P85 – Predictive breeding for wine quality: sensory and chemical phenotyping of wines from a F1 grapevine population

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Abstract

New pathogen resistant grapevine varieties greatly reduce the use of fungicides and thus contribute to a more sustainable viticulture. However, the evaluation of the resulting wine quality of new varieties is a bottleneck in the selection process slowing down the breeding efficacy. Therefore, our major aim is to develop robust models to predict the genetic quality potential of grapevine varities. The implementation of metabolic markers for wine quality traits in marker-assisted selection (MAS) during grapevine breeding will result in an early and more efficient selection of promising genotypes.

A segregating white wine F1 population of ‘Calardis Musqué’ and ‘Villard Blanc’ consisting of 150 genotypes with 13 plants per genotype at two locations provides the basis for a broad set of genomic, metabolomic, and sensory data. A ‘Genotyping by Sequencing’ approach with a novel bioinformatics pipeline delivered a high-density genetic map of the breeding population. Authentic wines from standardized micro-fermentations were used for comprehensive sensory evaluation and chemical analysis of major and minor metabolites, including aroma compounds such as terpenoids, by SPE-GC-MS. Moreover, five annual repetitions at two locations allow refinement, evaluation, and validation of predictive models and an estimation of environmental impact on the phenotypic data.

The descriptive and quality score card for sensory evaulation was adapted to the large number of wine samples and the unusual broad range of wine qualities resulting from an unselected set of grapevine genotypes. With the annual repetition of the sensory evaluation of all wines from the 150 genotypes, a trained panel reproducibly differentiated a set of best and worst genotypes over five vintages. The intensity of the descriptive wine attribute “floral” correlates with the concentrations of the two aroma-active compounds linalool and cis-rose oxide in each vintage. Finally, linking sensory and analytical data from multiple vintages with genetic information gives new insights in genomic regions related to the quality potential. Thus, predictive models will provide descriptors for wine quality traits leading to a more efficient grapevine breeding.

Keywords: wine quality, phenotyping, metabolic quality potential, monoterpenes, genetic quality potential