Dealcoholizing wine: blessing or curse? - Abstract

The demand for non-alcoholic and low alcohol wines has increased tremendously in recent years. However, dealcoholising wine is still controversial. According to traditionalists, reducing alcohol in wine represents a threat to the "soul" of the wine. Others claim that wines with too much alcohol are unbalanced and overwhelm delicate fruit aromas. And while information from producers of dealcoholisation devices indicate a widespread use by winemakers, little is known about (partial) alcohol reduction of quality wines.

The market developments of (partly) de-alcoholised wines, the existing controversy of dealcoholisation of wine and the hint of secrecy about the usage of devices to lower alcohol content in quality wines, have motivated me to write this thesis.

The objective of this thesis is to explore and investigate the dealcoholisation of wine and the low and non-alcohol wine market, and to answer the question stated in the title of this thesis.

Most of my research is based on desktop research of (academic) articles, books, publications and information found on the internet. I have also carried out a survey via the account of WeShareWine on LinkedIn and Instagram to investigate consumer experiences of drinking non-alcoholic and lower-alcohol wines in the Netherlands.

In practice, dealcoholising wine is mainly driven by two developments. The first is a growing consumer demand for low and non-alcoholic wines for health and social reasons. The second is the increased alcohol levels in wine due to higher sugar levels of harvested grapes. The higher sugar levels can be explained by the global increase in average temperatures due to climate change during the past decades. In addition the production of riper styles of wine by extending the hang time has been a response to changing consumer preferences for rich, full-bodied wines and ripe fruit flavours.

Measures to lower the alcohol content in wines can be taken at the various stages of wine production: before, during or after the fermentation process of grape must. The first stage concentrates on lowering the sugar concentration of the grape juice. During the fermentation stage one can arrest the fermentation process, dilute the grape must with water, remove sugar with nanofiltration or use modified or non-Saccharomyces cerevisiae yeast strains with a lower efficiency rate. The use of physical dealcoholisation methods can reduce the alcohol content in a fully or partially fermented wine to a controllable extent.

There are basically three methods of alcohol removal: extraction, membrane separation and heat treatment. Extraction processes use extraction substances such as carbon dioxide. So-called supercritical CO_2 extraction methods are rarely used in practise because they are expensive to utilize and require large initial investments. Using a semipermeable membrane one can remove ethanol from wine by a physical separation process. The most commonly used at a commercial level include reverse osmosis (RO), osmotic distillation (OD) and pervaporation (PV). These are less capital intensive and relatively easy to use in an existing winery of an average size. Thermal processes are based on the principle of heating and evaporation. The spinning cone column (SCC) and vacuum distillation (VD) are two very common thermal methods for reducing the alcohol content in wine. Although SCC plants also require considerable capital investments they run very efficiently and can dealcoholize wine in large volumes at reasonable operating costs, reducing the additional costs per litre to approximately one Euro. This also explains why SCC plants are merely used by large wineries producing large amounts of de-alcoholised wines or by specialised firms who dealcoholize wine for external clients.

Alcohol is clearly important for wine sensory sensations, influencing wine viscosity and body, and our perceptions of astringency, sourness, sweetness, aroma and flavour. However, the precise organoleptic impact on wine remains ambiguous. Human sensory systems (taste, olfaction and chemosensory irritation) are complex and show individual differences.

Despite techniques in dealcoholisation to preserve wine aroma and taste within to a certain extent, the organoleptic experience of the final de-alcoholised wine does change significantly, affecting the quality and consumer liking. Most common responses are less aromas, lack of hotness on the palette and shorter finish. In general, the more alcohol is removed, the more aromatic qualities and taste tend to worsen. Consumers seem to perceive fully de-alcoholised wines as unbalanced and less complex, many report a taste experiences similar to drinking grape juice.

Nevertheless, it is clear that there is growing group of consumers seeking for non-alcoholic and reduced alcohol beverages especially because of increased health consciousness. The market for non-alcoholic wines is expected to grow with approximately 10% per annum in the near future globally, which is almost twice the growth rate of the total wine market.

The market for partial de-alcoholised wines looks also promising. In the US the market of lower-alcohol wines (between 5.5% - 8.5% v/v) is expected to grow more than 25% per annum over the next 5 years. A balance must be struck here between the proportion of alcohol reduction and the taste experience of the consumer. Since alcohol still plays a role in the product it should be easier to produce a partially de-alcoholised wine with an attractive taste for consumers compared to a fully de-alcoholised wine. It seems that in Europe this category for lower-alcohol wines has not received appropriate attention of producers given its market potential. It is crucial that consumers will not be disappointed by the taste, so producers should make an effort to produce these kind of wines with a great organoleptic experience. If the market succeeds in producing lower-alcohol wines of good quality as serious alternatives for ‘normal’ wines, the market size for these kind of wines could be substantial. And it would attribute to the global strategy of the World Health Organization to reduce the consumption of alcohol worldwide.

For the ‘normal’ wine category a limited partial dealcoholisation should be considered as one of many oenological practices winemakers can choose from to produce wine of quality and style they pursue. Especially in situations where the sugar accumulation of harvest grapes is (too) high. Together with other viticultural and vinification practices reducing the alcohol content can significantly improve the quality of wine, since excessively high alcohol levels can mask delicate wine aromas and may give an unpleasantly overwhelming alcoholic sensation. Winemakers should employ partial dealcoholisation responsibly to produce the best wine their terroir permits.

Alcohol concentration in wine is an important contributor to the aroma, flavour and mouthfeel. It is the backbone of wine. If you remove all of it, the resulting beverage is a far cry from the original wine. Yet too much alcohol can result in an unbalanced wine, which can be repaired with partial dealcoholisation. This brings me to the conclusion that dealcoholising wine can be both a curse and a blessing, depending on the situation.

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