



Biodiversity of wild yeast isolates and their potential in brewing

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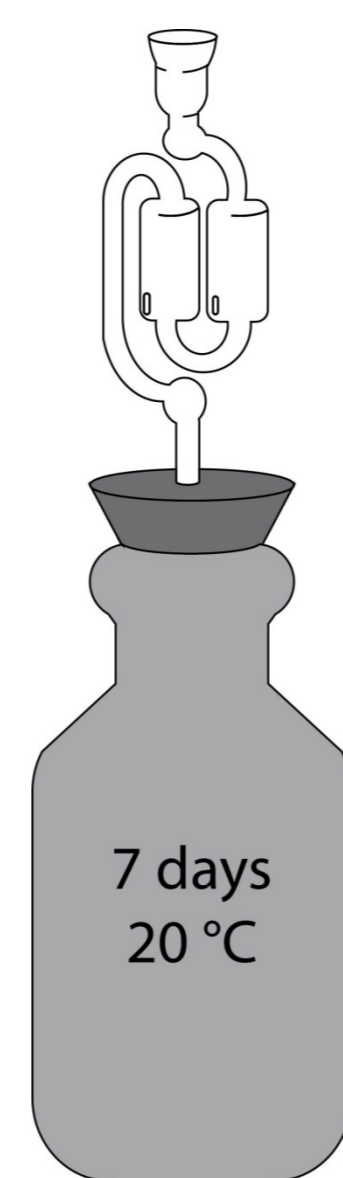
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Introduction

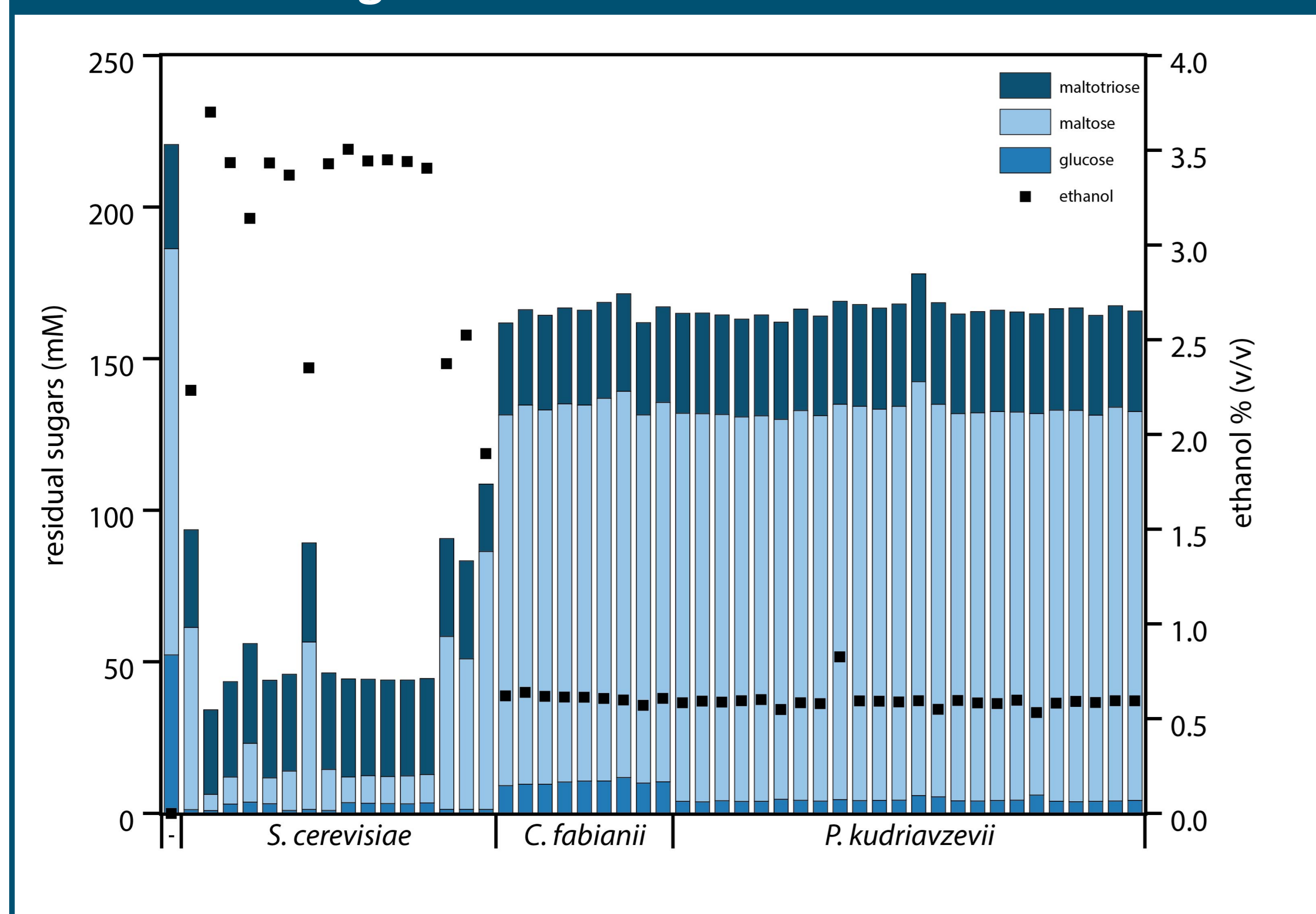
Biodiversity among wild yeast strains could be exploited for beer innovation. Wild yeast strains used in this study included various strains of *Saccharomyces cerevisiae*, *Cyberlindnera fabianii* and *Pichia kudriavzevii*¹. In contrast to *Saccharomyces* species, little is known on the *Cyberlindnera* and *Pichia* species. Previously, these wild yeasts were found to produce high aroma, relative to ethanol², increasing their potential for innovation in brewing low-alcohol beverages.

Experimental set-up

49 strains, belonging to these three yeast species were characterized based on individual wort fermentations. Residual sugars and ethanol percentage (v/v) were measured using HPLC (Box 1) along with volatile organic compounds (VOC's) using HS-SPME GC-MS (Box 2).



Box 1: sugar utilization and ethanol formation



Fermentation outcomes (Box 1)

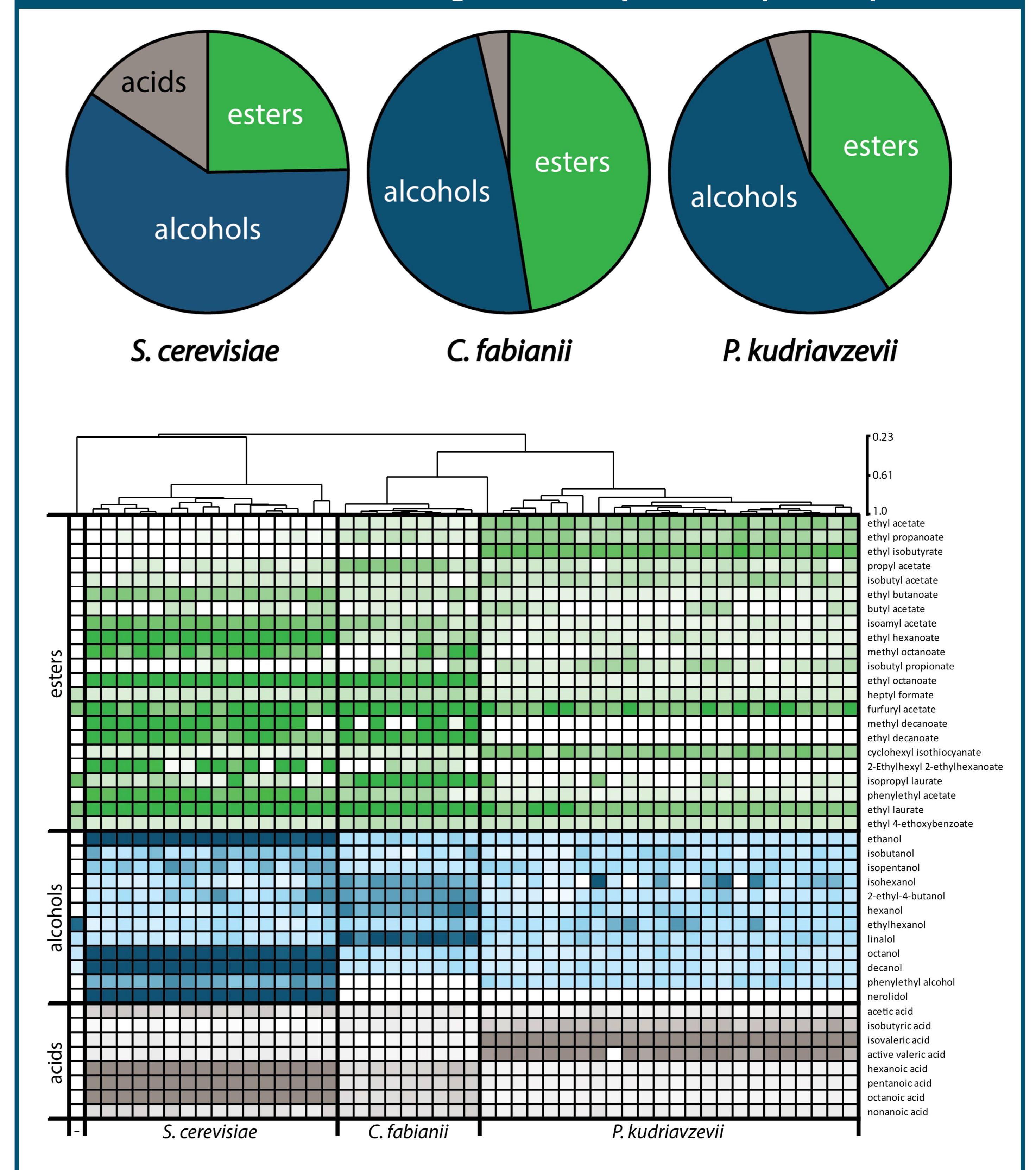
The composition of the wort is represented by the blank (-) and each bar represents 1 strain. All 49 strains utilized glucose, although *C. fabianii* cultures had more residual glucose than cultures of *S. cerevisiae* and *P. kudriavzevii*. Of all strains only the ones from *S. cerevisiae* were able to consume the maltose present in the wort. With increased maltose consumption, the ethanol percentage increased too. All *C. fabianii* and *P. kudriavzevii* strains were low ethanol producers (< 1 % v/v).

Volatile organic compounds (VOC's) (Box 2)

S. cerevisiae strains produced more volatile alcohols and acids while both *C. fabianii* and *P. kudriavzevii* strains showed a relative higher presence of volatile esters.

Based on the volatile esters, alcohols and acids detected, all strains within each species clustered together. A larger variation exists between the genera than within one species.

Box 2: Volatile organic compounds (VOC's)



Conclusions

- All *C. fabianii* and *P. kudriavzevii* strains fermented only glucose and were low ethanol producers while volatile esters increased.
- Only *S. cerevisiae* strains consumed maltose and gave higher ethanol percentages (v/v), volatile alcohols and acids.
- Diversity between genera is bigger than within one species.
- Using representative strains from different genera can support diversification of the fermented product.



¹ Nyanga et al., (2007) Yeasts and lactic acid bacteria microbiota from masau (Ziziphus mauritiana) fruits and their fermented fruit pulp in Zimbabwe. International journal of food microbiology 120: 159-166.

² Nyanga et al., (2013) Fermentation characteristics of yeasts isolated from traditionally fermented masau (Ziziphus mauritiana) fruits. International journal of food microbiology 166: 426-432.