

SPONTANEOUS FERMENTATION DYNAMICS OF INDIGENOUS YEAST POPULATIONS AND THEIR EFFECT ON THE SENSORY PROPERTIES OF RIESLING

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Abstract

Varietal Riesling aroma relies strongly on the formation and liberation of bound aroma compounds. Floral monoterpenes, green C6-alcohols, fruity C13-norisoprenoids and spicy volatile phenols are predominantly bound to disaccharides, which are produced and stored in the grape berry during berry maturation. Grape processing aims to extract maximum amount of the precursors from the berry skin to increase the potential for a strong varietal aroma in the wine. Subsequent yeast selection plays an important part in this process. While *Saccharomyces cerevisiae* seems to be limited in their expression of glycosidase enzymes required to cleave and liberate the aroma compounds from their precursors, different non-*Saccharomyces* yeast genera show more prominence. Due to the infrequent and scarce occurrence of *Saccharomyces cerevisiae* in the vineyard and grape samples, many scientific findings report that spontaneous alcoholic fermentation is dominantly conducted by yeast strains originating from the winery environment rather than from the vineyard. However, recent advancements of modern genetic tools have elucidated site-specific microbiota on grapes from different vineyards and vintages. Their role in fermented wine has not yet been clarified.

This study aims to shed light on the roles of vineyard and winery microbiomes in wine fermentations in relation to fermentation dynamics, aroma formation and sensory perception. Riesling grapes from five different Riesling vineyards in the Pfalz region, Germany was picked aseptically during the 2015 vintage. Pilot-scale spontaneous fermentations of each of the individual vineyard with triplicates were conducted with aseptically managed winemaking. Fermentation progress was monitored by density measurements and FTIR-spectroscopy. Yeast population dynamics in the fermentations were monitored and identified with next-generation sequencing technology. Descriptive analysis of the wines was used to evaluate the changes in aroma and flavor sensory profiles.

Results show plausible promise in both the microbial difference occurring in the vineyard as well as clear impact of the winery-derived microbiome. Modulation of aroma and taste was observed and correlated with the occurrence of specific yeast species.

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