



Physicochemical and sensory characteristics of Argentine ciders

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Apple growth regions in Argentina

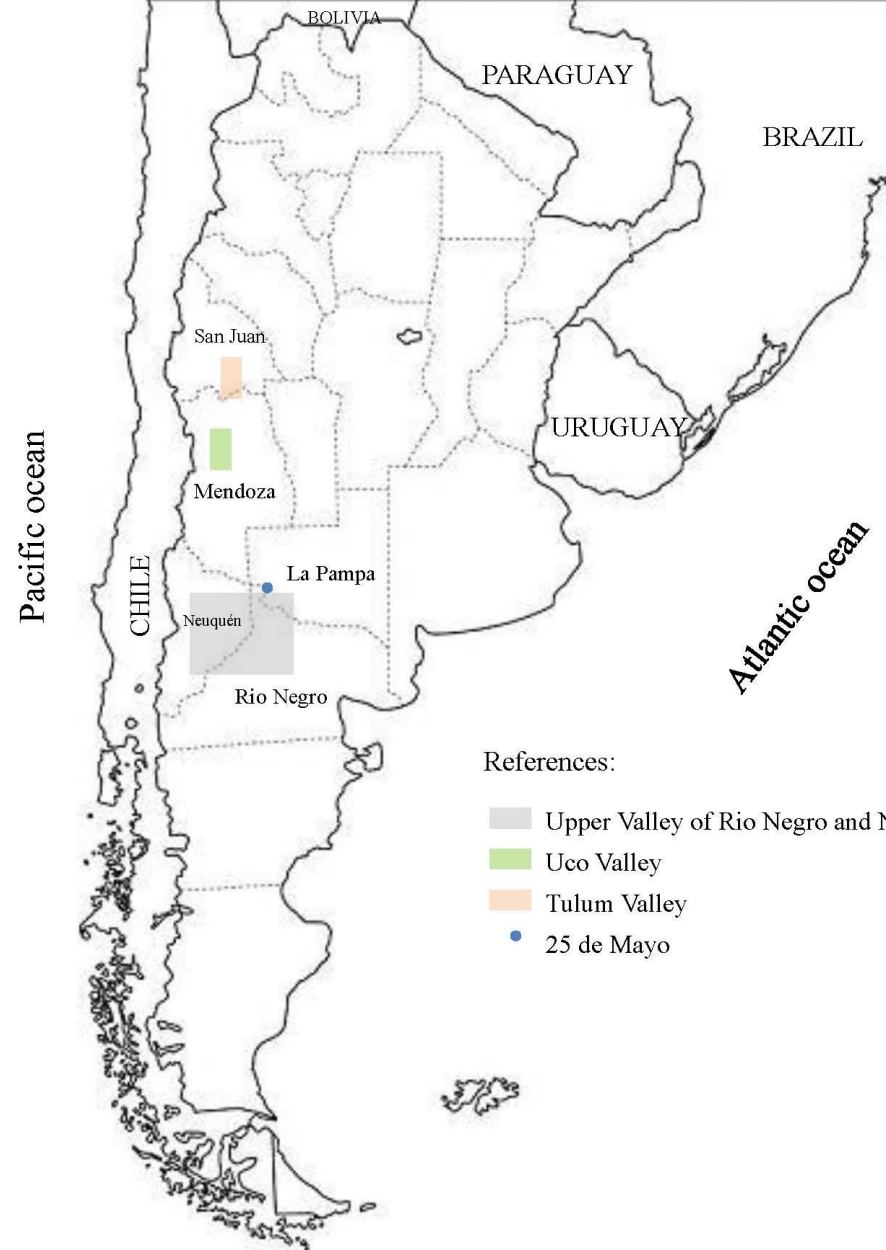



Fig.1. Regions of apple production in Argentina



Upper Valley of Río Negro and Neuquén: 85 % of apple production.

The remaining production (15 %) is shared among the Uco Valley (Mendoza), 25 de Mayo (La Pampa) and Tulum Valley (San Juan).

Total cultivated area: above 27000 hectares.

35 % of apples for fresh consumption.

17 % of apples for export.

48 % of apples for industry: 83 % for concentrated juice, 5 % for snacks (dried fruit) and 12 % for cider.

So, cider is made from apples not meeting certain quality standards such as size and look, and sometimes, with microbial spoilage.



The symbol of an apple in Villa Regina



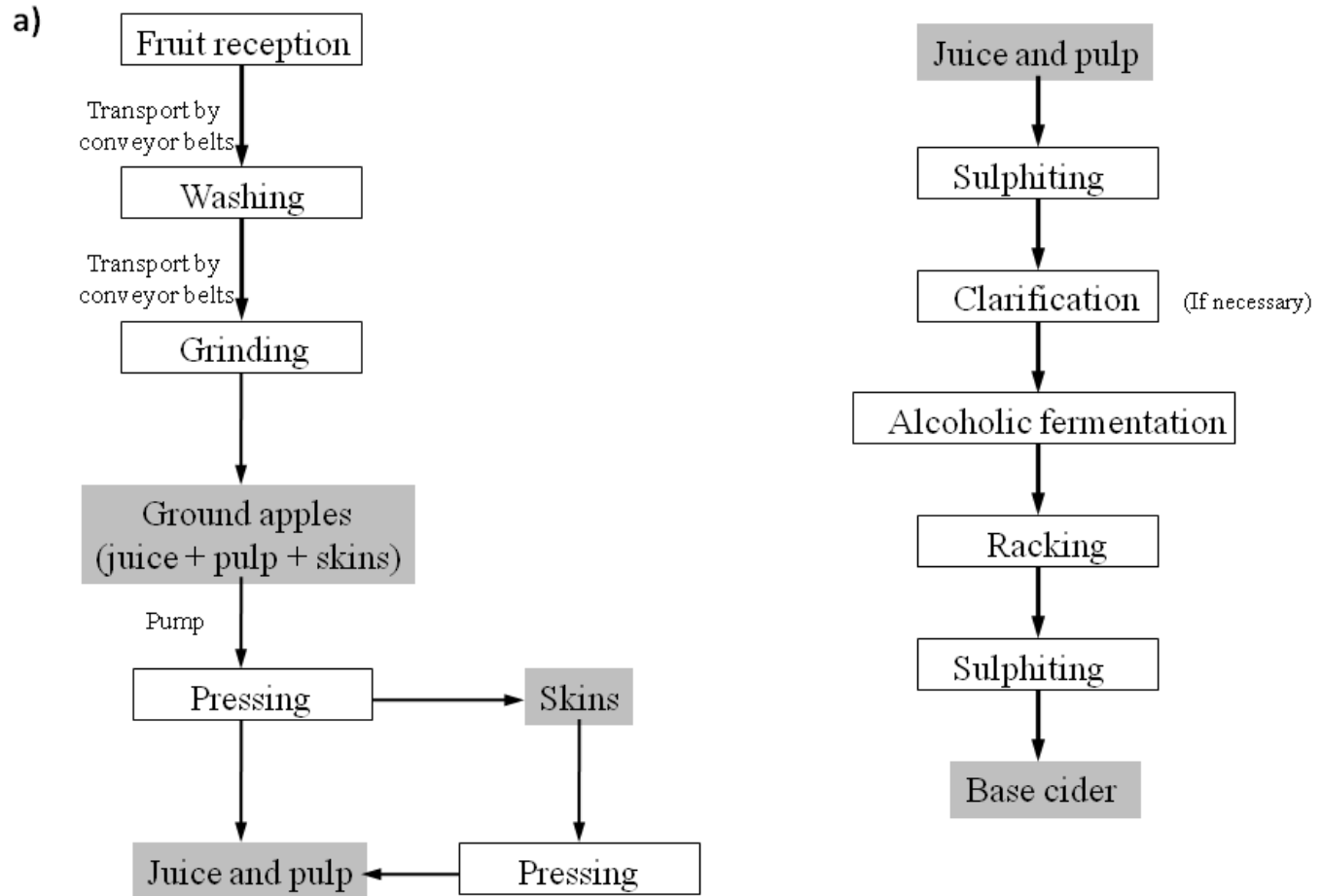
A cider house in Villa Regina



Río Negro river in Villa Regina

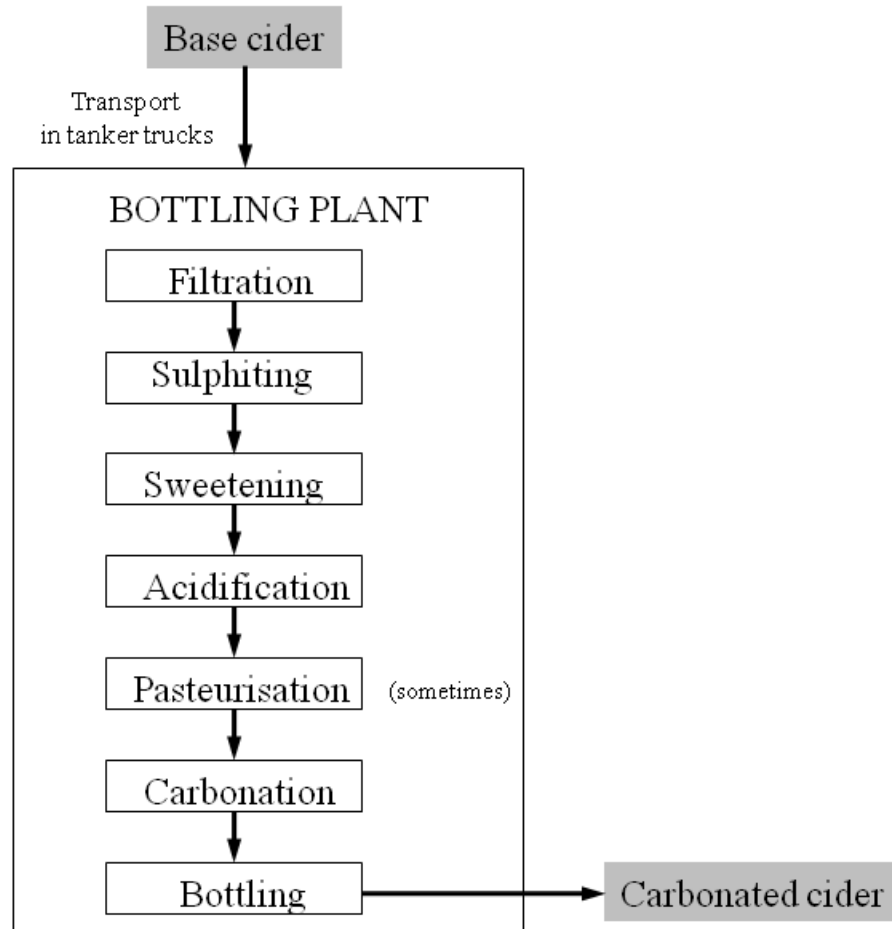
Flow chart for industrial cidermaking

Extraction of juice and production of base cider



Production of carbonated cider

b)

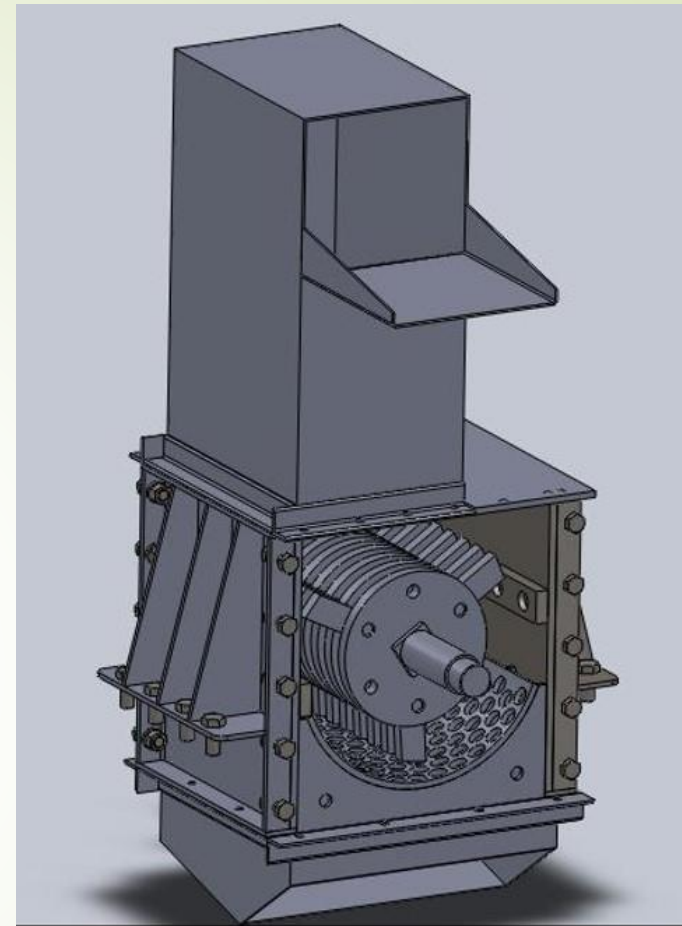




Conveyor belts



Roller press



Hammer mill



Large – scale cidermaking:

- ❑ Large cider houses processes up to 15,000 tons of fruit.
- ❑ Indigenous yeast strains mostly lead the alcoholic fermentation, but sometimes commercial yeasts are used.
- ❑ Bottling on site is performed by just one cider house.

Small – scale cidermaking (artisanal):

- ❑ Typically involves the processing of 200 – 300 Kg of good quality fruit (mouldy and/or damaged apples are rejected).
- ❑ Apples come from specially designated orchards.
- ❑ Cidermaking operations are better controlled.
- ❑ Bottling is performed on site.

Some important points:

- ❑ The average yield of juice ranges from 50 to 60 L per 100 Kg of apples. It depends on fruit ripeness.
- ❑ Sugar concentration (juice) = around 140 g/L (14 °Brix ≈ 8 °Be).
- ❑ Potential alcohol content (v/v) calculated as:

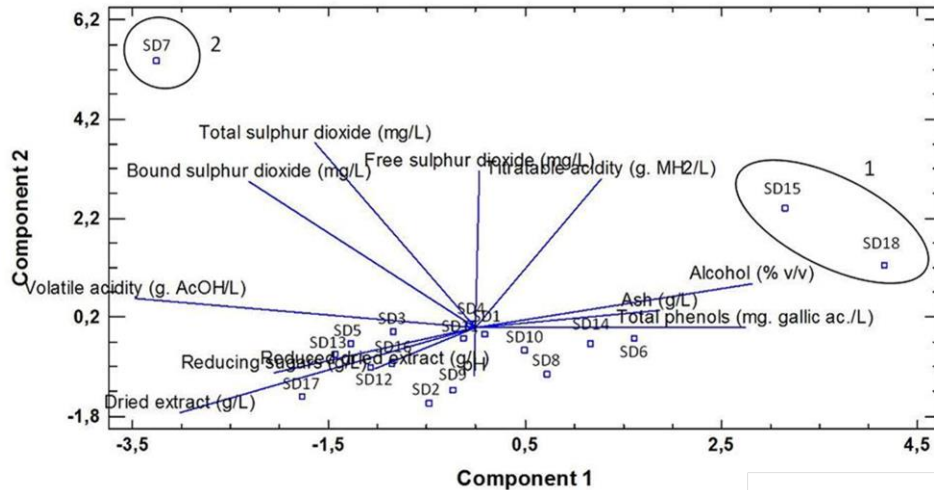
$$PAC\left(\frac{v}{v}\right) = \frac{\text{Sugar content}\left(\frac{g}{L}\right)}{\frac{17\frac{g}{L}}{1^\circ\text{alcohol}}}$$

- ❑ Fermentation at room temperature (around 20 °C).
- ❑ In large – scale cidermaking concrete vessels are used for fermentation. Some cider houses began replacing them by stainless steel ones.

Outcomes of our research

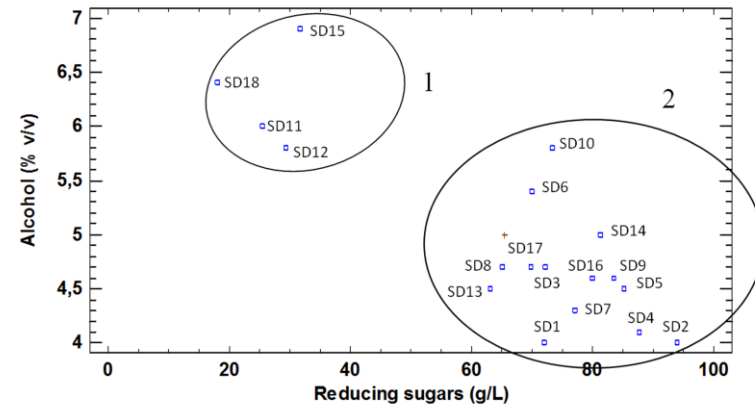
- First sensory panel of cider evaluators in Argentina.
- 59 aroma descriptors and 46 taste descriptors used in sensorial analysis.
- Industrial and artisanal ciders were differentiated in terms of their alcohol and reducing sugars contents.
- Ciders better differentiated in aroma than in taste: alcoholic, herbaceous and defective notes discriminated around 60 % of the ciders.
- Apple and apple juice the most recorded olfactory descriptors.
- Sweet was the most frequently recorded descriptor in taste.

The quantitative sensory analysis of ciders showed that:

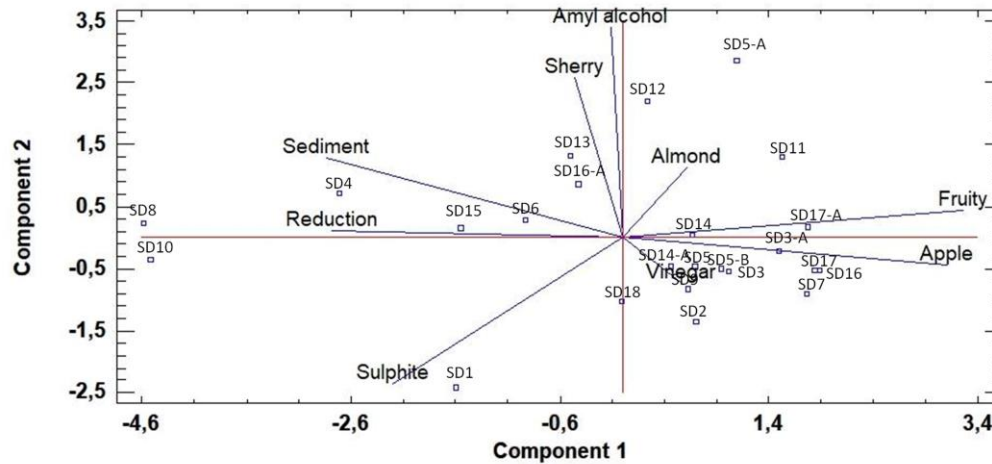


First, sparkling ciders were differentiated from carbonated ciders in terms of their physicochemical properties.

Alcohol and reducing sugars contents were the most discriminating variables.

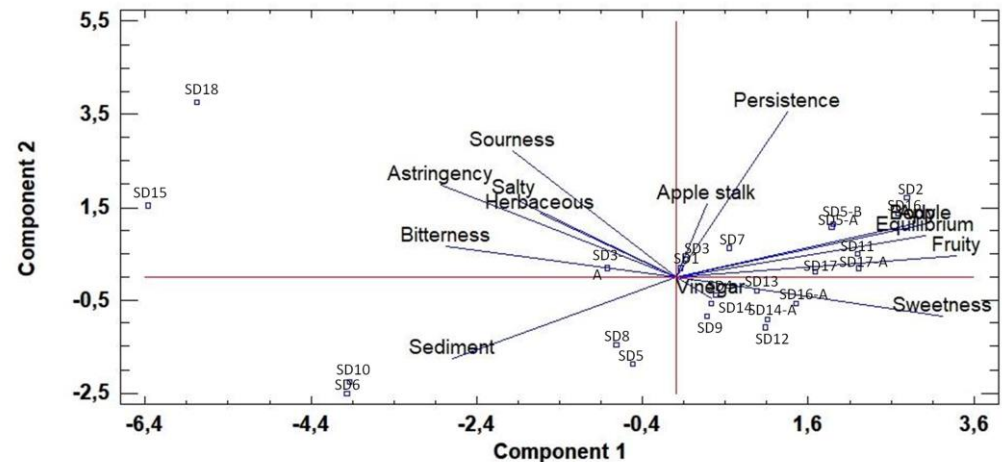


And it also showed that:



In aroma, sensory evaluators were able to differentiate ciders with off – flavours (sediment, reduction) from those with remarkable fruity notes (apple).

Panellists were able to differentiate defective ciders (sediment) from fruity ciders with a predominantly apple character.





New research is focused in:

- ▶ To study the influence of apple variety and yeast strain with potential for cidermaking (NPCCC: North Patagonia Culture Collection, PROBIEN CONICET) in the quality of cider.
- ▶ To study non traditional apple varieties such as Sturmer Pippin, Jonagold de Coster, Orleans Reinette, etc.
- ▶ To characterise the resulting ciders chemically, and sensorially.
- ▶ To record the volatile profiles of these ciders.
- ▶ To seek for new ciders with fruity flavour and less sweetening.

Ciders Research Group



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¡Thank you for your attention!

