“Development of an alcoholic fermented beverage from fruit”

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Introduction

The present work was started in partnership with Murças S.A., a company from Esporão Group, in 2020 and had, as main goal, the study of feasibility for development of an alcoholic fermented beverage from orange fruit (Citrus sinensis).

Esporão Group has a sustainable business model and, in this context, Quinta dos Murças has about 800 trees, mostly orange trees, whose fruits do not have, until now, commercial objective (Esporão, 2015).

To combine the availability of the fruit with the development of a product that meets the needs of consumers, it is important to understand the trends of alcoholic beverages for the coming years.

The main trends for this market are focused on Healthier and more “natural” products, clean label products, quality instead of quantity (“Drink less, but better”) and products with lower alcohol content / zero alcohol (Pasco, 2020).

Aim

The aim of this study is to develop an alcoholic fermented beverage from orange, without intentional addition of ingredients such as acidity regulators and sugar (chaptalization) that is:

- Differentiated / Innovative
- In line with the Esporão Group’s Mission, Vision and Values
- In line with consumer trends

Methodology

The work had a screening part and another one focused on the process, having a total of 5 main experiments and 17 samples, and the objectives of each experiment were:

1. This experiment was the first contact with the product, it was carried out to know its behavior during fermentation, as well as to be able to understand its sensory profile.
2. Screening of up to 2 yeasts (out of 5 initial options) with better sensory profile, to continue with the tests and evaluate the impact of adding orange peel to improve the sensory profile of the final product.
3. Evaluate the sensory profile of 2 varieties of oranges.
4. Evaluate the effect of interrupting the fermentation to obtain a product with higher residual sugar and, consequently, more balanced.
5. Evaluate the performance of using malolactic culture (Oenococcus oeni) - malolactic fermentation (MLF) - aiming to obtain a more balanced product.
6. Inclusion of bottle fermentation as suggestion of final product.

Analytical parameters monitored:
- Juice yield (%)
- Potential alcohol (PA) (%Vol.)
- pH
- Average alcoholic strength by volume (TAV) (% vol.)
- Temperature (ºC)
- Total acidity (g/L)
- Density (ºBrix)

Sensory evaluation: descriptive qualitative analysis, with expert assessors.

Partial Results

Results of the more promising experiments:

![Experiment 5 (A)](image1)

![Experiment 5 (B)](image2)

![Experiment 5 (C)](image3)

![Experiment 6 (D)](image4)

Table 1. Initial analysis.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Juice Yield</td>
<td>32%</td>
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<tr>
<td>pH</td>
<td>4,25</td>
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<tr>
<td>ºBrix</td>
<td>12,2</td>
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<tr>
<td>PA (%Vol)</td>
<td>6,5%</td>
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<tr>
<td>pH</td>
<td>4,58</td>
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</table>

![Table 2. Final analysis (Lab analysis).](image5)

<table>
<thead>
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<th>Parameter</th>
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<tbody>
<tr>
<td>TAV (%Vol)</td>
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<td>Total acidity</td>
<td>5,29</td>
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<tr>
<td>pH</td>
<td>4,58</td>
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<tr>
<td>pH</td>
<td>4,67</td>
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</table>

Sensory analysis:

A: Odour - orange fruit, fruity notes, slightly oxidized, some lactic odor;
- Taste - fruity, no bitterness, very low acidity, light sulphur notes, alcoholic sensation.

B: Odour - orange fruit, lactic notes, light sulphur notes;
- Taste - fruity, very low acidity, no bitterness, alcoholic notes.

C: Odour - orange fruit, light sulphur notes, light lactic odor;
- Taste - orange fruit, low acidity, no bitterness, alcoholic notes.

D: Odour - orange fruit, more complex and intense, clean, scent of lavender;
- Taste - orange fruit, balanced acidity, no bitterness, fresh, but lack of some creaminess.

Discussion & Next Steps

Preliminary results showed that:
- Among the 5 yeasts tested, the two that had the best sensory profile were L1 and L5 and, among them, L1 was selected for presenting more complex notes throughout maturation.
- The addition of orange peel contributes to enhance the sensory profile of the product.
- Due to its high acidity and low sugar levels, the use of MLF seems to be a good alternative to reduce the acidity and balance the final product.
- Bottle fermentation added sensory benefits to the final product and should be considered.
- New tests with MLF, raw materials of excellent quality and strict control of the parameters and process must be carried out, for a more in-depth study of the effect of MLF on the product’s overall balance.
- Consumer research.

References
