented by using resistant plants, planting early, rotating crops, using barriers against climbing pests, sanitation, and sealing cracks in buildings.

## 4 ACTION

IPM uses multiple tools to reduce pests below an economically damaging level. A careful selection of preventive and curative treatments will reduce reliance on any one tactic and increase likelihood of success.

## 5 MONITOR

Continue to monitor the pest population. If it remains low or decreases, further treatments may not be necessary, but if it increases and exceeds the action threshold, another IPM tool should be used.



## WHERE CAN YOU PRACTICE IPM?



**Buildings and Homes:**

Inspect, identify pests, keep pests out, clean to deny pests food and water, vacuum, trap, or use low-risk pesticides.



**Farms:**

Check for pests/pest damage regularly, identify accurately, choose pest-resistant plant varieties, encourage/introduce beneficial insects, time planting to avoid pests, and if needed use low-risk pesticides.



**Managed Natural Systems:**

Identify the pest and use management options that have minimal risks to pollinators, humans, and pets.



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# Careers

As you study viticulture through your participation in the 4-H Let's Grow Grapes lessons, you will learn that a variety of careers exist in the grape-growing industry. This Careers section touches on eight careers and lists the responsibilities and expectations of each. You will find that many opportunities await those interested in this exciting field.

Research current wages for jobs related to the grape and wine industry in the U.S. Bureau of Labor Statistics *Occupational Outlook Handbook* at <https://www.bls.gov/ooh/> and also at the U.S. Department of Labor, Employment and Training Administration *CareerOneStop* website at <https://www.careeronestop.org/ExploreCareers/Plan/salaries.aspx>.

## Viticulturist: Vineyard Manager

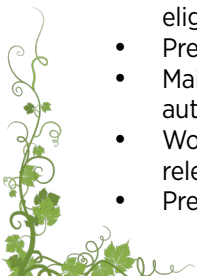
- Full-time, year-round position, extended hours during harvest
- 5 years of experience and/or degree in a relevant field
- Maintain a high-quality wine grape crop, scout vineyards frequently, implement pest management strategies, work with outside scouting and chemical companies to explore the most successful strategies
- Work directly with the winemaker to determine harvest quality objectives by variety and sample fruit for analysis
- Maintain farm and worker safety and lead safety compliance training
- Maintain agricultural certifications and compliance standards
- Train, oversee, and manage daily, weekly, and seasonal schedules for labor crews for multiple vineyards
- Oversee maintenance and use of all farm equipment, supervise equipment operator, laborers, and outside service providers such as agronomists
- Bilingual preferred Spanish/English, ability to translate instruction to workers in multiple languages

## Office Manager: Operations and Compliance

- Full-time or part-time, office support, may use outside services
- Maintain employee records, verify employment eligibility
- Prepare and process employee payroll and taxes
- Maintain adequate insurance coverage: farm, auto, liability, health, workers' compensation
- Work with regulatory agencies to maintain relevant business permits and licenses
- Prepare and file annual tax returns for business

## Laboratory Technician:

- Full-time or part-time, extended hours during harvest
- Experience working in a lab for more than one harvest, with a background in chemistry, attention to detail is necessary
- Collect samples from the vineyard for analysis and run laboratory tests such as pH, TA, Brix, and other tests as needed
- Maintain and calibrate laboratory equipment such as:
  - ◇ pH meter, an instrument used to measure the hydrogen-ion activity in water-based solutions, including acidity and alkalinity that is expressed as the pH
  - ◇ *refractometer*, an instrument used to measure the soluble solids in a liquid when testing a fruit's sugar content; the result is stated as Brix.
  - ◇ *hydrometer*, an instrument that measures the specific gravity of a liquid. Winemakers use hydrometers to measure the alcohol content by volume throughout the fermentation process to ensure sugar is being converted into alcohol.
  - ◇ *densitometer*, an instrument for determining optical, photographic, or mass density
  - ◇ *spectrometer*, an analytical instrument in which an emission (as of particles or radiation) is dispersed according to some property (such as mass or energy) of the emission and the amount of dispersion is measured.
  - ◇ Perform *enzymatic analysis* for wine making and for determining soil amendments
- Work directly with the winemaker or food processor to determine the time to harvest and product quality
- Work independently in a laboratory, and assist the wine cellar staff as needed with yeast inoculations and fermentation management



**Equipment Operator:**

- Full-time, seasonal
- 2 years of experience and certifications
- Comfortable with long hours of working on a tractor, using leaf-pulling implements, mowing, operating the harvester, using the forklift, and other duties
- Able to maintain the farm equipment and troubleshoot issues as they arise in the field
- Plan, install, and maintain trellis systems, irrigation, fencing, frost protection, and roadways
- Drive large vehicles and safely transport equipment among farms
- Maintain pesticide sprayer certification and attend annual continuing education courses
- Calibrate spray equipment and properly apply pesticides according to the label
- Maintain cleanliness of equipment, barns, and the pesticide storage area

**Laborer:**

- Full-time, seasonal
- Proficiently perform all grapevine management tasks, including pruning, vine tying, leaf pulling, crop thinning, and harvesting
- Weeding and in-row cultivating
- Fruit sorting and processing
- Bottling and other cellar activities
- Planting vines and installing trellis systems
- Harvesting grapes, lifting up to 50 pounds
- Spanish or English language proficient

**Outside Services:**

- Vineyard consultant, scouting, and chemical recommendations
- Agronomist for soil biology testing and recommendations
- Mechanic
- Engineering, services for managing water use
- Legal services

**Marketing Director** at a regional tourism organization

- Full-time, year-round
- Degree in marketing, communications, or public relations
- 5+ years of experience in marketing, branding, or communication
- Oversee the marketing budget for agritourism in the region and implement new partnerships for funding cooperative tourism in the area
- Coordinate creative development, production, and distribution of content across multiple media, including social media

**Sommelier:**

- A certified wine specialist
  - ◇ Court of Master Sommelier (CMS), service-related pathway
  - ◇ Wine & Spirits Education Trust (WSET), communication and educational pathway
  - ◇ Sommelier certification levels (introductory, certified, advanced, and master) are based on the number of years spent studying and examinations passed
- 5+ years of experience in hospitality field
- Work in various hospitality and wine industry-related jobs
- Wine director for a restaurant group or grocery chain in charge of purchasing wine for the menu or retail shelf





# Grape Fast Facts: Growing Grapes in Michigan

Enjoy learning more about grapes by reading the facts that follow.

- Grapevines (genus *Vitis*) are a genetically diverse species of perennial, flower-bearing and fruit-bearing, woody vines with long tendrils.
  - ◇ The species *Vitis vinifera* is the common grapevine native to Europe and the Middle East.

These grapes are most commonly fermented into wine. Examples are Cabernet Sauvignon and Pinot Grigio.

The list of species classified as *Vitis vinifera* is extremely diverse.
  - ◇ *Vitis labrusca* are native to North America.

Familiar varieties include Concord and Niagara.

Grapes may be consumed as a fruit or as a juice, or the juice can be fermented.
  - ◇ Many crosses or hybrids between European and American varieties have been developed and commercialized by grape geneticists. Examples include:

Itasca, Marquette, and Frontenac (University of Minnesota)

Noiret, Corot noir, Valvin, and Muscat (Cornell University)
  - ◇ *Vitis riparia* is a native wild grape you see growing abundantly in Michigan. It is often used as rootstock because of its resistance to phylloxera, a grape pest.
  - ◇ Most table grape varieties have been bred to be seedless, although some varieties still have seeds.
- For thousands of years, civilizations have cultivated grapevines and moved them around the globe. The first known species was found in the country of Georgia, near the Black Sea (Batiuk et al., 2016). There are now over 10,000 species of grapes worldwide.
- *Viticulture* is the science and practice of cultivating grapes.

- Today, many varieties of grapes grow in Michigan. A grape grower may choose a particular variety to plant for any or all of the following reasons:
  - ◇ It can be grown successfully in Michigan.
  - ◇ It can be eaten or sold for a profit to a consumer or a processor.
  - ◇ It can be harvested and made into a value-added product.
  - ◇ It has name recognition.
  - ◇ It is disease resistant.
  - ◇ It is cold hardy.
- Grapes have been typically grown in the southwestern and northwestern regions of the state near Lake Michigan because of the suitability of the climate and soils. However, newly developed cold-hardy varieties are now being grown across lower Michigan and in the southern Upper Peninsula.
- Grapes are grown in vineyards that may include 500 to 1,700 plants per acre, depending on the variety, trellis (support system) used, and the row spacing. Typically, the vineyard rows run from north to south to maximize the sun exposure on the canopy and fruit. But drainage, slope, and the level of mechanization may factor into decisions on the layout.
- Good growers should walk in their vineyard daily, scouting for anything out of the ordinary. They must understand the annual growth cycle of a grapevine and be able to quickly identify its parts. They must understand the difference between a healthy vineyard (lush, green, free of disease) and an unhealthy vineyard (yellow, full of pests, not producing fruit).
- Managing a vineyard during the growing season requires tremendous work. Key times of the year when additional labor or mechanization might be needed include:
  - ◇ Pruning in late winter and early spring.
  - ◇ Hedging and leaf pulling in mid-summer.
  - ◇ Harvest in fall.





- Growing any crop requires the use of tools and inputs. Important vineyard tools include hand pruners, a tractor, a sprayer, a mower, and any implements specific to grape growing such as an over-the-row pruning or hedging implement, a leaf remover, or a harvester. Important inputs depend on the type of farming system employed: conventional, organic, biodynamic, Michigan Agriculture Environmental Assurance Program (MAEAP), Great Lakes Sustainable Wine Alliance, or other systems.
  - ◇ Conventional growers grow high-quality fruit with assistance from mechanical and chemical inputs. They may use herbicides under rows for weed management, insecticides for insect management, and fungicides for disease management.
  - ◇ Organic growers have the same goal, but they would follow organic protocols and procedures, and they would limit the use of some chemicals not approved for organic growing.
  - ◇ The Great Lakes Sustainable Wine Alliance system is based on the MAEAP, which is a verification program for farms and cropping systems with the goal of protecting ground water and all surface water within the Great Lakes region.
- According to statistics from the U.S. Department of Agriculture, National Agricultural Statistics Service (2020, p. 2-3):
  - ◇ 10,900 acres of grapes are under cultivation in Michigan that include:
    - ◇ 5,450 acres of Concord.
    - ◇ 2,325 acres of Vinifera.
    - ◇ 2,075 acres of other native (Catawba, Delaware, Fredonia, Niagara, and Norton).
    - ◇ 1,050 acres of hybrids.
- Michigan grapes are sold for direct consumption and made into products such as jelly, juice, and wine. Some products include:
  - ◇ Table grapes sold for direct consumption (for example, Cotton Candy).
  - ◇ Jelly grapes (for example, Concord).
  - ◇ Juice grapes (for example, Concord and Niagara). In Michigan, there are 157 growers, growing Concord and Niagara grapes on over 7,000 acres.
  - ◇ Wine grapes: approximately 120 varieties are grown in Michigan.

- The economic impact of the wine and cider industry is tremendous.
  - ◇ According to the Michigan Economic Impact Study 2022 (WineAmerica, 2022):
    - ◇ The Michigan wine industry generated \$6.33 billion in total economic activity in the state.
    - ◇ The Michigan wine industry employs as many as 25,611 people and generates an additional 9,351 jobs in ancillary industries.
    - ◇ The average annual wage in the Michigan wine industry is \$44,800.
    - ◇ The total wages generated by direct, indirect, and induced economic activity by the wine industry were \$2.10 billion in 2022.
    - ◇ Michigan's wine country had 615,700 tourist visits and \$208.94 billion in annual tourism expenditures added to local economies.
    - ◇ Tax revenue for Michigan in 2022 from the wine industry was \$25.71 million in federal consumption taxes and \$190.58 million in state consumption taxes, which include excise and sales taxes.

## References

- Batiuk S., Maghradze, D., Mdinaradze, I., Rusishvili, N., & Megrelidze, L. (2016). Grape and wine culture in Georgia, the South Caucasus. *BIO Web of Conferences*. <https://doi.org/10.1051/bioconf/20160703027>
- U.S. Department of Agriculture, National Agricultural Statistic Services. (2020). *2020 small fruit and hops inventory: Grapes*. [https://www.nass.usda.gov/Statistics\\_by\\_State/Michigan/Publications/Michigan\\_Rotational\\_Surveys/mi\\_fruit20/Grapes%20hops.pdf](https://www.nass.usda.gov/Statistics_by_State/Michigan/Publications/Michigan_Rotational_Surveys/mi_fruit20/Grapes%20hops.pdf)
- WineAmerica. (2022). *Michigan economic impact study 2022*. The National Association of American Wineries. <https://wineamerica.org/economic-impact-study/michigan-wine-industry/>





# Recipes

## Introduction

The recipes included in this section explore the rich history, culture, and traditions of grapes. As you explore more about the history of grapes you will discover people from ancient times enjoyed eating grapes, drinking grape juice, and fermenting grapes into wine. You can do your own research online to discover a vast array of recipes that contain grapes, grape juice, and raisins.

Be sure to wash your hands for at least 20 seconds before cooking and use safe cooking practices.

## Grape Jam From Concord Grapes

Prep time: 15 minutes

Cook Time: 35 minutes total

Total Time: 50 minutes

Servings: about six 8-ounce jars

Ingredients:

2 quarts destemmed Concord grapes

6 cups sugar

Instructions:

1. Sterilize canning jars.
2. Separate pulp from the skin of the grapes.
3. If desired, chop skins in food blender or chopper.
4. Cook skins gently 15–20 minutes, adding only enough water to prevent sticking (about ¼ cup).
5. Cook pulp, skins, and sugar. Bring to jelling point, about 10 minutes. As mixture thickens, stir frequently to prevent sticking.
6. Pour into hot jars, leaving ¼-inch headspace.
7. Wipe jar rims and adjust lids.
8. Process for 5 minutes in a boiling water bath.

The “Grape Syrup” recipe is adapted from the National Center for Home Food Preservation at [https://nchfp.uga.edu/publications/uga/uga\\_uncooked\\_j\\_i.pdf](https://nchfp.uga.edu/publications/uga/uga_uncooked_j_i.pdf). So Easy to Preserve Bulletin No. 989. Athens, GA: Cooperative Extension, University of Georgia. It was adapted and used with permission.

## Uncooked Grape Jelly

Prep time: 5 minutes

Cook time: none

Total time: 15 minutes

Servings: About five 8-ounce containers

Ingredients:

2 cups lukewarm water

1 box powdered pectin

One 6-ounce can frozen grape juice concentrate

¾ cups sugar

Instructions:

1. In a 2-quart mixing bowl, mix the pectin slowly into the lukewarm water. Stir constantly until completely dissolved. Let stand 45 minutes. Stir occasionally but do not beat.
2. Thaw juice by placing can in cold water. When the juice is thawed, pour into a 1-quart mixing bowl.
3. Add ¾ cups sugar. Mix thoroughly. All the sugar will not be dissolved.
4. Add the remaining ½ cups sugar to the dissolved pectin mixture. Stir constantly until all sugar is dissolved.
5. Pour into freezer containers or canning jars, leaving ¼-inch headspace.
6. Cover with a tight lid.
7. Let stand at room temperature until set (up to 12 hours).
8. Freeze or refrigerate. This will last 6 months in the freezer and 4 weeks in the refrigerator.

The “Uncooked Grape Jelly” recipe is retrieved from the National Center for Home Food Preservation at [https://nchfp.uga.edu/publications/uga/uga\\_uncooked\\_j\\_i.pdf](https://nchfp.uga.edu/publications/uga/uga_uncooked_j_i.pdf). So Easy to Preserve Bulletin No. 989. Athens, GA: Cooperative Extension, University of Georgia. It was adapted and used with permission.





## Grape Syrup

Prep time: 30 minutes

Cook time: 25 minutes

Total Time: 55 minutes

Servings: About two 8-ounce jars

Ingredients:

1¼ grape puree

1½ cups sugar

¼ cup corn syrup

1 tablespoon lemon juice

Instructions:

To prepare puree:

1. Wash and destem ripe grapes.
2. In a large saucepan, heat grapes at a low temperature setting for 8 to 10 minutes to loosen skins. *Do not boil.*
3. Put through a food mill with wire mesh strainer.
4. Discard skins and seeds.

To make syrup:

1. Sterilize canning jars.
2. Combine ingredients in a saucepan.
3. Bring to boil and boil for 1 minute.
4. Remove from heat and skim off foam.
5. Pour into hot half-pint (8-ounce) jars, leaving ¼-inch headspace.
6. Wipe jar rims and adjust lids.
7. Process 5 minutes in a boiling water bath.

The “Grape Syrup” recipe is adapted from the National Center for Home Food Preservation at [https://nchfp.uga.edu/publications/uga/uga\\_uncooked\\_j\\_j.pdf](https://nchfp.uga.edu/publications/uga/uga_uncooked_j_j.pdf). So Easy to Preserve Bulletin No. 989. Athens, GA: Cooperative Extension, University of Georgia. It was adapted and used with permission.

## Stuffed Grape Leaves

### Background

Many countries have a long history of eating stuffed grape leaves. Many Greek people claim that stuffed grape leaves go all the way back to Alexander the Great when he besieged Thebes, a city in Greece. Food was so scarce that the Thebans cut what meat they had into little bits and rolled it in grape leaves to make it more filling (Ferretti, 1983).

The word *dolmas*, *dolmeh*, or *dolmades* in Middle Eastern and Greek cooking, refers to various stuffed foods usually young leaves of the grapevine stuffed with rice, onion and many times, ground lamb. Dolmas can also include stuffed zucchini, bell peppers, cabbage, and onions (Britannica, 2024).

Most countries and even regions within a country have their own unique spin on the recipe. Some recipes call for meat; others only call for vegetables. Some are cooked in tomato sauce; others are cooked in lemon broth or grape syrup. Stuffed grape leaves are often seasoned with allspice and cumin and loaded with fresh herbs such as parsley, dill, and mint.

Esmail Nasrollahiazar, Michigan State University Extension Viticulture Specialist and technical contributor to the 4-H Viticulture Project *Let's Grow Grapes*, loves growing grapes, making wine, and teaching about viticulture. He enjoys many foods from his native country Iran and especially enjoys dolmeh.

Esmail said, “Wrapping grape leaves is not easy and when my mom was in a good mood, she would make dolmeh for us in early summer when the leaves are in great shape and fresh. We also canned the leaves to make dolmeh in wintertime. When I was young, we made our own grape syrup.”

Esmail's family grape syrup recipe:

Leave the grapes on the vine until the sugar level increases and the acid level decreases in the grape juice. Then harvest, destem, and extract the juice. Boil it until the juice becomes concentrated. If your grape juice is too acidic, you can adjust the acid level by adding some baking soda to reduce the acidity.

You can also purchase grape syrup from a variety of stores.







Esmail states, "In the south of Iran, people add date syrup instead of grape syrup. This makes their dolmeh sweeter than the northern region. Some people prefer to make a mixture of sugar and lemon juice and add it to the pot."

According to Esmail the sultana (Thompson Seedless) grape leaves are the leaves his family uses to make stuffed grape leaves. They prefer them because they are large, flexible and have shallow lobes, making wrapping and rolling easier. The leaves are also smooth and tender when cooked.

Esmail's recipe for dolmeh follows:

## Dolmeh – Persian Stuffed Grape Leaves

Prep time: 1 hour

Cook time: 20 minutes

Total time: 1 hour 20 minutes

Ingredients:

2 tablespoons and 3 tablespoons olive oil

1 yellow onion, finely chopped

1/2 cup chopped *sabzi* (herbs such as parsley or any combination of parsley, cilantro, green onions, mint, and dill)

1/2 teaspoon allspice

1/2 teaspoon cumin

1.5 pounds cooked ground beef or ground lamb

1 cup cooked white basmati rice

1/2 cup cooked yellow split peas

salt and pepper to taste

30–40 grape leaves (fresh or jarred) (include a few extra to place on the bottom of the pot)

grape syrup (make your own or purchase; see the previous recipe given)

Instructions:

1. In a skillet, heat 2 tablespoons of olive oil over medium high heat and sauté the chopped onion until translucent, about 2 minutes. Add the spices and let them sweat for a couple more minutes.
2. In a large bowl, combine the meat, rice, split peas, the onion and herbs, spices, salt and pepper. Mix everything together with your hands until everything is well mixed.
3. Take the stems off every grape leaf and blanch them (if using fresh leaves) in boiling water for 10 minutes. If using jarred leaves rinse well in water. Drain.
4. To roll the grape leaves, place a leaf with the vein side up on your work surface. Place 1 to 2 tablespoons of the filling mixture in the center of the leaf. Fold the edges in and up, and roll the grape leaf until it looks like a sausage. Repeat with the other leaves until you've run out of filling or leaves.
5. Line a pot that has a heavy base with (unrolled) grape leaves. Add 3 tablespoons of oil and coat the bottom of the pan.
6. Place the stuffed grape leaves in rows. Alternate the direction of each layer of rows.
7. Add equal amount of syrup and water to cover the bottom of the pot at least 2 inches.
8. Cover the pot and bring to a boil.
9. When it boils, lower the heat to low and steam for 20 minutes.

Recipe from Esmail Nasrollahiazar, Michigan State University Extension Viticulture Specialist





## Lemony Frozen Grapes

Prep time: 10 minutes

Total time: varies

### Ingredients:

Grapes (green, red, or a combination)

Lemonade (frozen concentrate prepared as directed on package)

Sweetened lemon-flavored powdered drink mix

### Instructions:

1. Wash and destem grapes.
2. Using a shallow baking dish, cover the bottom with grapes.
3. Cover the grapes with lemonade.
4. Refrigerate for 4 to 12 hours.
5. Drain grapes.
6. Roll the grapes in the powdered drink mix.
7. Freeze the grapes for 30 to 45 minutes. They should be firm but not frozen solid.
8. Enjoy.

Recipe from Dixie Sandborn, Michigan State University Extension 4-H horticulture specialist

## References

Andress, E., & Harrison, J. A. (2014). *So easy to preserve* (Bulletin 989). (6th ed.). University of Georgia Cooperative Extension.

Britannica. (2024, March 18). *Dolma*. <https://www.britannica.com/topic/dolma>

Ferretti, F. (1983, December 25). Stuffed grape leaves, Greek style. *New York Times*. <https://www.nytimes.com/1983/12/25/travel/stuffed-grape-leaves-greek-style.html>





## Animated Videos

The animated videos *Viticulture Time* were created for the Michigan Wine Collaborative Talent Pipeline in collaboration with Michigan State University Extension and Michigan 4-H Youth Development. The following table lists the available titles and links as well as the lesson(s) in the 4-H Viticulture Project *Let's Grow Grapes: Michigan 4-H Viticulture* that correspond(s) best with the animated video.

Title	Lesson	Link
Lesson: Digging Deep (Soil)	2	Lesson: Digging Deep (Soil) (youtube.com) <a href="https://bit.ly/49yCYai">https://bit.ly/49yCYai</a>
Activity: Soil Analysis	2	Activity: Soil Analysis (youtube.com) <a href="https://bit.ly/49HZ2zu">https://bit.ly/49HZ2zu</a>
Lesson: Grape Leaves	3	Lesson: Grape Leaves (youtube.com) <a href="https://bit.ly/3VXQn8O">https://bit.ly/3VXQn8O</a>
Viticulture Time: Photosynthesis	3	Viticulture Time: Photosynthesis (youtube.com) <a href="https://bit.ly/3UgvDb9">https://bit.ly/3UgvDb9</a>
Activity: Grape Leaf Rubbings	3	Activity: Grape Leaf Rubbings (youtube.com) <a href="https://bit.ly/3xAUiyb">https://bit.ly/3xAUiyb</a>
Viticulture Time: Pruning	4	Viticulture Time: Pruning (youtube.com) <a href="https://bit.ly/440cNs2">https://bit.ly/440cNs2</a>
Lesson and Activity: Grape Harvest and Berry Sampling	5	Lesson & Activity: Grape Harvest and Berry Sampling (youtube.com) <a href="https://bit.ly/49ycR3d">https://bit.ly/49ycR3d</a>
Spring in the Vineyard	6	Spring in the Vineyard (youtube.com) <a href="https://bit.ly/4bawyi1">https://bit.ly/4bawyi1</a>
Summer in the Vineyard	7	Summer in the Vineyard (youtube.com) <a href="https://bit.ly/3VTh9Pp">https://bit.ly/3VTh9Pp</a>
Fall in the Vineyard	8	Fall in the Vineyard (youtube.com) <a href="https://bit.ly/4ayhTxX">https://bit.ly/4ayhTxX</a>
Winter in the Vineyard	9	Winter in the Vineyard (youtube.com) <a href="https://bit.ly/3Jisgdc">https://bit.ly/3Jisgdc</a>



# Growing Grapes in Containers

This activity is adapted from the Michigan State University Extension article "Let's Grow Grapes in Containers" by Dixie Sandborn, published on November 27, 2023, at <https://www.canr.msu.edu/news/let-s-grow-grapes-in-containers>.

## Introduction:

Growing grapes may seem like an undertaking only for a trained viticulturist in a vineyard. But with a little planning, you can grow almost any grape variety in a container on a sunny patio or balcony.

The hardest part of growing grapes is to know when and how they need to be pruned. The naturally dwarfing Pixie grape is ideal for containers. This grapevine grows only 18 to 24 inches tall as well as 18 to 24 inches wide and doesn't need much, if any, pruning.

## Materials:

- One 15- to 20-gallon container with drainage holes in the bottom, at least 16 to 18 inches deep and 18 to 24 inches wide
  - Avoid dark-colored pots, which absorb and hold too much heat from the sun.
  - Choose a wood container as your best option.
- Small piece of screen (if needed)
- Small stones
- Light potting soil from a garden center
  - Do not use soil from your garden.
- Grapevine with roots, crown, and shoots
- Water
- Hand pruners
- Mulch
- Ties (zip ties, fabric strip fasteners such as Velcro, or other suitable garden ties)
- One 4-foot stake or other support system
- Compost
  - Add to your pot each year to increase nutrients.

## Planting Steps:

1. Gather your materials.
2. Put some small stones in the bottom of the pot until the bottom is fully covered. You may need to put a small piece of screen over the hole in the bottom of the pot to keep the stones from falling through the drainage hole.
3. Add potting soil to the container until it is about half full.
4. Take the grape plant and fan out the roots. You want the roots spread out, so that when the plant grows, the roots don't tangle around each other and girdle the plant. Girdling roots grow in a circular pattern just below or slightly above the soil surface, and restrict the movement of nutrients and water by putting pressure on the trunk.
5. While holding the grapevine, add soil to the pot until the plant is supported by the soil. Do not bury the plant below its original planting depth.
6. Add 1 inch of compost.
7. Water the pot completely until you see water running out of the bottom of the pot. You may need to add more soil.
8. Mulch the grapevine. This will make it more attractive for your patio or balcony and will help keep the soil from drying out. Evenly distribute the mulch 2 to 3 inches deep.
9. After planting the grapevine, select the strongest cane or two canes if you want a double-trunked vine. Prune off the rest of the canes. It might sound counterintuitive to cut back a new plant, but it allows the plant to focus its energy on building a few solid vines.
10. Next, cut the cane(s) back leaving only two or three buds. These buds will produce the shoots for your new potted grapevine.
11. Tie the grapevine to the stake or support system.
12. Water the vine thoroughly at least once per week.
13. Once a year, add compost to increase nutrients.





**Steps for Long-Term Care:**

- During the first growing season for your new grapevine, you want to make sure it develops a healthy root system by planting it properly using the previous steps.
- Pollinating:
  - ◇ Most grape varieties are self-fertile and produce fruits on their own. However, shaking the plant gently when flowers open results in a better yield.
- Pruning:
  - ◇ Do not prune during the first year of growth. (Remember you pruned the grapevine when planted, leaving only one to two canes.)
  - ◇ Prune in the late winter to early spring, leaving only two buds during dormancy. Refer to the pruning videos from Michigan State University Extension, particularly to the one titled Pruning Grapevines at <https://www.canr.msu.edu/grapes/viticulture/pruning>.
- Mulching:
  - ◇ Mulch the grapevine with shredded bark, compost, or pebbles to prevent excessive water evaporation from the soil and to protect roots from temperature fluctuations.
- Overwintering:
  - ◇ In climates with harsh winters, you need to protect the plant, especially from temperatures at or below -7 °F. Move the container into a garage or other protected area if necessary.
  - ◇ Protect the vine during cold snaps in the early spring.
- Insect pests and diseases:
  - ◇ Treat fungal diseases as needed.
  - ◇ Treat with a fungicide, following the manufacturer's directions.
  - ◇ Keep an eye out for common garden insects such as aphids, Japanese beetles, moths, and caterpillars.
  - ◇ Pick the pests off the grapevine or spray with a solution of water and dish soap.





# Glossary

Note that each vocabulary word is followed by the number of the lesson or section it appears in.

**agronomist** (2) – an expert in soil management and crop production

**American Viticultural Areas (AVAs)** (1) – federally designated areas where wine is produced exhibiting similar characteristics that are distinct from other regions

**ampelography** (3) – a science devoted to the identification of grape cultivars based on the vegetative characteristics of the vine

**Brix** (5) – the measure of total soluble solids, which is the approximate percentage of sugar in grape juice by volume

**bud break** (6) – the act of buds emerging

**cambium** (9) – woody tissues nearest to the trunk

**cane** (4, 6) – 1-year-old wood that is retained when pruning

**cane pruning** (4) – a system of cutting the grapevine back to one or more canes that will produce new shoots

**canopy** (3, 7) – the green-growing vegetative portion of the grapevine composed of shoots, leaves, tendrils, and shoot tips

**chilling hours** (4) – the amount of time the vine must remain dormant

**cold air drainage** (10, 12) – the movement of cold air from a higher elevation to a lower elevation

**cold hardiness** (4) – the ability to tolerate cold temperatures

**cordon** (4) – an extension of the grapevine trunk usually horizontally oriented and trained along the trellis wires

**cover crops** (2) – crops planted to prevent soil erosion, suppress weeds, and provide organic matter

**crop block** (11, 12) – a particular area of the vineyard represented by a single variety or a soil type, a topography feature such as a slope or fence lines, or a natural feature such as a stream

**crop load** (4) – amount of fruit one vine can support

**cultivars** (4) – varieties of plants in horticulture that have been deliberately selected for desirable characteristics, such as taste, hardiness, disease resistance, and others

**densitometer** (Career section) – an instrument for determining optical, photographic, or mass density

**dormancy** (4, 9) – the state in which a plant is alive but not actively growing. There is no photosynthesis occurring.

**dormant** (4) – being in the state of dormancy

**dropping** (4) – in reference to fruit, it refers to pruning when the fruit load is too heavy to encourage quality over quantity

**economic injury level** (13) – the lowest level of injury that will cause economic damage

**economic threshold** (13) – when the density of the pest requires management practices from reaching the economic injury level

**enzymatic analysis** (Career section) – determining the active biological components for wine making or for amending the soil

**geographic information system (GIS)** (10) – a computer tool that captures and stores data related to the Earth's surface

**graft union** (9) – the precise spot where the *scion*, a shoot system, and the *rootstock*, root of a different grape species, join to make a grafted vine

**ground truth** (11) – *noun*: information that is known to be true. *verb*: to gather data on site to test the truth of something

**growing degree days (GDD)** (4, 10) – total accumulation of heat during the growing season

**hardy** (9) – able to withstand temperatures to a certain degree

**headlands** (10) – part of the vineyard (field) that is used as a staging area, access to the vineyard, and a place where equipment has room to maneuver in the field, such as making turns and loading and unloading equipment and supplies

**hedging** (7) – trimming grapevines into a desired shape

**herbicide** (9) – a substance used to destroy or limit unwanted plants such as weeds

**humus** (2) – rich, highly decomposed organic matter mostly made from dead plants and insects, crushed leaves, and twigs

**hydrometer** (5, Career section) – device that measures the specific gravity (SG) of the liquid you are about to ferment

**infiltration** (2) – downward entry of water into the soil or rock surface





**infiltration capacity** (2) – the rate at which a soil can absorb water

**Integrated Pest Management (IPM)** (3, 11, 13) – a science-based decision-making process that identifies and manages pests

**isoline** (10) – a line on a map that shows elevation of the land

**lug** (8) – a shallow container used for harvesting

**microclimates** (12) – climate conditions of a relatively small area that differs from the surrounding area

**nodes** (6) – part of the plant that causes leaf growth

**percolation** (2) – flow of water through the soil and the porous or fractured rock

**pH** (5) – the measure of the strength and concentration of acids present in a medium

**phloem** (3) – a tissue in the vascular system that transports sugars and proteins to the rest of the plant and to the grapes

**photosynthesis** (3) – a process utilizing radiant energy to fix carbon dioxide gas and water into carbohydrates

**pre-emergent herbicide** (9) – an herbicide used before the weed emerges from the ground

**pruning** (4) – the removal of plant parts to obtain horticultural objectives

**rachis** (8) – the central stem of the grape cluster

**refraction** (5) – principle that explains how light bends when it moves from one medium to another.

**refractometer** (5, Career section) – an instrument used to measure the soluble solids in a liquid when testing a fruit's sugar content; the result is stated as Brix

**rootstock** (9) – root of a different grape species

**scale** (10) – the size and proportions of objects within a given space on a map or the relationship of features to its actual size in the real world

**scion** (9) – a shoot system

**scouting** (13) – looking for visual clues of pests or pest damage

**shoots** (6) – the primary growth structures of a grapevine

**spectrometer** (Career section) – an analytical instrument in which an emission (as of particles or radiation) is dispersed according to some property (such as mass or energy) of the emission and the amount of dispersion is measured

**spur** (4) – short cane

**spur pruning** (4) – a system of cutting grapevines typically used for canes arising on cordons

**sucker** (6) – shoot that grows from the base of the trunk

**tannins** (5) – desirable compounds that give color and flavor to wine

**titratable acidity** (5) – the total acid concentration in the fruit or the tartness of the fruit

**topography** (10) – the configuration of the surface of an area including natural and constructed features

**training system** (7) – the way the vines will be pruned and trellised for fruit growth and quality

**trellis** (7) – a structure used as support for vines or other plants where the vines are tied or tucked along wires

**trellis system** (7) – a group of related structures that support the vines

**tucked** (7) – a way of describing how shoots are woven into the trellis system by hand or by machine

**tying** (4) – the process of attaching the grapevine to the trellis using tape or twine

**varietal character** (5) – the combinations of aromas and flavors, as well as the sugars and acids of wine grapes

**variety** (3) – a group of plants within a species that has one or more distinguishing characteristics

**véraison** (4, 8) – the stage in development when berries begin to soften and change color

**vertical shoot positioning (VSP)** (4) – a training system in which growth is trained upward from low cordons

**viniferous varieties** (12) – grapes suitable for making wine

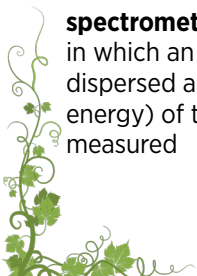
**vintage** (5) – year of harvest

**viticulture** (Grape Fast Facts, Introduction) – the science and practice of cultivating grapes

**viticulturist** (2) – an individual who specializes in vineyard development and grape growing

**wet feet** (10) – a condition in which a species does not tolerate wet growing conditions

**wetlands** (10) – low points in the land with saturated soil, sometimes consisting of swamps or marches





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**PARTICIPANT NOTEBOOK**

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