

NEWSLETTER November 2014

Wine-making: Yeast Nutrients

This is the first of a series of newsletters that we intend to make available to our clients. The newsletters cover our business activities in disinfection, water and wastewater treatment, as well as “fun” topics. This first newsletter relates to a “fun” topic – wine-making.

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Yeast is cheap labour, but yeast does not work for free. The main “wages” that yeast collects is from the sugar that it “eats”, in other words, some of the sugar is not converted into alcohol. Although this process is the main energy source, yeast needs additional nutrients as “nutritional supplements”. The main additional components needed are phosphate and one or more nitrogen sources. The latter is so important that it has drawn much scientific and commercial attention, to the extent that the term Yeast Assimilable Nitrogen (YAN) has been coined, and that YAN measurement prior to fermentation has become standard practise in wineries.

In most cases, the addition of some diammoniumphosphate (DAP) will satisfy the needs of wine yeast, so that this has also

become standard practise. It is a good rule of thumb to add 2 g of DAP to a 10 litre batch prior to fermenting. The amount is not critical, and some excess of DAP will neither harm the yeast, nor the wine drinker, and has no adverse effect on taste, unless used in unreasonable quantities. In commercial wine-making, the rules of Australia and of the EU on DAP are far stricter than the US rules, so that the limit recommended here is 3 g of DAP (or any other more complex yeast nutrient mix) per 10 litre batch.

Unfortunately, things are not necessarily as easy as they may appear at first glance, this is made very clear in cases such as with DAP. To begin with, it contains nitrogen and phosphorous in an atomic ratio of 2 : 1, but yeast requires more nitrogen than that. The easy remedy is to add something that provides additional nitrogen, and in an agricultural-heavy environment like North America, urea as one of the classical nitrogen fertilizers comes to mind. It is cheap, easy to get, and not harmful to humans, and there are indeed yeast nutrient products on the North American market that are mixtures of DAP with urea. The bad (and eventually fatal) news is that yeast can only use urea partially, and converts it to carbamate, which it leaves behind. Carbamate is a known carcinogen, so that reader should abstain from using these product, unless there is a desire to

develop cancer. We strongly advise against the purchase and use of yeast nutrients that contain urea, or of yeast nutrients where the manufacturer does not declare its composition. Regrettably, these potentially fatal products are sold in Canada and the United States to hobby wine-makers; although they are prohibited in commercial wine-making in these countries. It must be pointed out that there is nothing wrong with using urea as a nitrogen fertilizer in a vineyard, where it is used as a nutrient for the grapevines, as opposed to nutrient for future yeast.

The relative nitrogen deficiency of DAP is often compensated by adding diammoniumsulfate (DAS) to the mixture, with or without additional amino acids (in the US, only glycine is a permitted additive amino acid for wine). DAS also serves as a sulfur source.

Yeast has an additional nutritional need of inorganic components such as potassium, calcium, magnesium, and in trace amounts (micro-nutrients) copper, iron, manganese, and zinc. If a good source of well water is used in the preparation of fruit wine, the need for calcium, magnesium, iron, and manganese is taken care of. If reverse osmosis water or distilled water is used, re-mineralization of that water is a necessity, as it is when the water is intended for human consumption. For wine-making, mineral additives are available to offset the deficiencies of mineral poor water such as reverse osmosis water.

In addition to inorganic substances discussed above, certain organic compounds are essential nutrients for yeast, such as thiamin (vitamin B1), riboflavin (vitamin B2), biotin (vitamin B7), pantothenic acid (vitamin B5), nicotinic acid (vitamin B3), and inositol, which can be considered "vitamin cocktail for yeast". It is somewhat ironic that for most of these vitamins, yeast itself is an excellent source. However, at the time fermentation is kick-started, there is not a sufficient amount available to the yeast, unless it is added.

As a conclusion, there is a need to add yeast nutrients, preferably the more complex types, and possibly also mineral additives if the water is poor in minerals.

Advice: Avoid yeast nutrient that contains urea. Do not buy yeast nutrient where the manufacturer or vendor do not say what the ingredients are, and whether these are food grade or pharmaceutical grade.

Related Osorno Products

Yeast Nutrient Complex, 100 g bottle, 0.5 g are needed per 1 litre wine batch

Yeast Nutrient Complex with Yeast Vitamins, 100 g bottle, 0.5 g are needed per 1 litre wine batch

Osorno's yeast nutrient complex contains diammonium phosphate, diammonium sulfate, diammonium fumarate, and glycine, thus solving the problem of the N : P balance that is described in the above article. The nutrient with yeast vitamins contains in addition vitamin B1, vitamin B2, vitamin B3, vitamin B5, vitamin B7, myo-inositol, and glucose. All ingredients used by Osorno for yeast nutrients are either food grade or pharmaceutical grade.

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