

Have you heard about Verjuice?

Grape growing and wine making produce a large amount of by-products such as stalks, seeds, leaves, pomace and lees. One undervalued viticultural by-product is unripe grapes derived from cluster thinning which are usually left to rot (Fia et al., 2018, 2021). Considering that the grapes reach about 60% of their final mass at



veraison time and a typical thinning rate of 30% (Carmona-Jiménez et al., 2021), a vineyard with a production of 10 tons/ha will generate approximately 1.8 tons/ha of unripe grapes. In New Zealand, the total grape producing area is 40,323 ha with a total volume of grapes harvested of 370,000 tons. Grape cultivation can

generate about 72,000 tons of thinned unripe grapes. The exploitation of these by-products is a challenge for the sustainability of the wine industry. Indeed, the wine sector has looked for alternatives to convert waste materials into food ingredients/products with high-added value (Dupas de Matos et al., 2017, 2018), hence minimizing environmental impact and increasing profitability of these agro-industrial sectors. One great example is to press the thinned unripe grapes to make **Verjuice**: an unfermented grape juice.

Verjuice has a long history of use as a seasoning in foods dating back to medieval times. While still a relatively unknown product in Western cuisine, Verjuice has been rediscovered as a food condiment as an alternative to vinegar or lemon juice for use in salad dressings and appetizers (Setorki et al., 2010; Dupas de Matos et al., 2018). Although Verjuice has a longer history of food use internationally, it is still an unknown product in NZ. As Verjuice is not yet regulated there is a wide scope for winemakers to innovate and have autonomy over variables such as grape picking time, grape varietal, production methods and target end-uses. In fact, this reflects the diversity in sensory characteristics found in commercial Verjuice currently available in the global market, where some are very sour and others sweeter. Thus, the utilisation of unripe grapes represents a great opportunity for NZ wineries to increase their income by commercially using a material that is normally discarded,

converting a waste material into a product of value. Based on the amount of unripe grapes that cultivation can generate, there is an opportunity to produce approximately 43 million litres of Verjuice in NZ.

With this in mind, Dr Amanda Dupas de Matos applied for research funding at Massey University to explore NZ consumer preferences and attitudes towards Verjuice. Successfully, Dr Amanda has been awarded an early career researcher grant for her research project entitled: "Exploring new opportunities for the NZ wine industry through researching consumer response to Verjuice: a non-alcoholic grape-based product". To deliver commercial NZ Verjuice, there was a key research question to answer: **What sensory profile is desirable to NZ consumers in Verjuice products?**

The first part of this project consisted of an initial exploration of NZ consumer preferences to Verjuice to facilitate a subsequent comparison between consumer and winegrower views towards Verjuice products. In the consumer discussion groups carried out at Feast ([Food Experience and Sensory Testing](#)) Lab, Massey University,



consumers tasted Verjuice products from different countries (NZ, Australia, Portugal, England, Austria, Iran, United States, and Canada) and discussed their **sensory profiles, possible uses, preferred packaging types, and label messaging**. In parallel, semi-structured online interviews were conducted with winegrowers from different countries to understand **business motivations, challenges and decisions** concerning verjuice production (sensory profile, uses focus, selling channels, bottling, price, export, etc). From this, opportunities were identified aligning Verjuice to different use case scenarios and sensory signatures, providing both short and long-term transformative impact for the NZ wine industry.

The **top-level insights** obtained from the consumer discussion groups were:

- ➔ **Sensory attributes:** consumers described the Verjuice products using different terms, such as sweet, sour, bitter, salty, umami/savoury, floral, unripe fruits, green apple, apple/pear, grape/winey, tropical fruit, citrus/lemony, pomegranate, herbs/spices, tea, piney, honey, dried fruit,

nutty, earthy, woody, fermented, chemical, astringent/dry, warm, etc. Interestingly, even though the grapes are still unripe and so the aroma compounds not still completely developed, consumers were able to perceive many flavour attributes and not only the sourness and sweetness (which are the main two features of this product).



→ **Main uses:** consumers came up with many ways of cooking or incorporating Verjuice in different recipes, resulting in five main uses: beverage, cocktail & drinks, marinating, cooking & deglazing, and dressing & sauces.

→ **Preferred packaging:** if a Verjuice is to drink on its own or to be used as an ingredient in a mixture, consumers tended to prefer containers and closures associated with drinks (e.g., wine, beer), with volumes varying between 250-750mL. On the other hand, if it was for cooking, they tended to prefer containers associated with condiments (e.g., vinegar, olive oil), screw caps, with or without dozer, and volumes varying between 375-750mL.

→ **Label information:** consumers mentioned many elements they desired from a Verjuice label, such as: alcohol free, brief product story, environmental aspect, sensory description, suggested uses, QR code to take them to the company website for recipes, health benefits, nutritional table, ingredients, use by date, storage instructions, etc.

When comparing consumer and winegrower views towards Verjuice products key insights were revealed. Briefly, it was interesting to discover that consumer opinions did not necessarily always agree with views and needs of winegrowers, in terms of sensory profile, desired packaging and label information. In addition, it seems that perhaps wine producers have not explored the potential and versatility of this product, as for most of them, Verjuice is not their core/main business and decisions are driven by the wine production.

Next steps and Key Outcomes

A larger quantitative consumer study is under way to understand consumer responses (liking and emotion) and characterize the sensory profile of different Verjuice products. To complement the sensory studies, the volatile composition and other oenological parameters of Verjuice products were also obtained to possibly identify the chemical drivers of liking.

Understanding and predicting consumer choice is essential to the development, acceptance, and success of new products. The science proposed here is novel, and yet well-balanced with potential for market pull.



Exploring consumer engagement and responses and therefore potential markets for Verjuice in NZ would add further to the national and international wine industry reputation as being at the forefront of global wine industry innovation.

Funding

This research project is supported by Massey University Research Fund (MURF), administered by the College of Sciences.

Contact us



Dr [Amanda Dupas de Matos](#)

Sensory Research Officer with Food Experience and Sensory Testing (Feast) Lab Massey University, Palmerston North, NZ

Email: a.dupasdematos@massey.ac.nz

Prof [Joanne Hort](#)

Director of Food Experience and Sensory Testing (Feast) Lab
Fonterra Riddet Chair in Consumer & Sensory Science
Massey University, Palmerston North, NZ

Email: j.hort@massey.ac.nz

