

Soil Testing for Vineyards in South Dakota

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Not all soils are conducive to growing quality grapes, so prospective vineyard sites should be tested before a decision is made to plant grapes. Tests can identify soils that are either too high in pH, salts, or salinity, or that are “too rich” (too high in organic matter and nitrogen) for grapes. In addition, testing before planting allows for the incorporation of nutrients—such as phosphorus—that do not move easily through the soil to plant roots.

Each soil sample should represent a uniform area. If vegetation or slope across a site varies dramatically, sample the different areas separately. Also, take separate samples of areas that have had different cropping history (for example, pastures vs. fields). When looking at larger properties, a good starting point is to use the Web Soil Survey to view soil type maps of your area. Find the survey at <http://websoilsurvey.nrcs.usda.gov/app/> or check with your local NRCS office.

Your regional SDSU Extension office or your local NRCS office can help you get started with testing.

Soil Testing Recommendations

- Soils should be tested prior to a decision to plant grapevines. Once vines are planted, testing should be done every two to three years, or whenever a nutritional problem is suspected. Once the vines are in production, petioles should be tested each year to monitor vine nutrition.
- Each site should be tested at two depths: 0” to 6–8” and 6–8” to 24”. A soil probe will greatly aid sampling; you may be able to borrow one. If not, a shovel will also work. Remove surface plant residues before pushing the probe into the soil.
- Take 15 to 20 samples from a uniform area, and mix thoroughly. Remove any visible rocks and plant

residues. Make notes and label each composite sample carefully so that you can identify where the sample came from when you receive the test results.

- When you fill out the soil sampling submission sheet, make sure the labels correctly denote exactly where your samples were collected.
- Air dry the samples before mailing (do not use heat for drying).

We recommend the following tests:

Drainage

Check soil drainage by digging a hole 3-feet deep. Fill the hole with water and wait 48 hours. If water is still present in the hole after that time, the site is not well-drained enough for grapes, which are deep-rooted and not tolerant of “wet feet.”

Water

If you are using well or surface water for irrigation, it’s also a good idea to have the water tested for EC and pH.

Laboratory tests

- pH
- Organic Matter
- Phosphorus (P)
- Potassium (K)
- Magnesium (Mg)
- Soluble salts (EC) and CEC
- Texture class

Notes on specific tests:

Although nitrate nitrogen will change over a season, we recommend testing it also, as very high levels can prevent new vines from hardening off properly for winter.

If you know that the soil pH is over 7.3, we suggest you also test zinc levels on low (under 2%) organic matter soils.

Recommended Soil Test Levels

Levels of non-mobile nutrients such as phosphorus and potassium, as well as soil pH, are best adjusted prior to planting your grapevines. Once you know your soil test levels, your state horticulture extension specialist will be happy to assist you with recommendations for nutrient applications.

pH: Most varieties tolerate a wide range in pH, from 5.0 to 7.6. A range of 6.0 to 6.8 is ideal for most of our northern hybrids, but we have vineyards growing relatively successfully on pH as high as 7.8. Higher pH soils may require occasional foliar feeding of micronutrients. If pH is over 7.2, consider using sulfur materials to lower the pH (see note below under CEC). Consult an extension soil specialist for further information on adjusting soil pH.

Organic matter (OM): Under 6%; 3% or under is best. Each 1% of soil OM will contribute about 20 lbs/A nitrogen each growing season.

Phosphorus (P): 20-30 ppm P (Bray test) or 10-25 ppm P (Olsen test, often used on the high calcium soils common in South Dakota).

Potassium (K): 150 ppm K (300 lb/A) in the top 8" if Mg is high, K should be equal to 50% or more of the exchangeable Mg in the top 8"

Magnesium (Mg): 100 to 125 ppm Mg (200 to 250 lb/A)

Zinc: 3 ppm (6.0 lb/A; some authorities state that levels over 1 ppm are sufficient)

Nitrate Nitrogen: The level of nitrate nitrogen plus that furnished by the OM should not exceed 100 lb/A in the root zone. For example, a soil with 4% OM would furnish 80 lb/A N so nitrate N should be 20 lb/A or less. Add the nitrogen from both the 8- and 24-inch soil depths once the vines are established.

CEC: If CEC is over 18, sulfur will not be economical in lowering soil pH, as the soil is too highly buffered.

Soluble Salts: EC under 1.5 mmhos/cm
Irrigation water should also be under 1.5 mmhos/cm

Texture: Sandy loam or loams are ideal; on heavier soils test drainage in several areas.

Additional resources

- <http://northerngrapesproject.org/>
- "Starting a Commercial Vineyard in South Dakota" SDSU Extension publication
- "Vineyard Work Calendar" SDSU Extension publication