INTRODUCTION

Grape juice composition:
- The complex interaction between yeasts and their environment is brought sharply into focus when wine fermentations fail to complete.
- Choice of yeast strain, of which there are many, grape juice composition and winemaker intervention are key elements of fermentation performance.
- The relationship between yeast strain and grape juice composition is the subject of this work.

Yeast strain fitness:
- Through the DNA barcoding of 90 wine yeast strains, of commercial or environmental origin, yeast fitness has been assessed in a range of industrially relevant conditions.
- The genetic determinants contributing to fitness in one of these conditions, high copper, has been mapped.

RESULTS

Yeast fitness in high copper conditions:
- Single inoculum experiments validated fitness profiles determined in serial batch experiments (Figure 2).

Figure 2
Relationship between yeast genetics and copper tolerance:
- A dominant feature associated with copper sensitivity/tolerance was a locus on chromosome 8 which collocated with a gene called CUP1 (Figure 3).
- The number of copies of CUP1 was determined by qPCR. The relationship between CUP1 copy number and fitness in high copper is shown in Figure 4.

CONCLUSIONS

- Using a barcoded yeast collection is an effective and efficient way to simultaneously assess the relative performance of wine yeasts under a number of environmental conditions.
- CUP1 copy number was found to be a major contributing factor to copper tolerance in wine yeast.
- CUP1 copy number does not explain all observed fitness profiles.