

YAN and nutrient supplementation for fermentation.

YAN

To have a successful wine grape fermentation, one that goes to completion and doesn't stink, you must need to have a certain amount of nitrogenous nutrients. The actual amount of nitrogen available in the must, that the yeast can use, is called the Yeast Assimilable Nitrogen or YAN. It is quoted in milligrams per litre, mg/l and can be determined by analysis.¹ Note that DAP contains 21% Nitrogen so 100 mg/l DAP is equivalent to a YAN of 21 mg/l.

Sources of YAN

Grape must has two main sources of YAN, amino acids and ammonium salts². The amino acids are important in the early phase of a fermentation. Ammonium salts are important later, from about 1/3 sugar depletion. After about half the sugars have fermented, the yeast can no longer assimilate nitrogen. Additions of ammonium salts (such as DAP) after this halfway point won't be used by the yeast but will remain in the wine, raising the pH unnecessarily (DAP is quite alkaline) and encouraging any spoilage organisms like Brett. Lallemand Fermaid O and Fermaid AT contain amino acids, Fermaid AT also has DAP. Enartis Nutriferm Arom Plus contains amino acids, no DAP: 100mg/l of any of these = 12 mg/l YAN.

Measuring YAN

YAN does not change greatly in the final phase of grape ripening³ so it is possible to sample one week, or maybe two, before harvest. This allows time to get the result before the start of the ferment. Juice sample preparation needs to reflect the fermentation regime: a proportion, perhaps 30%, of the YAN resides in the grape skins⁴.

Required amount of YAN

Logically, the higher the Brix, the higher the YAN required. And some yeast strains are reported to have higher nutrient requirements than others.

The Laffort website has a YAN calculator that takes these factors into consideration. The Pambianchi⁵ source also allows for variations in yeast requirements

Enartis⁶ notes the effect of Brix: Below 24 Brix (13.5 Baume) minimum YAN = 250 mg/l
 Above 24 Brix (13.5 Baume) minimum YAN = 300 mg/l

AWRI⁷ states: Minimum YAN for low risk fermentation: White – app. 150 mg/L, Red – approx. 100 mg/L
YAN requirement for clean/fruity flavour: White – 250 to 350 mg/L, Red – unknown (currently researching).

Lallemand are disinclined to suggest required YAN values, but have provided the guidelines below.

Be cautious with values from books and magazines that reflect European or North American practice.

Australian soils are ancient, heavily weathered and thus generally grow nutrient deficient grapes whereas other Continents have younger soils with more nutrients.

Supplementing YAN

The method is basically simple: measure the must YAN and if necessary add additional nitrogen sources to achieve the desired YAN. The difficulty is deciding whose recommendations to follow. The various methods are set out in table form below.

But

Only add enough DAP at the ferment start to get a YAN of 150 mg/l. Yeast will use this DAP rather than amino acids at this stage, leading to a lack of yeast factors needed later in the fermentation. Yeast won't use the amino acids later in the ferment, so they will be left behind as a nutrient for spoilage organisms. Add more DAP or other nutrients at 1/3 sugar depletion if required.

Don't forget to pump over on day 2: at this stage, oxygen helps the yeast produce sterols and other factors

1 Vintessential \$45+, 10 ml sample +SO₂, frozen. Laffort \$45+, same day service at Lilydale.

2 <https://www.vintessential.com.au/yeast-nutrition-successful-fermentations/>

3 https://www.awri.com.au/industry_support/winemaking_resources/wine_fermentation/yan/

4 The AWRI and Vintessential sources give details of sample preparation.

5 <https://techniquesinhomewinemaking.com/index.php/winemaking-tools/>

6 According to www.enartis.com.au.

7 https://www.awri.com.au/industry_support/winemaking_resources/wine_fermentation/yan/ but see also https://www.awri.com.au/industry_support/winemaking_resources/calculations/diammonium_phosphate

that will be useful later.

Stinky ferments

If you have provided the necessary yeast nutrients, your fermentation may still stink if the yeast gets stressed, i.e. too hot or cold, or oxygen starved due to a lack of plunging. It's always a good idea to anticipate and prevent temperature shocks, particularly at pressing off. And to set up ferments for pumping over⁸.

Fussy yeast.

Some yeast strains are reputed to be better behaved than others, particularly with local Shiraz and Chardonnay ferments. And new strains come on the market from time to time. Ask around.

Various methods of nitrogen supplementation⁹.

AWRI method: If YAN is less than 150 mg/l, add enough DAP at crush to bring the YAN up to 150 mg/l. Then, if more YAN is needed, add DAP at 1/3 sugar depletion in line with their (higher) recommendations, though many winemakers these days add “organic” sources of nitrogen as well as DAP.¹⁰ This latter nutrient addition is frequently staggered over several days as long as the final addition is no later than ½ sugar depletion.

The Laffort method is easy, just use the calculator on their website.

Enartis suggest that if you need to supplement, you add Nutriferm Arom Plus 200-300 mg/l at crush, then, if more YAN is needed, at 1/3 sugar depletion use Nutriferm Advance noting that 100 mg/l of both these products supplies 12 mg/l YAN.

The Lallemand recommendation is as follows:

YAN of juice/must	Add at yeast rehydration	Add at ferment start	Add at 1/3 sugar depletion
> 200 mg/l	Go-ferm Protect Evolution™ ¹¹ 30g/100l	Nothing	Fermaid O 20 g/100l
125-200 mg/l	Go-ferm Protect Evolution 30g/100l	Fermaid O 20 g/100l	Fermaid O 20 g/100l
70-125 mg/l	Go-ferm Protect Evolution 30g/100l	Fermaid O 40 g/100l	Fermaid O 20 g/100l
< 70 mg/l	Go-ferm Protect Evolution 30g/100l	Fermaid AT 30 g/100l	Fermaid AT 30 g/100l

Lallemand¹² state that their organic sources of nitrogen are 2.5 times more effective than DAP so their apparent YAN values may appear lower than others.

Daniel Pambianchi¹³ has produced an excellent YAN calculator that works with Laffort, Enartis and Lallemand products even if “mixed”, i.e. even if you use a Lallemand yeast and Enartis nutrients. It's also easier to use than the Laffort calculator.

8 You should always pump over on day 2 to oxygenate the ferment. Peynaud, Knowing and making wine, pp 113,175.

9 What follows is in part my interpretation of the various suppliers and other sources.

10 Johnny Clark, pers. comm. “Organic” nutrients include Enartis Nutriferm Advance, Lallemand Fermaid O and Fermaid AT

11 Contains “sterols and yeast derived micronutrients”, but note the Peynaud reference.

12 “Making sense of yeast assimilable nitrogen”, Grape Grower and Winemaker, November 2019

13 <https://techniquesinhomewinemaking.com/index.php/winemaking-tools/>