

Palatable spirit from palatable fermentations

by Mikrobios

It is perhaps axiomatic that palatable spirit of the gin and vodka type can be obtained only from a pleasant ferment. I've been making wine for thirty years; when I first began making spirit I was amazed at how much of the flavour of the ingredients was retained by the final diluted spirit, even after a slow reflux distillation in an 8 plate-equivalent still. It seems to me that, as in steam distillation, various oils and essences are carried over by the vapours at relatively low temperatures.

I treat the making of the 'wash' as I would the making of a wine. It's a specialized wine — high in alcohol, thin, lacking tannin, rather acid, but it actually tastes blandly pleasant, and would probably mature in bottle quite well, and, by reason of its alcoholic strength, might stay at its peak for a year. Making it is very simple.

Recipe

Water to 25 L
cane sugar 6 Kg
grape concentrate 0.5 L
fresh orange juice 0.5 L
Dried Yeast 10 G (2 sachets)
Nutrient (Minavit) - see text
Malic Acid 25 G

Method

Invert the sugar by bringing 2 L water to the boil in a large pan and adding the sugar and malic acid. Boil for 15 minutes, stirring well. Turn off the heat, and add water to cool. Pour into a clean fermenter. Add grape concentrate, orange juice and nutrient. Make up to 25 L with water. Stir well. Allow to cool to 25 – 30 degrees C. Reactivate the dried yeast by pouring into 50mL of filtered tap water which has been boiled and cooled to 30 degrees C. Stir well. After 15 minutes add the yeast suspension to the fermenter. Put a fermentation trap in place. Insulate the fermenter by wrapping it with a towel, or, in cold weather, a sleeping-bag. Partial aeration — by gently blowing air through the ferment for a minute or so — once daily for the first three days and at the end of fermentation, when the SG is about 0.990 and the bubbles are becoming infrequent — is beneficial. Allow the wine to rest in a cool place. Fine if necessary, and rack off the yeast when clear.

If you have the space, it's good to keep a batch ahead.

Notes

Water. Best filtered with a plumbed-in activated carbon filter where chlorinated mains water is used. Boiling is probably unnecessary.

Cane sugar. Ordinary white granulated sugar. Inversion by acid hydrolysis as above makes a great difference — fermentation starts more quickly, goes faster, and, at the end, shuts off like a switch when the sugars are all gone. I think it leaves a cleaner taste, too.

Grape concentrate. Continuing the theme of fitting substrate to organism, grape concentrate helps fermentation. It may supply trace nutrients. In an anaerobic environment

the yeast is working under stressed conditions, so it is probably best to make all other conditions as favourable as possible. I use high-quality single cultivar white grape concentrate.

Orange juice. The reasoning behind the addition of juice is to add fine vegetable cell-wall material. Yeast multiplies in the must and is kept suspended by the movement of the ferment. As fermentation dies down, the yeast sinks to the bottom of the fermenter. If the cells are compacted there is competition for sugars and nutrients, and the lower layers of cells starve, and, in time, may die and autolyse. There are few taints worse than autolysing yeast and a sensitive palate detects it immediately. Vegetable cell-wall fragments apparently prevent compaction of the yeast at the end of fermentation by allowing channels of diffusion for nutrients. Orange juice is perhaps a better choice than (cloudy) apple-juice, which is pectin-rich and increases the methanol concentration.

Yeast. I'd go for a wine cultivar. A good choice is the Champagne yeast EC1118, available in Europe as Gervin Varietal C. Lalvin (USA) also sell this strain. Many commercial vineyards use it. It is said to ferment up to 18.5% alcohol. (I aim for about 14% — high alcohol is another source of stress for the yeast. I'd rather have a ferment that 'switched off' when the sugars were finished than one which struggled on without a definite ending.) This strain quickly forms a floccular sediment, leaving a clear wine above.

[I wouldn't use an industrial non-beverage distiller's yeast. I tried this twice, and on both occasions found that, although fermentation was quick — I've never seen a faster — the yeast would not settle satisfactorily at the end of the fermentation. In fact it began to autolyse before it was fully settled. A most unpleasant taint ran through the supernatant and — just perceptibly — through all fractions of the distillate. I had to take all the packing out of my column and boil it with a detergent to get rid of the taint. I now suspect that this yeast was a strain genetically modified for super-fast fermentation in a continuous industrial process; non-settling was in fact a requirement. At the end of the circuit the yeast would have been pulled out of suspension by a cell-separator. Very, very effective, but not for home use.]

Nutrient. I use Gervin's Minavit; it seems complete, and, by the smell of it, may contain yeast hull lipids, which are apparently very beneficial for yeast growth. I use 1G – 1.5G/L. Some authorities claim that the best results are obtained by dividing the nutrient into three aliquots and adding these sequentially at 48hr periods. I try to calibrate the amount of nutrient giving a complete and quick fermentation without leaving too many soluble nitrogenous materials in the finished wine. Tronozymol is another nutrient also available. I believe that in the US there is a complete nutrient called Fermaid.

Malic acid. Tartaric or citric acids may be substituted.

Insulating the fermenter. This stabilizes the temperature of fermentation. Falls in temperature — at night, for example — cast the yeast out of suspension, depositing it at the bottom, where it remains. This slows fermentation and risks autolysis.

Aeration of the must. This allows yeast growth at the beginning of fermentation: yeast multiplication takes place under microaerophilic conditions (that is, just short of being completely anaerobic). Under completely anaerobic conditions, the yeast can respire but not efficiently reproduce. Yeast reproduction is necessary at the start of fermentation to build up the numbers of the organisms necessary for a brisk conversion of sugars, so it is a good idea to start off with well-aerated water. I briefly aerate the must once a day for the first three days by blowing into it for a minute or so with a tube, gently, allowing the froth to subside. When fermentation is nearly finished, a few bubbles rising to the surface, I thoroughly aerate the wine by pouring from one container to another. This allows the yeast to finish off the last of the sugars aerobically and more efficiently.

Fermentation time

Six or seven days; fermentation 'switches off' quickly when the sugars are used up and the gravity is about 0.990. The wine clears in about three more days. A little egg-white,

gently whisked in half a litre of the wine, and layered on the top, helps. Rack the wine off the yeast when clear, and store until needed in a stoppered container.

Distillation

See below.

Polishing

The wine produced by the method above is so palatable that, if distillation is carried out slowly and carefully using a good reflux still, polishing with carbon should not be necessary. Polishing is needed only if a truly neutral spirit is required.

Variations

The above is only a series of suggestions; I'd like to go on and try all kinds of different yeasts and fruit-juices and grape varieties.

Sources

For an erudite but very readable account of yeast dynamics in fermentation, George Clayton Cone's pages in *In Ferment*

<http://www.lallemand.com/danstar-lalvin/InFerment/InFerment.html>

are very useful; I have adopted many of his hints.

For an authoritative account of the theory of distillation, home applications, and suggestions and calculations for design, I commend Tony Acland's excellent pages on

http://www.geocities.com/kiwi_distiller/