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Process modelling approaches for the improvement of fermented beverages

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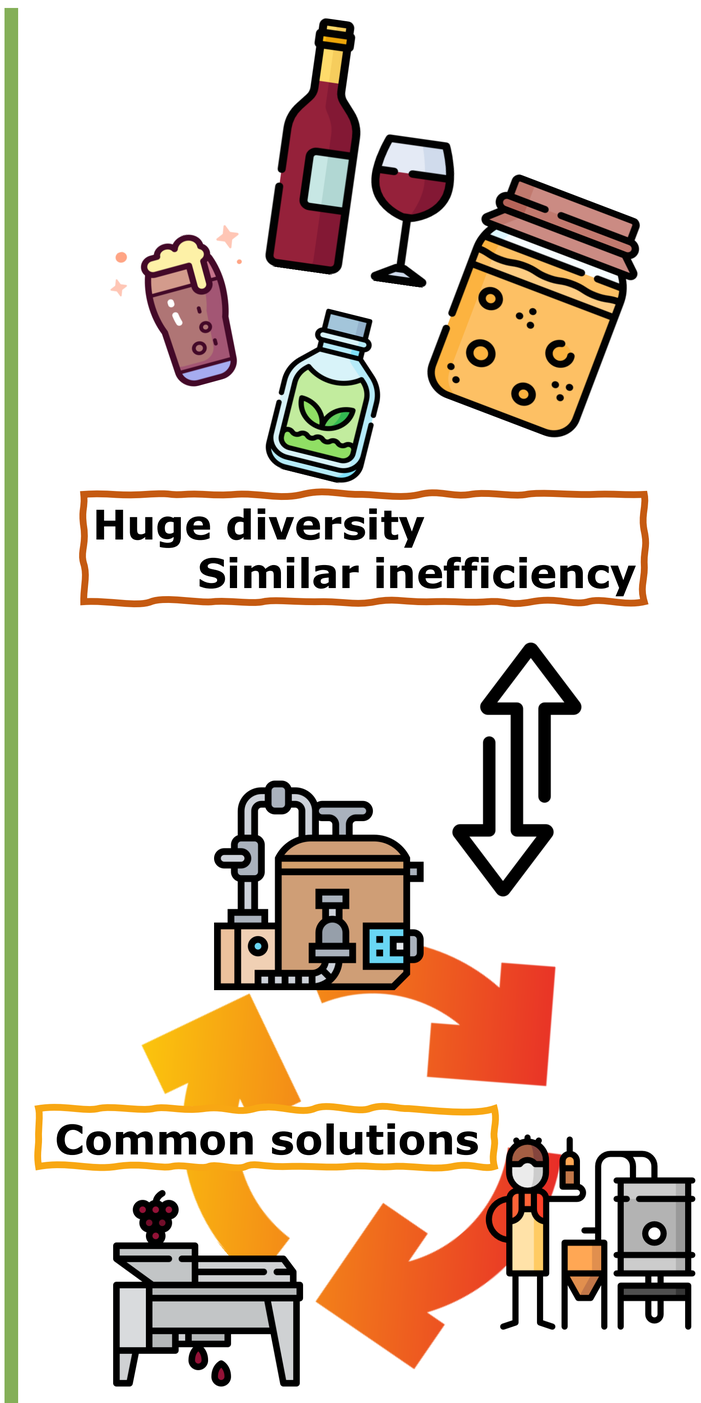
Fermented beverages are widely consumed goods, spread all over the world, albeit with different characteristics and specificities. The aim of this PhD project is the development and fine-tuning of models to improve the fermented beverage sector.

The variety of raw materials, the great diversity in processes and production equipment make the fermented beverage sector one of the most fascinating in the food industry. However, this great heterogeneity makes processes often inefficient. This leads to scarcely efficient processes with significant environmental footprints (CO_2 production, water consumption), low process optimisation and low or no exploitation of by-products.

In this framework, the development of models that can predict process kinetics, or suggest exact dosages can lead to improvements that will allow:

- Lower environmental impact of the industry;
- Development of supply chains for the exploitation of production waste;
- Higher quality products obtained by making maximum use of all production inputs.



Objective

- **Development of models**, including their fining and integration in DSS (decision support system) tools
- **Exploitation of valuable byproducts** by their reintegration in beverages production chain
- Study over the efficacy of established **treatments in beverage matrices** to reduce environmental impact of the sector

PhD milestones

1.Bibliographic research will be conducted on various beverages such as wine, beer, and kombucha, as well as on the methods for analyzing their components.

2.Set-up of the experimental plan: Once we have identified the phenomena we want to study, we will design experimental plans that optimize data collection for all variables.

3.Deployment of experimental plans and sampling.

4.Laboratory analysis and data collection: using a combination of:

1. Established traditional methods (e.g., total phenols, total anthocyanins, antioxidant capacity assays, etc.),
2. Cutting-edge -omics approaches including metabolomics, volabolomics, and transcriptomics.

5.Statistical analysis and model development

6.Dissemination of results

7.Phd thesis writing

Selected References

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