



Timely Viticulture

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"Timely Vit" is designed to give those in the Maryland grape industry a timely reminder on procedures or topics they should be considering in the vineyard.

Nitrogen Fertilization in the Vineyard

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The annual goal in the established vineyard is to have the vines fill their allotted trellis space, top out vegetative growth just above the top wire at veraison, and produce a crop that is in balance with the vegetative vigor. Regrettably high water availability and high nitrogen (N) content of Mid-Atlantic soils typically leads to excess vigor and extended vegetative growth.

- Nitrogen is a major component in proteins and growth regulators (cytokinin and auxins) in plants and therefore is utilized in large quantities.
- Nitrogen is a very dynamic element in the soil and plant. Many of the N compounds are very soluble and are easily taken up by the plant and leached from the soil.
- Nitrogen is supplied naturally in the soil primarily through the breakdown of organic matter. Each 1% of organic content in the soil can supply from 5 to 20 lbs. of N/acre/year, depending on soil series, temperature, etc.
- For many grapevines (especially *vinifera* cultivars), excessive N may lead to excessive vigor and unbalanced vines. This ultimately leads to reduced fruit quality due to shaded fruit and delayed ripening. Excess N may also decrease fruit firmness and make the berries more susceptible to Botrytis infection.
- Overall, **excess vigor** is a problem with grapevines, so a conservative approach is typically taken with supplemental N fertilization. On heavy soils or soils with high moisture content apply too much N during the growing season may result in the vine actively growing late into the fall with poorly hardened wood that has increased sensitivity to winter damage.
- Nitrogen requirements are best determined by growth and performance. The grower needs to determine rates of N for each variety for each block of the vineyard. *Vinifera and premium Hybrids are managed for moderate yield and maximum fruit and wine quality.* Thus N supply is in the lower end of the spectrum.
- Soil tests for nitrogen have not proven useful in determining plant needs, so leaf analysis is the best tool for determining fertilizer needs in bearing vineyards.
- When developing a nutrient management plan, leaf analysis, soil series, and vineyard vigor observations including shoot growth rates (number of hedges/sheerings), leaf color, yield, and pruning weights should all be taken into account.
- For *vinifera*, N needs and applications should be based on tissue testing in conjunction with observations on vigor and productivity. Typically grafted *vinifera* vines are very vigorous and **do not** require annual N applications, with the possible exception of high sand content soils.
- Premium and Grafted Hybrids will typically respond similarly to *vinifera* cultivars and may require little or no annual N fertilizer.

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Pre-Bloom

- Self-rooted Hybrids and American cultivars require regular annual applications to maintain vigor and balance productivity.
- As a guideline, the annual N requirement for *vinifera* and premium Hybrids ranges between 0-30 lbs. actual N/acre. But as previously stated, most do not require annual applications and many vineyards can go many years without N applications, again depending on soil organic matter and moisture availability.
- For premium Hybrids, annual N requirement ranges between 0- 50 lbs. actual N/acre, with the same considerations as for *vinifera* above.
- Self rooted Hybrids and Americans may require 20-60 lbs./acres annually.
- Most N (75%) is stored in the roots of dormant vines and early spring vine growth of the vine is primarily fueled by the reserve N stored in the roots, trunks and other permanent wood; this typically runs out around bloom.
- Most N uptake by the vine occurs at 2 periods: 2-3 weeks prior to bloom and 2-6 weeks after bloom. Vines take up only 10% of N applied at bud break, but double the rate of N uptake near bloom. Thus, it is **not** recommended to apply N at bud break, but preferably around full bloom, in late May or early June.
- A second application, if necessary, can be made no later than mid-July if the growth of the vines has slowed or stopped by that point or the leaves look light or chlorotic.
- Vineyards on sandy soils typically require more N during the growing season, and depending on the soil organic matter content, it is best to split the applications.
- Fertigation, if possible, is the desired and most efficient mode of application as it concentrates the N in the root zone. Apply small amounts (1-3 lbs. actual N) as needed.
- Dry fertilizer is typically banded under the row to feed the grapevines and not the turf middles.
- MDA *requires* all commercial farms to have a nutrient management plan. Send tissue and soil sample results to a Nutrient Management Advisor at UME, and we will take all information into consideration in preparing the recommendations in your nutrient management plan.

N content of fertilizers:

- Ammonium nitrate contains 32% N and has an acidic soil reaction (1 lbs. N = 1.8 lbs. CaCO₃). It takes 1.8 lbs. of lime to neutralize the acidic reaction of 1 lbs. of ammonium nitrate fertilizer. It may be difficult to obtain due to explosive nature.
- Urea contains 46% N. It is an economical N source, also with an acidic soil reaction (1 lb. N = 1.8 lbs. CaCO₃). It is subject to ammonia volatilization if not incorporated.
- Calcium Nitrate contains 15% N, and is more expensive, but is an excellent source for fruit since it also supplies calcium which is important for fruit. It has a basic soil reaction so no neutralization is needed.

Resources:

- Dr. Terry Bates Cornell University; Dr. Tony Wolf, Virginia tech; Dr. Tim Martinson, Cornell University;
- Visit <http://extension.umd.edu/smallfruit/grapes> for more viticulture management information.

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