

Getting the most out of your grape vine soil test report

- Evaluate your site and its suitability for growing grape vines.
- Make sure grape vines can tolerate typical cold winter temperatures at your site.
- Adjust soil pH to the optimal range for the grapes vines you will grow.
- Add fertilizer at the recommended rate and do not over fertilize.

General Information for Your Home Vineyard

Grape vines need full sun to promote fruit maturity and to reduce disease pressure. Vines do best in well drained soils and in sites with good air circulation. One year before planting prepare the soil to a depth of 12-18 inches:

- Eliminate weeds – which compete for water and nutrients
- Adjust soil pH if necessary
- Apply phosphorus and potassium if deficient
- Incorporate organic matter especially if trying to improve compacted soils

More specifics on planting site requirements, vineyard design, variety selection, planting tips and pest management strategies can be found in the resources listed on page 7.

Remember the best time to plant dormant bare root grapevines is early spring (April – early May) before budbreak, as soon as the soil can be worked.

The ideal soil pH depends on the type of grape vine

French American (hybrid) grape vines that are grown for wine prefer a 6.0 soil pH; Vinifera grape vines grown for wine and fresh consumption prefer a pH of 6.5; and Native American Concord grape vines grown for juice and table use prefer a lower pH in the range of 5.5 – 6.0.

The amount of material needed to adjust the soil pH will depend on the soil texture (the amount of sand, silt and clay in the soil) and the type of grape vine.

If your soil is naturally alkaline and has a pH above 8.0 it may be difficult to grow grape vines.

Ground limestone is used to raise the soil pH.

When planning to grow French American (hybrid) grape vines the soil pH needs to be above 6.0. Mix the lime into the upper 6 inches of soil one year before planting to avoid harming plant roots and to provide the necessary time for the material to adjust the pH throughout the root zone.

Dolomitic lime will be recommended when both the pH and magnesium levels are low.

When selecting a liming material read the label and look for the Effective Neutralizing Value (ENV) which is used to calculate exactly how much lime to apply.

The ENV indicates the amount of material that will react with soil acidity in the first year of application. Take the recommended lime rate and divide it by the % ENV to determine exactly how much to apply.

For example, if the soil test report states you will need 8 pounds of lime for every 100 square feet and the product you have has an ENV of 90% you will actually have to apply 8.8 pounds to change the soil pH into the desired range.

8 lbs. of lime (recommended rate) = **8.8 lbs.** will be needed for each 100 sq. ft.

.90 (percent of ENV which is listed on the bag)

Table A estimates the pounds of ground limestone needed per 100 square feet when incorporating it into the upper 6” of soil.

Table A: Approximate pounds of ground limestone to apply per 100 sq. ft. for different soil types.									
Soil pH	Coarse-textured soils Sandy			Loamy soils			Fine-textured soils Clayey		
	Pounds (lbs.) of Lime to apply per 100 square feet with different soil types desired pH								
Desired pH →	5.5	6.0	6.5	5.5	6.0	6.5	5.5	6.0	6.5
Original pH ↓									
4.5	8½ lbs.	11 lbs.	13 lbs.	16 lbs.	21 lbs.	24 lbs.	21 lbs.	28 lbs.	32 lbs.
5.0	6 lbs.	9 lbs.	11 lbs.	12 lbs.	17 lbs.	20 lbs.	16 lbs.	22 lbs.	26 lbs.
5.5	-	3 lbs.	4¼ lbs.	-	5 lbs.	8 lbs.	-	6 lbs.	11 lbs.
6.0	-	-	1¾ lbs.	-	-	3 lbs.	-	-	4 lbs.
6.5	-	-	-	-	-	-	-	-	-

When a large amount of material is recommended, such as 20 pounds of lime per 100 square feet, mix half in the spring and the other half in the fall before planting.

Wood ashes are not used as an amendment to improve soil physical properties. However, they can be used to raise soil pH in place of lime. Avoid applying both lime and wood ashes which can raise the soil pH beyond the optimum range. When using wood ashes as a lime substitute, you will need to apply twice the recommended lime rate and as with any soil amendment be sure to incorporate them into the upper 6 inches of soil a year before planting. Do not apply more than 10 lbs. of wood ashes per 100 square feet to avoid raising the pH above the optimum range.

Wood ashes are also a source of potassium and contain 4-10% potash (K₂O). If applying 5 pounds per 100 square feet supplemental potassium will not be needed.

Sulfur is recommended to lower soil pH You may need to acidify the soil when growing Native American Concord grape vines which prefer a pH of 5.5 – 6.0. See **Table B** to determine the amount of elemental sulfur needed per 100 square feet to lower the soil pH when incorporating the material into the upper 6” of soil.

Table B: Approximate pounds of elemental sulfur to apply per 100 sq. ft. Mix into upper 6” of soil.

Desired pH →	Coarse-textured Soils Sandy Soils					Loamy Soils					Fine-textured Soils Clayey Soils				
	Pounds (lbs.) of sulfur to apply per 100 square feet and mix into the upper 6” of soil desired pH														
	6.5	6.0	5.5	5.0	4.5	6.5	6.0	5.5	5.0	4.5	6.5	6.0	5.5	5.0	4.5
Original pH ↓															
7.5	1¼	2	2¾	3½	4¼	2	3½	4½	6	7	3	5¼	6¾	9	10½
7.0	½	1¼	2	3	3½	1	2	3½	5	6	1½	3	5¼	7½	9
6.5	-	½	1½	2½	2¾	-	1	2½	4	4½	-	1½	3¾	6	6¾
6.0	-	-	½	1½	2	-	-	1	2½	3½	-	-	1½	3¾	5¼

Adapted from the University of Illinois

Promote plant health and increase yield with proper fertilizer applications.

Nutrients required by grape vines in the highest quantity are nitrogen (N) and potassium (K). Other essential nutrients are usually available in adequate quantities when the pH is in the optimal range.

There is no benefit to applying more fertilizer than plants require. Over application of nutrients may be harmful to vine growth and the environment.

Fertilizer Sources

Organic matter is added to the soil to improve soil properties by increasing the water and nutrient holding capacity, improving aeration and drainage, feeding microorganisms and providing some nutrients. Common organic matter sources include composted manure, peat moss, plant-based compost and plant and animal by-products.

Animal manures and plant-based compost (yard waste, grass clippings, food waste) are readily available and popular amendments and fertilizers commonly considered as **natural organics**.

Nutrient content of composted products will vary depending on the source (plant or animal), moisture content, how it was stored and how long it was composted. Weed seeds, a high salt content and pathogens might be a problem with fresh manure or other organic materials if they are not fully composted. Knowing the nutrient and salt content of your compost or manure pile would add precision to application rates for a given site. However, this would require testing every time one of the above variables changes, making this impractical and cost prohibitive for the average gardener.

The nutrient analysis of commercially available manure and compost is found on the bag. Keep in mind these products may also have a high salt content and only 5-20% of the organic forms of nitrogen will be available to the plants during the first year of application.

Only mix in manure or other materials that are fully composted. Fully composted manure has aged for at least 6 to 9 months. Incorporate into the upper 4 to 6 inches of soil before and to minimize runoff.

Inorganic fertilizers are compounds that are chemically synthesized from basic raw materials, isolated from naturally occurring sources or mined materials that provide nutrients. They are less expensive and have a higher nutrient content. They are water-soluble and are quickly available to plants, easy to apply and especially useful in cool weather.

Care should be taken when using *water-soluble fertilizer* sources because they are made of salts that can damage plants if misapplied. If over applied and watered in excessively they can negatively impact water quality if leached beyond the root zone and into the ground water.

The nutrient content (fertilizer analysis) is required on every bag of commercially available fertilizer. The first number indicates the *percent* of nitrogen (N), the second number is the *percent* of phosphate (P_2O_5) a source of phosphorus, and the third number is the *percent* of potash (K_2O) a source of potassium. They are simply referred to as N-P-K. A 50 lb. bag of 10-6-4 contains 5 lbs. of N, 3 lbs. of P_2O_5 and 2 lbs. of K_2O . The rest of the material is made up of other inert material, such as sand or clay granules to help spread the fertilizer.

When nitrogen (N), phosphorus (P) and potassium (K) are all needed, a *complete fertilizer* that contains all 3 nutrients and has the correct ratio can be used. For example: if you needed twice as much nitrogen and potassium then phosphorus a fertilizer with a 2:1:2 ratio could be used. 10-5-10 or 20-10-20 would work.

Fertilizer Rates and Timing: Pre-plant fertilizer practices

Ideally the soil should be prepared a year before planting including the addition of phosphorus and potassium if recommended.

Nitrogen (N) is *not applied* before planting.

Phosphorus (P) is important in early root development and improves the quality of fruits.

Phosphorus does not move in the soil much. It is best to incorporate P before planting. Mix fertilizer into the upper 4 to 6 inches of the soil where root growth is most active.

If only P is needed, use **Table C** to help determine the amount of phosphorus fertilizer to apply.

Potassium (K) increases water efficiency, improves stress tolerance and the quality of fruit.

If yields are high year after year, the vines could benefit from an application of K because a considerable amount of K leaves the vineyard each year in harvested fruit.

Pre-plant incorporation of K is the most effective way to get enough K into the soil system when soil test indicates a less than optimum level is present.

The need for supplemental potassium is driven by climate and yields. When only potassium is needed note the soil test level and select a potassium fertilizer source and apply at the recommended rate. **See Table D.** Use the higher bolded rate if the soil is sandy (coarse-textured).

Remember if 5 pounds of wood ashes are applied per 100 square feet supplemental potassium (K) will not be needed.

Table C: Soil test levels and approximate pre-plant phosphorus (P) recommendations for grape vines

Soil test report levels	Ounces of phosphate (P ₂ O ₅) to apply prior to planting	Some fertilizer sources that contain phosphorus (notice the concentration differs for each so the amount to apply differs)			
		Inorganic fertilizers		Organic fertilizers	
		Super-phosphate 0-20-0	Triple Super-phosphate 0-46-0	Bone Meal 1-15-0 also contains N	Rock phosphate 0-3-0
		20% P ₂ O ₅	46% P ₂ O ₅	15% P ₂ O ₅	3% P ₂ O ₅
		Quickly available	Quickly available	Slowly available	Slowly available
		Amount of product to apply per 100 square feet			
Very low	4½ oz.	1⅓ lbs.	9¾ oz.	2 lbs.	9⅓ lbs.
Low	3½ oz.	1 lb.	7½ oz.	1½ lbs.	7⅓ lbs.
Medium	2¼ oz.	11¼ oz.	5 oz.	1 lb.	4½ lbs.
High	1½ oz.	7½ oz.	3¼ oz.	10 oz.	3 lbs.

Once grapes are established, they rarely will benefit from additional phosphorus.

Table D: Soil test levels and approximate pre-plant potassium (K) recommendations for grape vines

Soil test report levels	Ounces of potash (K ₂ O) to apply prior to planting	Fertilizer sources that contain potassium (K) (notice the concentration differs for each so the amount to apply differs)			
		Inorganic fertilizers		Organic fertilizers	
		Potassium sulfate 0-0-50	Potassium chloride 0-0-60	Kelp also contains N	Greensand
		50% K ₂ O	60% K ₂ O	1-0-2	7% K ₂ O
		2%		2% K ₂ O	
		Amount of product to apply per 100 square feet			
Quickly available	Quickly available	Quickly available	Very slowly available		
Very low	2¼ - 3½ oz.	4½ - 7 oz.	3¾ - 6 oz.	7¾ - 11 lbs.	2 - 3 lbs.
Low	1½ - 2½ oz.	3 - 5 oz.	2½ - 4 oz.	4¾ - 8 lbs.	1⅓ - 2¼ lbs.
Medium	1 - 1½ oz.	2 - 3 oz.	1½ - 2½ oz.	3 - 4¾ lbs.	1 - 1⅓ lbs.
High	0	0	0	0	0

**** Use the higher bolded amount if the soil is sandy (coarse-textured)**

Fertilizer Rates for Established Grapes

Nitrogen (N)

Nitrogen is one of the most important nutrients for plant growth and is needed in relatively large amounts by all plants.

The nitrogen content of a soil sample does not necessarily reflect the future availability of nitrogen because unlike phosphorus and potassium, the nitrogen level will fluctuate depending on biological activity, soil organic matter, soil conditions, rainfall levels and irrigation practices.

Nitrogen application rates are based on the age of the grape planting. Keep in mind that excessive nitrogen can increase disease problems and decrease fruit quality of grapes.

Table E lists approximate nitrogen application rates for various nitrogen fertilizer sources based on the age of the grape planting.

Years after planting	Ounces (oz.) of nitrogen per vine	Calcium Nitrate 15-0-0	Urea 46-0-0	Ammonium Sulfate** 20-0-0	Blood Meal 12-0-0	Cottonseed Meal 6-2-1
1*	½ oz.	3⅓ oz.	1 oz.	2½ oz.	4 oz.	8 oz.
2-5*	½ - 1 oz.	3⅓ - 6½ oz.	1 - 2 oz.	2½ - 5 oz.	4 - 8 oz.	8 - 16 oz.

* apply in the spring between budbreak and bloom and repeat application 4-5 weeks later.

** ammonium sulfate will provide nitrogen and also help to lower soil pH.

Phosphorus (P)

Once established, grape vines rarely benefit from additional phosphorus unless soil test levels are extremely low or the pH is very low.

Potassium (K)

Along with an annual application of nitrogen, grape vines will require an application of potassium. If you have a heavy crop of grapes this year keep in mind that fruit harvest removes more potassium from the soil. Increase recommended potassium rate by 50%. **See Table F** for potassium rates.

When all nutrients are low

If your soil test report indicates phosphorus and potassium are all low you can select a fertilizer with a 2:1:2 ratio, for example 10-5-10, and apply enough to provide 2 ounces per grape vine.

Fertilizer application tips for established grape vines:

If fertilizer is needed, broadcast it in the spring between bud break and shortly after bloom when shoot growth is about 10" long. Avoid fertilizer contact with the trunk and apply the fertilizer in a circle 6-18" away from the trunk. Apply ¼ - ½" of water if rain is not expected in a day or two.

Table F: Soil test levels and approximate potassium recommendations for established grape vines

Soil Test Levels	Ounces of Potash (K ₂ O) to apply per vine per application	Fertilizer sources that contain potassium (K) (notice the concentration differs for each so the amount to apply differs)			
		Inorganic fertilizers		Organic fertilizers	
		Potassium sulfate 0-0-50 50% K ₂ O	Potassium chloride 0-0-60 60% K ₂ O	Kelp also contains N 1-0-2 2% K ₂ O	Greensand 7% K ₂ O
		Quickly available	Quickly available	Quickly available	Very slowly available
		Amount of product to apply per 100 square feet			
		Very low	1 - 1¾ oz.	2 - 3½ oz.	1½ - 3 oz.
Low	¾ - 1¼ oz.	1½ - 2½ oz.	1¼ - 2½ oz.	2⅓ - 4 lbs.	11 - 18 oz.
Medium	½ - ¾ oz.	1 - 1½ oz.	¾ - 1¼ oz.	1½ - 2⅓ lbs.	7 - 11 oz.
High	-	-	-	-	-

Note:

Use the **higher bolded amount** for sandy soils.

Make the 1st application between budbreak and bloom and repeat the application in 4-5 weeks.

[For more gardening information visit Cornell Garden-Based Learning website:](http://gardening.cals.cornell.edu/garden-guidance)

<http://gardening.cals.cornell.edu/garden-guidance>

[For more information on growing fruit:](http://gardening.cals.cornell.edu/garden-guidance/foodgarden/#Growing%20Fruit)

<http://gardening.cals.cornell.edu/garden-guidance/foodgarden/#Growing%20Fruit>

[For more information on growing grapes:](https://gardening.cals.cornell.edu/files/2015/12/4grapes-23qh25l.pdf)

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