



Nutrient Management during Fermentation

This article explains what YAN is, the advantages of measuring and treating it, and how to determine what your YAN value means, among other YAN-related topics.

ARTICLES



While nutrient management may not seem essential, research shows that proper treatment through fermentation with appropriate nutrient additions can help inhibit hydrogen sulfide (H₂S) development and ensure more successful, completed fermentations.

What Is YAN?

In order for proper fermentation to occur, yeast must have adequate nutrients available. The yeast assimilable (or available) nitrogen (YAN) content can be measured at harvest on grape juice or must, and indicates the level of nitrogen (N) available at the start of fermentation. Nitrogen is an essential nutrient required for yeast health during the fermentation process. It contributes to the development of essential yeast molecules, which allow for healthy yeast growth and metabolism. The YAN value for a given lot of grape must or juice directs winemakers to determine what nutrient additions need to be made during fermentation to ensure fermentation completion and minimize the potential for H₂S production.

Advantages of Measuring and Treating YAN

With a better understanding of YAN and YAN management during fermentation, winemakers can take a proactive approach to controlling fermentation and final wine quality. Improving YAN management practices offers several advantages to the winemaker:

- Minimizes H₂S occurrences in finished wines
- Improves the number of clean wines and aroma/flavor development by the completion of fermentation
- Results in more successful, dry fermentations
- Reduces the number of stuck or sluggish fermentations, which may contribute to other problems or flaws in the finished wine
- Provides a way to develop a better understanding of YAN values and nitrogen needs for wine varieties made at the winery
- Reduces unnecessary costs of fermentation nutrients by only using those nutrients required for a healthy fermentation

How Do I Determine What My YAN Value Means?

Although there are differences in what nutrient suppliers consider a high, medium, and low YAN reading, the general principle is the same: use the initial YAN content and Brix of the juice/must in order to determine proper nutrient supplementation. Some consideration may also need to be given to yeast strain selection, as some yeasts have higher nitrogen requirements than others and should be treated accordingly. Penn State Extension Enology recommends following supplier guidelines for specific nutrient additions.

Nitrogen Product Lines that Contribute to YAN during Fermentation and Optimal YAN Rates per Supplier Recommendations

| Company | Nitrogen Product Lines | High/Medium/Low YAN Rates |
|--------------------------------------|--|---|
| Beverage Supply Group (BSG)/Lesaffre | <ul style="list-style-type: none"> • Startup™ • Startup-Org™ • Superferm™ • Superfood™ • Vinferm® | <p>Recommended YAN levels to reach by end of fermentation:</p> <ul style="list-style-type: none"> • ≤21°Brix: 200-250 mg N/L • 23°Brix: 250-300 mg N/L • 25°Brix: 300-350 mg N/L |

(milligrams of nitrogen per liter) to the YAN concentration. If the addition rate was doubled to 60 g/hL, then 20 mg N/L are contributed to the YAN value.

Therefore, if the must's starting YAN was 150 mg N/L, a 30 g/hL addition of GoFerm® will bring the YAN up to 160 mg N/L.

Most commercial nutrient products, including DAP (diammonium phosphate), have documented quantities of nitrogen that each of their products contributes based on standard addition rates.

Can I Assume that the YAN Content Is the Same Through All of My Fermentations or Each Year?

Unfortunately, there is no common predictor for the YAN concentration. Therefore, it should be measured for each incoming must just like Brix and pH are commonly measured at the start of each new fermentation.

What Issues May Arise If I Do Not Measure YAN?

Research regarding YAN is ongoing, and vintners are encouraged to stay up-to-date with the research literature. Without proper nutrient additions during fermentation, winemakers run the risk of:

- Increased incidence of stuck or sluggish fermentations
- Increased incidence of hydrogen sulfide development
- Increased incidence of spoilage yeast and bacteria
- Possible simplified aroma/flavor development by the end of fermentation

Many wineries may opt to only add a rehydration nutrient, like GoFerm®, and make DAP additions, as this was encouraged when research on nutrient management was initiated. However, recent research indicates that reliance on DAP may not suffice in addressing nutrient needs for some fermentations. Furthermore, some evidence indicates that larger DAP additions, without complex nutrient additions, may simplify the aroma and flavor component of the wine by the end of fermentation.

Research on YAN and nutrients is ongoing. Winemakers are encouraged to regularly investigate advances in yeast nutrient management.

Prepared by Denise Gardner, extension enologist.

| Company | Nitrogen Product Lines | High/Medium/Low YAN Rates |
|----------------------|---|---|
| Enartis Vinquiry | <ul style="list-style-type: none"> Nutriform | <ul style="list-style-type: none"> High: >225 mg N/L Medium: 125-225 mg N/L Low: <125 mg N/L |
| Gusmer Enterprises | <ul style="list-style-type: none"> MicroEssentials™ | Addition rates and timing based on specific fermentation conditions |
| Laffort | <ul style="list-style-type: none"> Bioactiv® Dynastart® Nutriscart® Thiazote® | <ul style="list-style-type: none"> High: >180 mg N/L Medium: 140-180 mg N/L Low: 40-140 mg N/L |
| Lallemand/Scott Labs | <ul style="list-style-type: none"> Fermaid™ GoFerm® | <ul style="list-style-type: none"> High: >200 mg N/L Medium: 125-200 mg N/L Low: <125 mg N/L |

This list is just an example for winemakers and should not replace product information provided by the supplier. See suppliers' catalogs or websites for complete listings of all products. This list was complete at the time of publication.

The table above lists several different suppliers of nitrogen-based products that contribute nitrogen during primary fermentation. This is to emphasize the variation in nutrient products and how supplier recommendations differ. Each of the brands offered by a given supplier represents a line of products to be used for different YAN conditions. Fermaid, for example, has several options that winemakers can choose from based on the winery's needs: Fermaid K™, Fermaid O™, and Fermaid A™.

How Do I Know If I Am Making Adequate YAN Additions?

Most suppliers offer a chart that indicates how much nitrogen is contributed to the YAN value based on the dosage rate of the product. For example, at a 30 g/hL (grams per hectoliter) addition rate of GoFerm®, the product contributes 10 mg N/L