



SMARTWINERY

HARVEST 2025

Paula Pérez Porras (PhD)
University of Murcia



Co-funded by
the European Union



NEUROPUBLIC

"Project GA101115013 co-financed by the European Union through the Interregional Investment Facility for Innovation (I3), within the framework of the European Regional Development Fund (ERDF)."

Fermentation control



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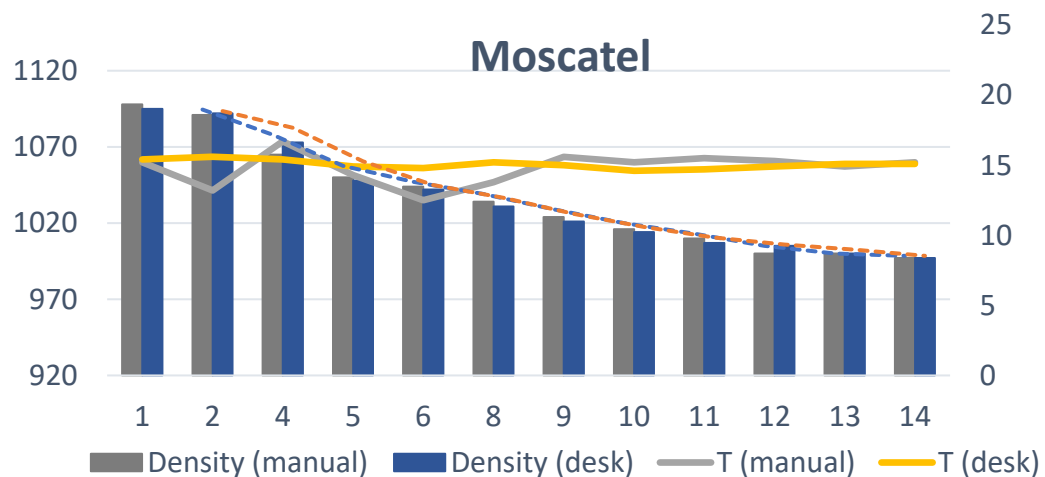
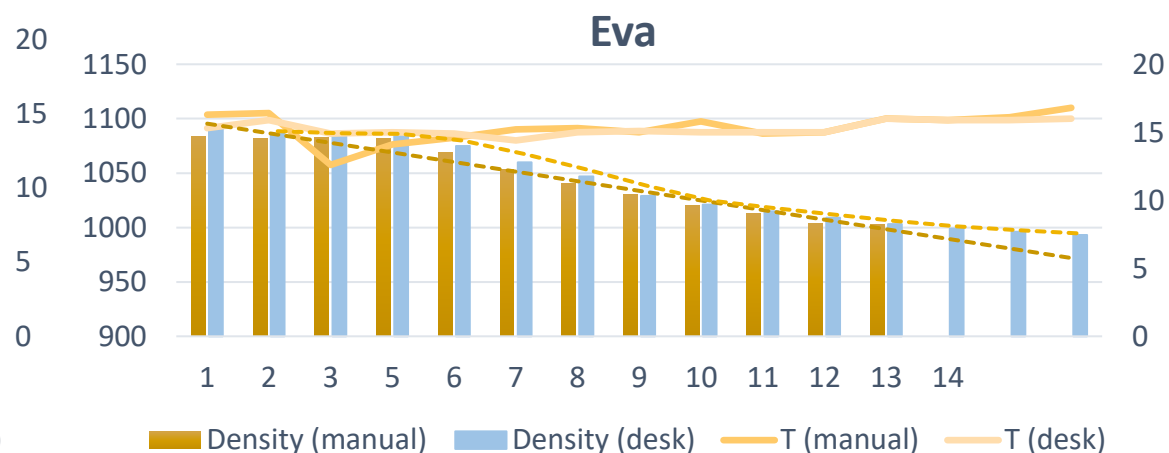
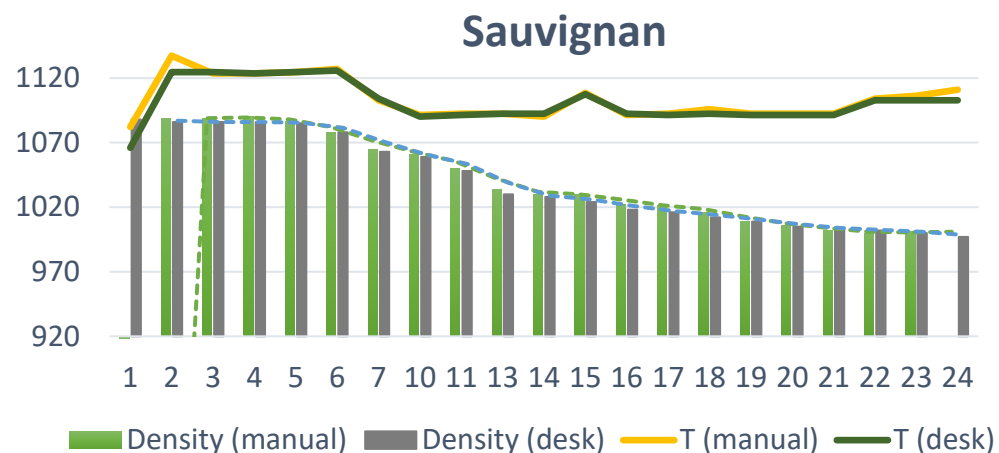
Fermentation control



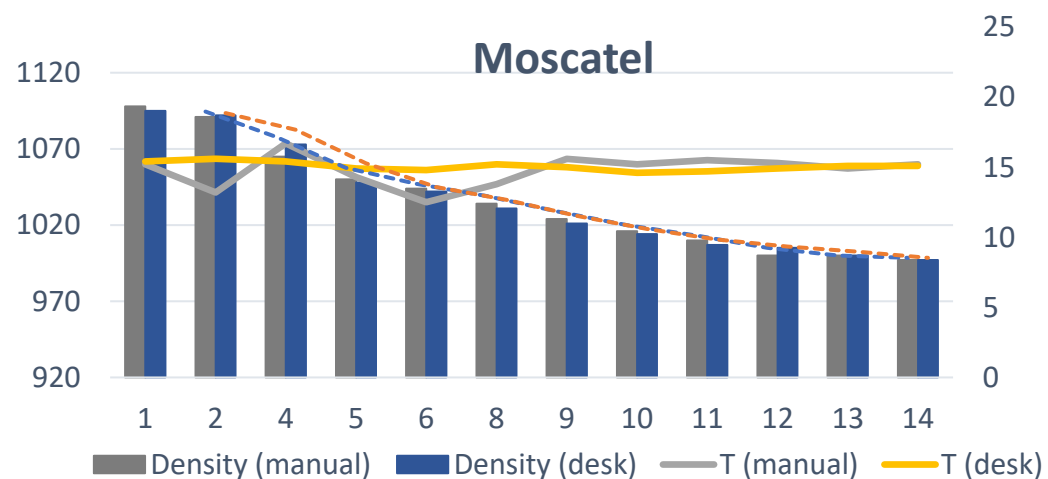
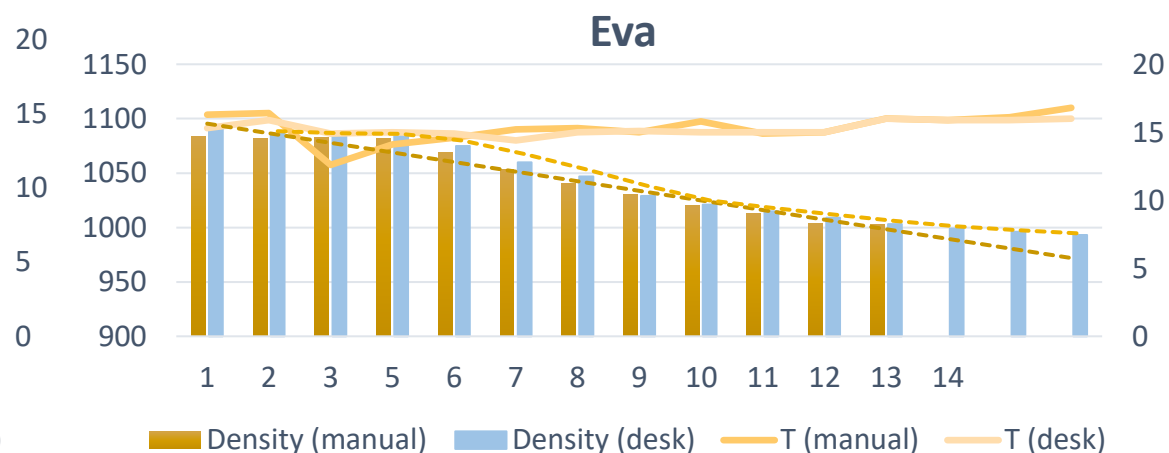
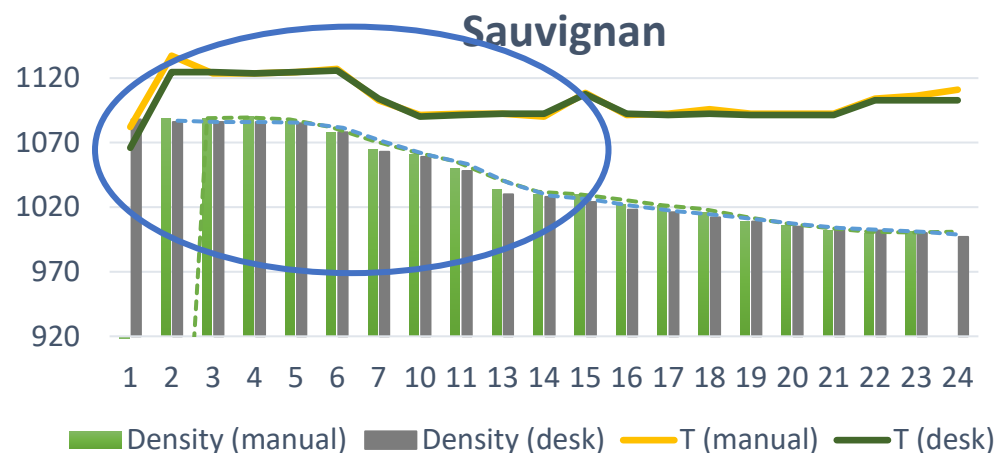
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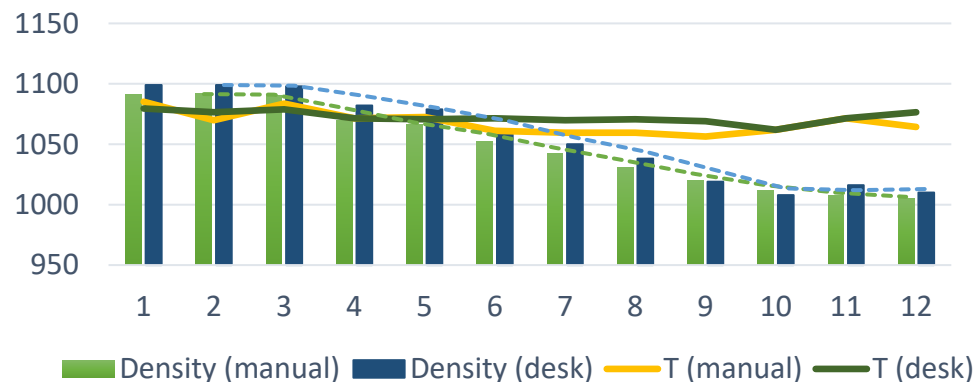


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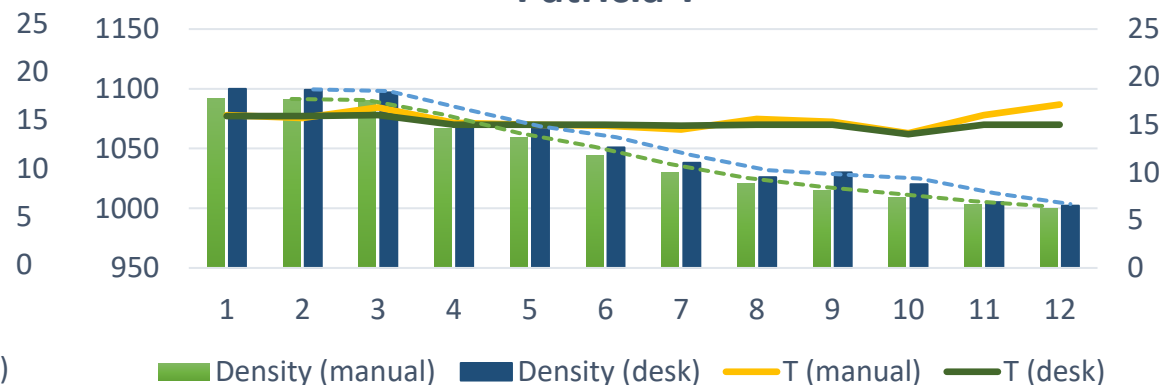


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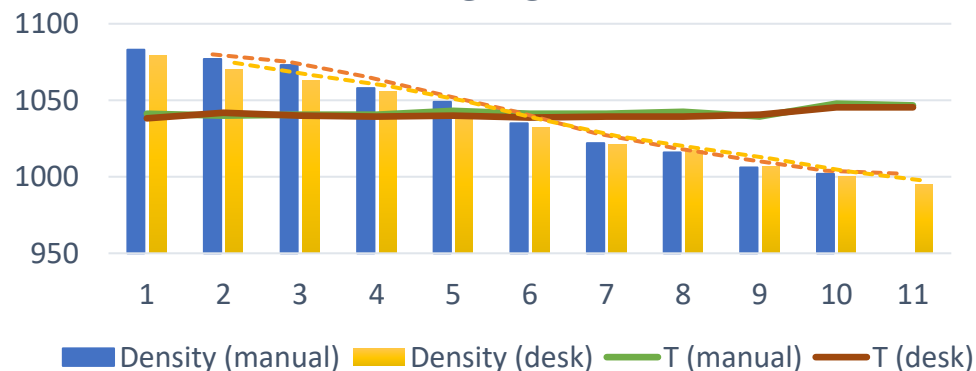
Patricia C



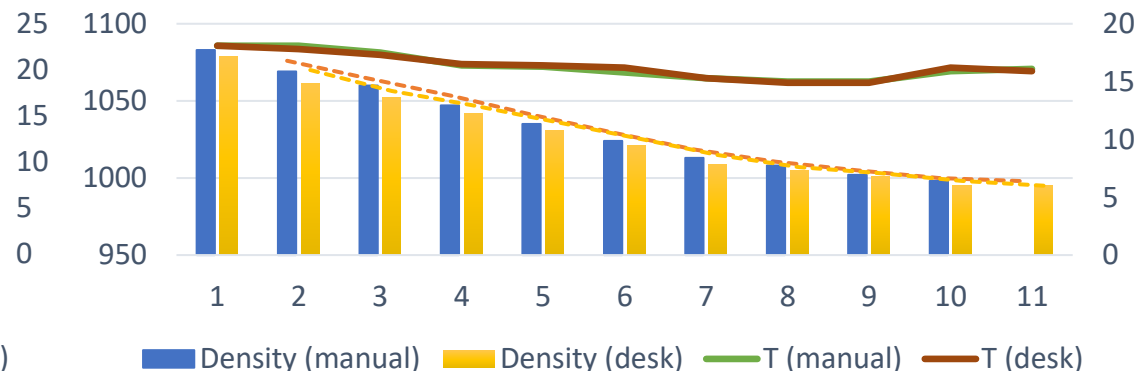
Patricia T



Airén C

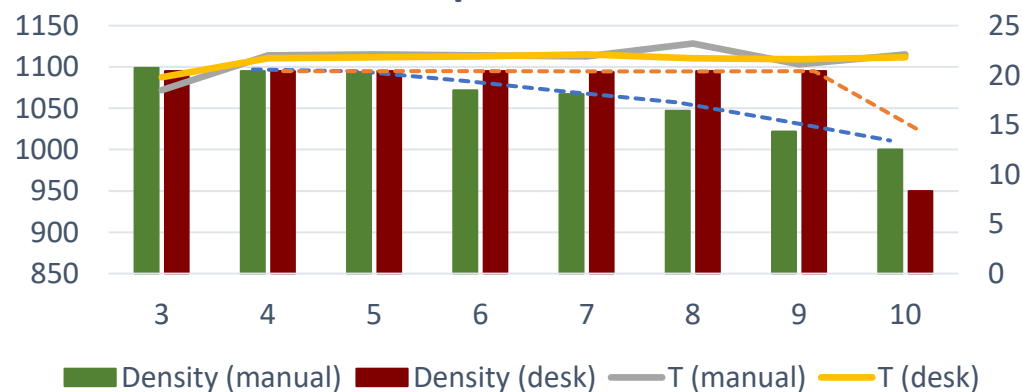


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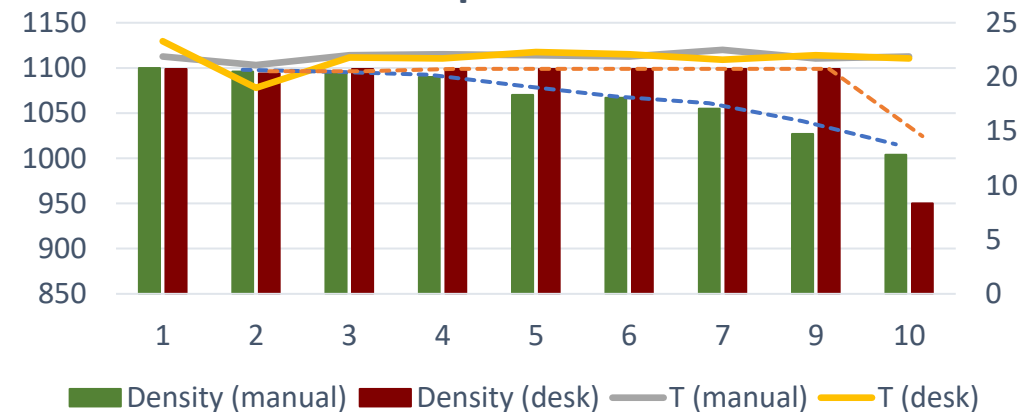


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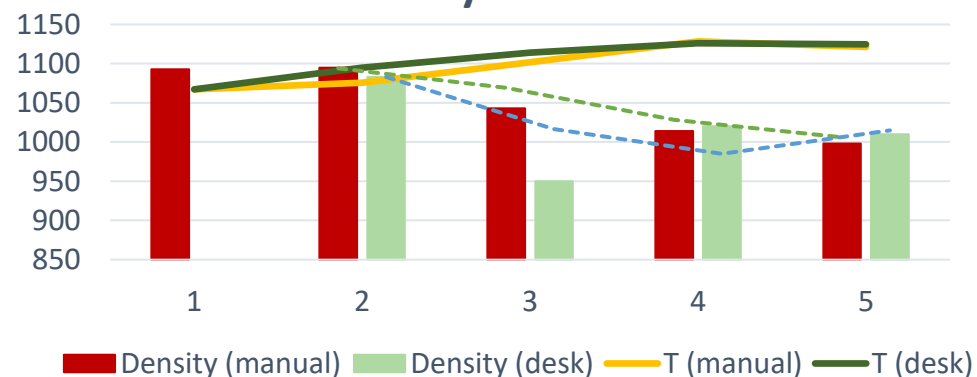
Tempranillo C



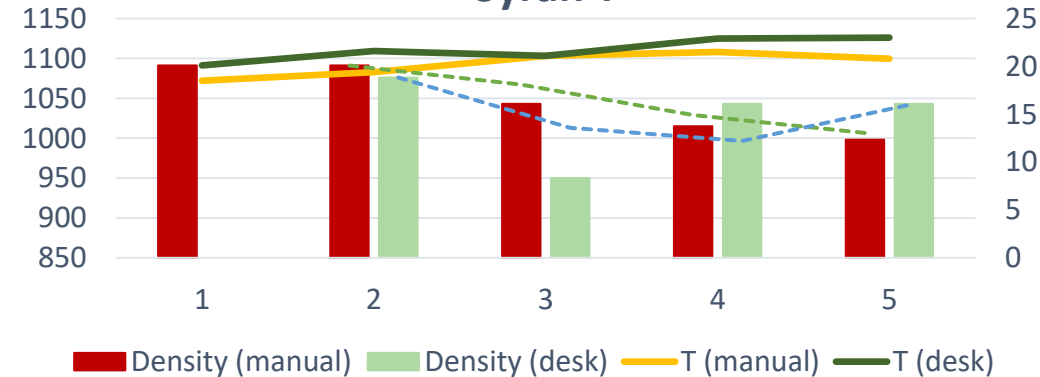
Tempranillo T



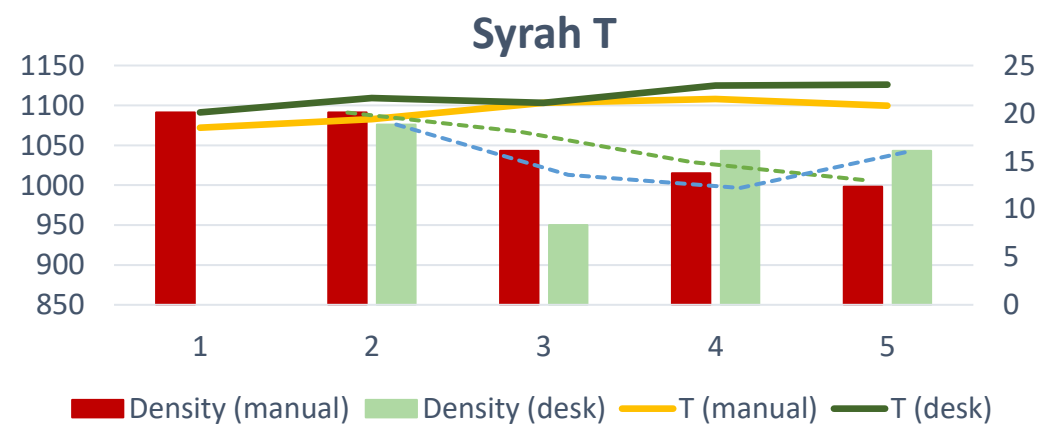
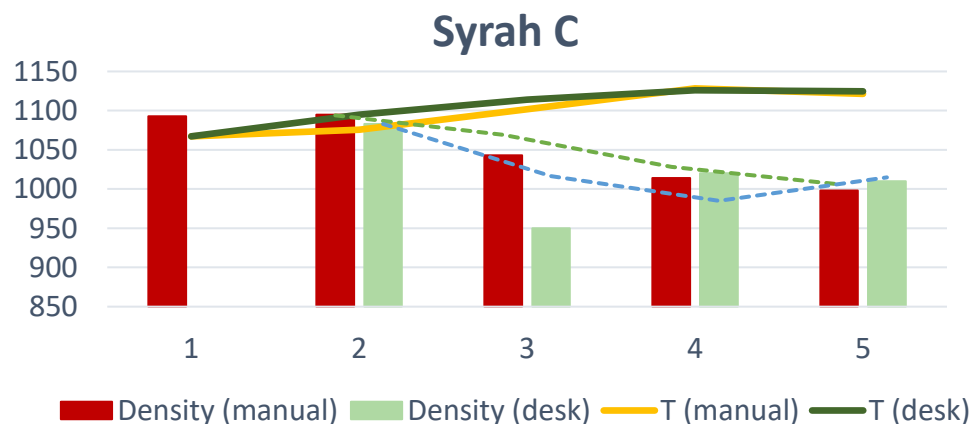
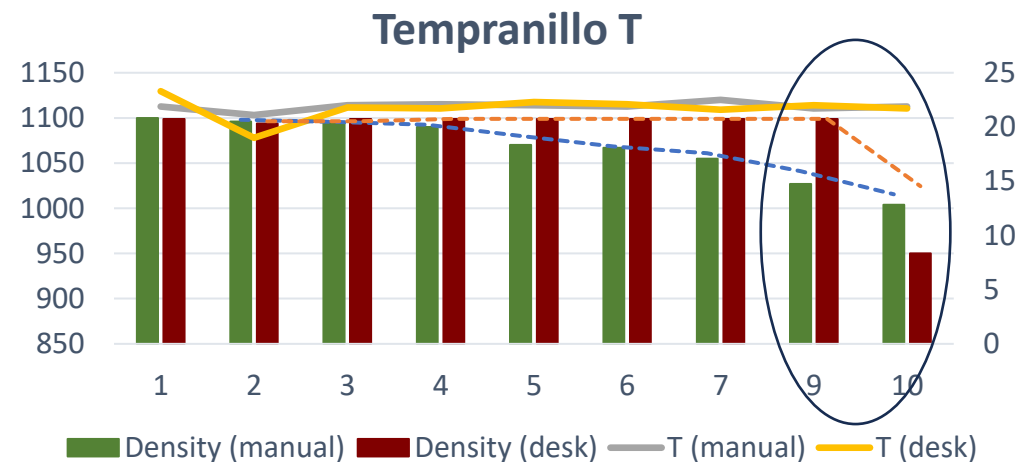
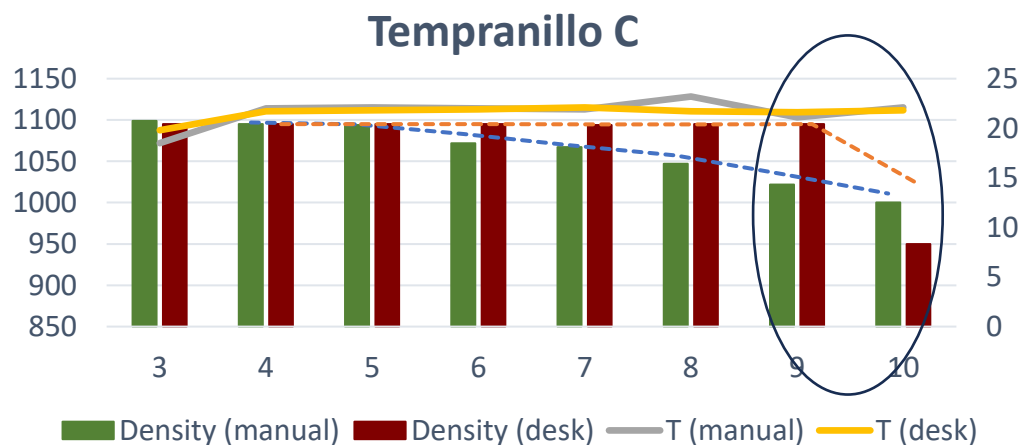
Syrah C



Syrah T



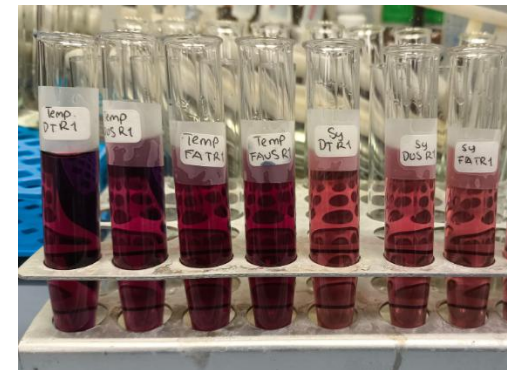
Fermentation control



Lab Analyses

In Grapes

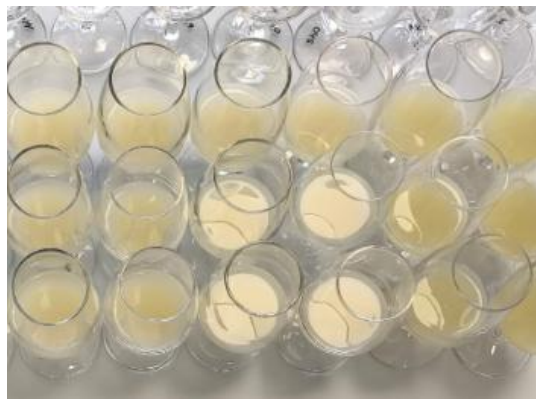
- **Tannins** (total, seed and skin)
- **Anthocyanins** (total, free, acetylated, coumarylated, catechin-bound)
- **Flavonols** (total, quercetin, myricetin, kaempferol, isorhamnetin, siringetina)
- **Phenolic acids** (caftaric, caffeic, p-coumaric, GRP, cutaric)



Lab Analyses

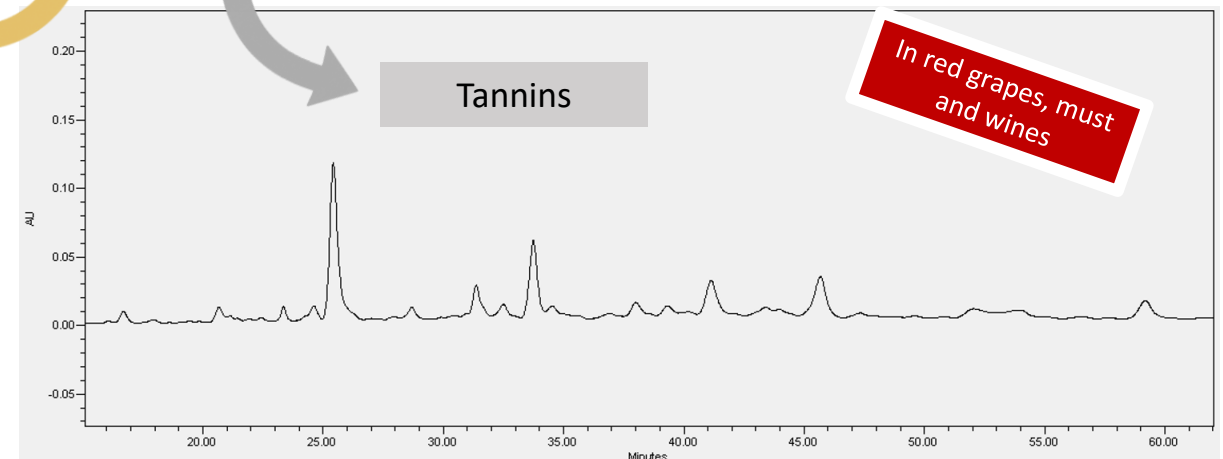
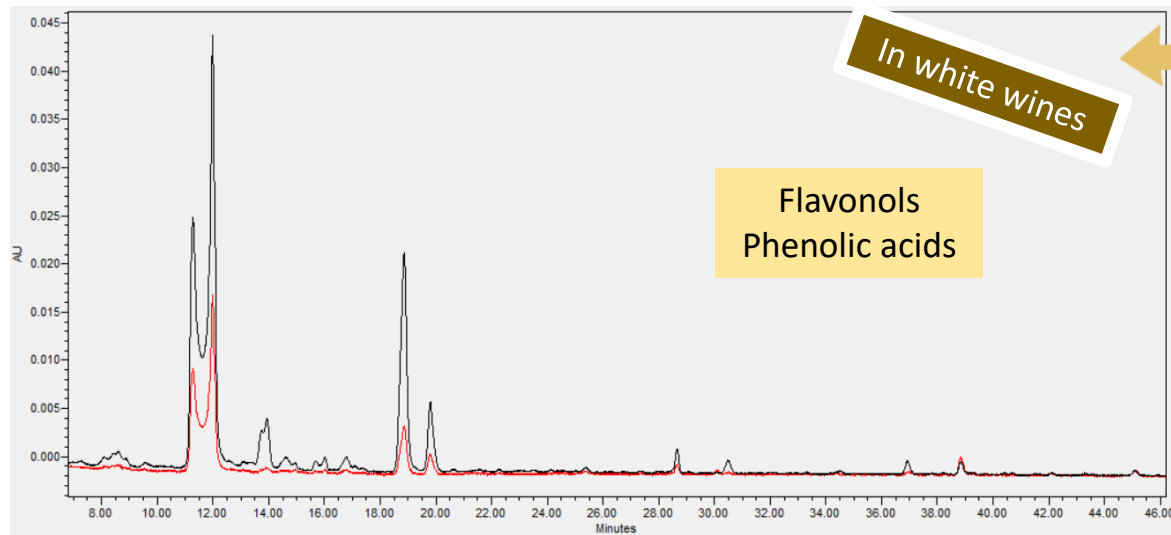
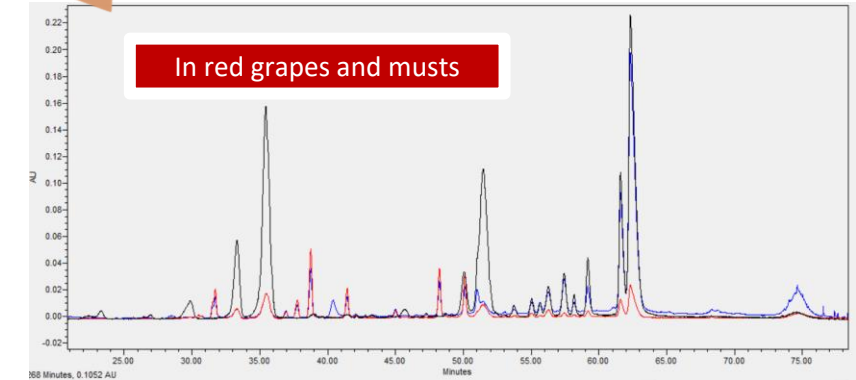
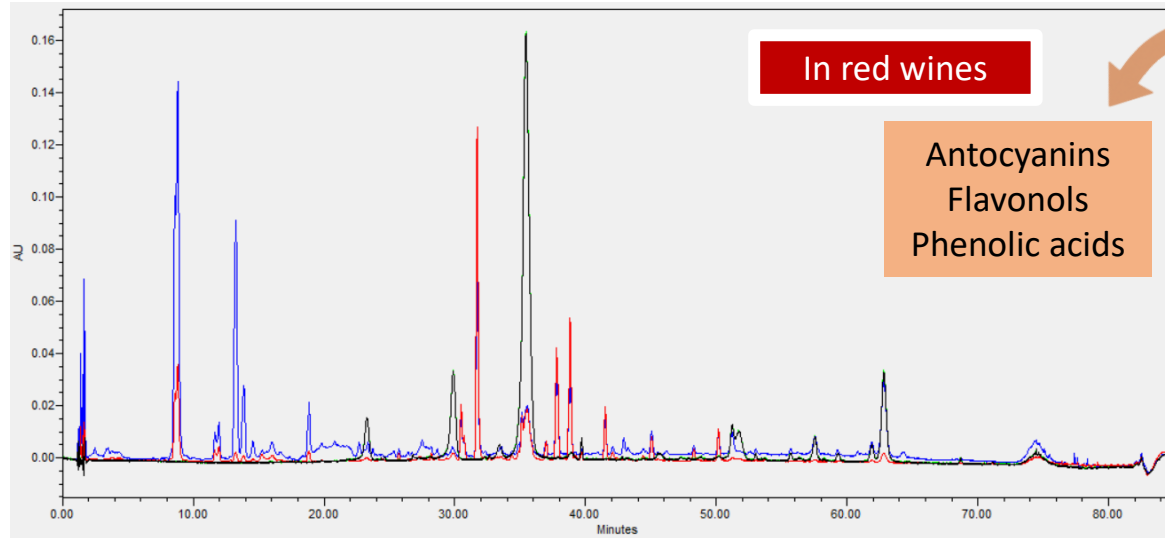
In Musts and Wines

- **Total Polyphenol Index (TPI)**
- **Color Intensity and Hue**
- **Total and Polymeric Anthocyanins**
- **Specific Pigments** (Vitisin A/B, Pigment A, Pyranoanthocyanins, etc.)
- **Tannins** (Total concentration, Mean Degree of Polymerization, % Galloylation and Epigallocatequin and epicatechin-galate concentration)
- **Volatile compounds**
- **Sensorial analysis (wine)**





SMARTWINERY



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White varieties

	Sauvignan	Patricia	Airén
GRAPE			
Flavonols	0.31 ± 0.02 b	0.67 ± 0.17 c	0.23 ± 0.00 a
MUST			
Total polyphenol index	8.19 ± 0.01 c	7.10 ± 0.00 b	4.29 ± 0.04 a
Abs 320 nm	3.46 ± 0.01 b	3.83 ± 0.00 c	1.96 ± 0.00 a
Abs 360 nm	1.32 ± 0.00 b	1.68 ± 0.00 c	0.87 ± 0.00 a
Colour intensity	0.34 ± 0.00 c	0.18 ± 0.00 b	0.17 ± 0.00 a
Browning	0.27 ± 0.00 c	0.14 ± 0.00 b	0.13 ± 0.00 a

Patricia stands out for its high flavonol and phenolic acid content, while **Sauvignan** excels in total polyphenols and colour intensity.

Airén shows the weakest phenolic profile, which could impact antioxidant capacity and colour characteristics.

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	Must		Wine	
	Airén Control (C)	Airén Treated (T)	Airén Control	Airén Treated
Total polyphenol index	4.29 ± 0.04 a	4.51 ± 0.04 b	3.95 ± 0.07 a	4.36 ± 0.12 b
Abs 320 nm	1.96 ± 0.00 a	1.86 ± 0.00 b	1.74 ± 0.01 a	2.01 ± 0.07 b
Abs 360 nm	0.87 ± 0.00 a	0.88 ± 0.00 b	0.65 ± 0.00 a	0.77 ± 0.04 b
Colour intensity	0.17 ± 0.00 a	0.23 ± 0.00 b	0.07 ± 0.01 a	0.07 ± 0.00 a
Browning	0.13 ± 0.00 a	0.18 ± 0.00 b	0.05 ± 0.01 a	0.05 ± 0.00 a

Airén showed an increase in phenolic concentration. However, browning, which is greater in US must, is equal to the control after fermentation, maintaining the highest antioxidant potential.

The decrease in the polyphenolic index observed in Patricia wines after ultrasound treatment may be linked to the enhanced extraction of polysaccharides which can interact with and retain phenolic compounds. This can be related to the varietal composition.

Also, the presence of polysaccharides is often associated with improved aroma stabilization, which is particularly relevant for Patricia due to its varietal aromatic profile.

	Must		Wine	
	Patricia C	Patricia T	Patricia C	Patricia T
Total polyphenol index	7.10 ± 0.00 b	6.16 ± 0.01 a	6.67 ± 0.05 b	5.89 ± 0.01 a
Abs 320 nm	3.83 ± 0.00 b	3.58 ± 0.03 a	3.19 ± 0.04 b	3.00 ± 0.00 a
Abs 360 nm	1.68 ± 0.00 b	1.39 ± 0.00 a	1.35 ± 0.00 b	1.18 ± 0.00 a
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Wine	Sauvignan	Patricia C	Patricia T	Airén C	Airén T
Total polyphenol index	7.78 ± 0.07	6.67 ± 0.05 b	5.89 ± 0.01 a	3.95 ± 0.07 a	4.36 ± 0.12 b
Abs 320 nm	3.55 ± 0.05	3.19 ± 0.04 b	3.00 ± 0.00 a	1.74 ± 0.01 a	2.01 ± 0.07 b
Abs 360 nm	0.89 ± 0.00	1.35 ± 0.00 b	1.18 ± 0.00 a	0.65 ± 0.00 a	0.77 ± 0.04 b
Colour intensity	0.19 ± 0.00	0.13 ± 0.00 b	0.12 ± 0.00 a	0.07 ± 0.01 a	0.07 ± 0.00 a
Browning	0.14 ± 0.00	0.10 ± 0.00 a	0.10 ± 0.00 a	0.05 ± 0.01 a	0.05 ± 0.00 a
Total flavonols	2.80 ± 0.01	3.86 ± 0.73 a	3.85 ± 0.59 a	3.50 ± 0.17 a	3.36 ± 0.02 a
Total phenolic acids	121.53 ± 3.39	119.39 ± 2.67 a	120.24 ± 2.96 a	118.65 ± 1.25 a	120.06 ± 2.09 a

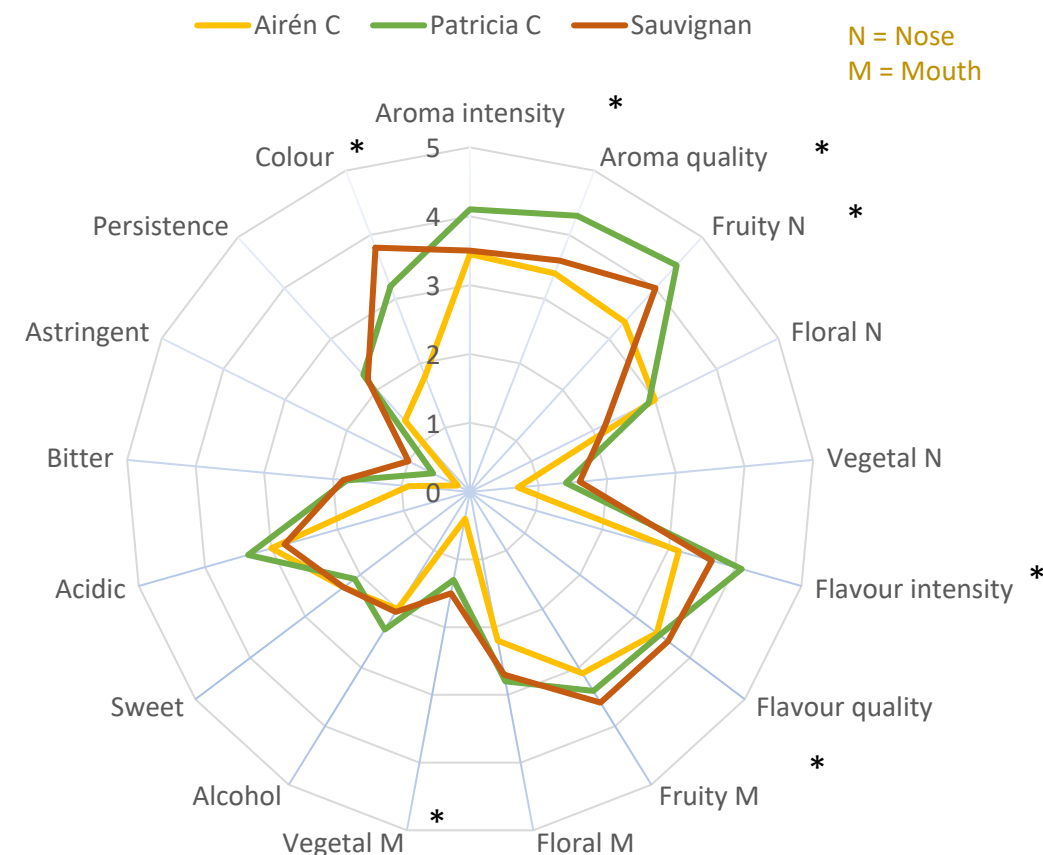
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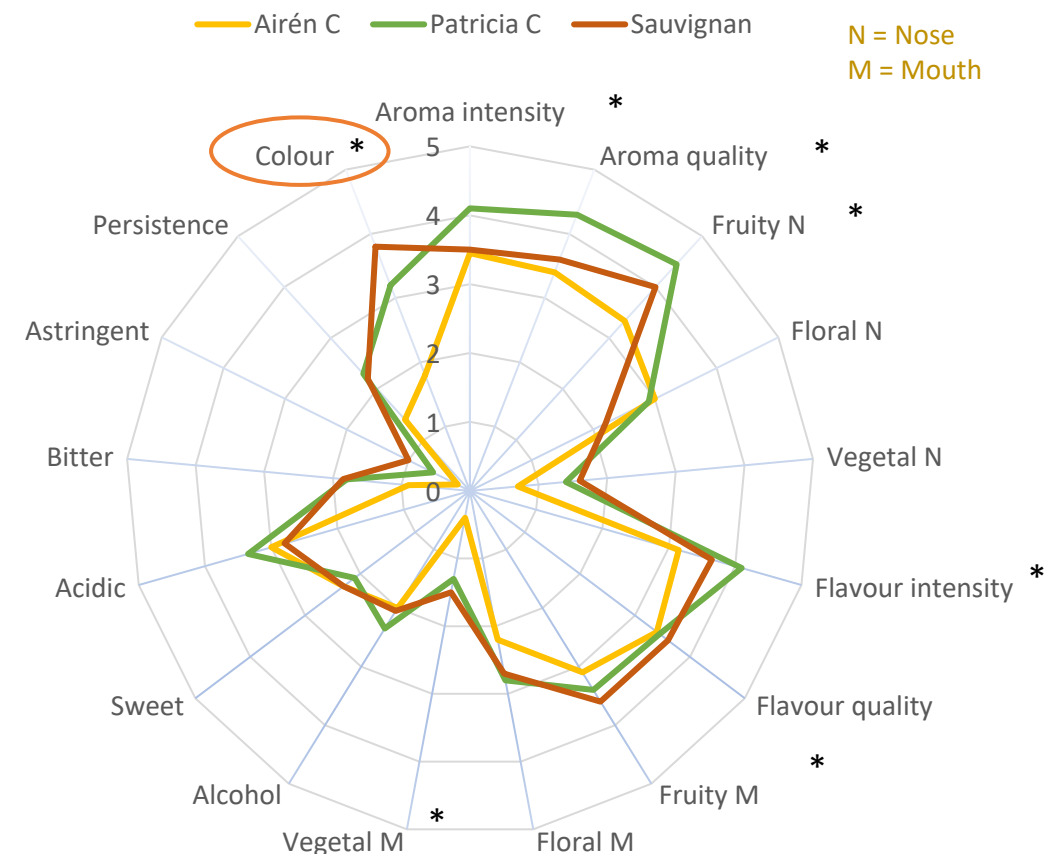
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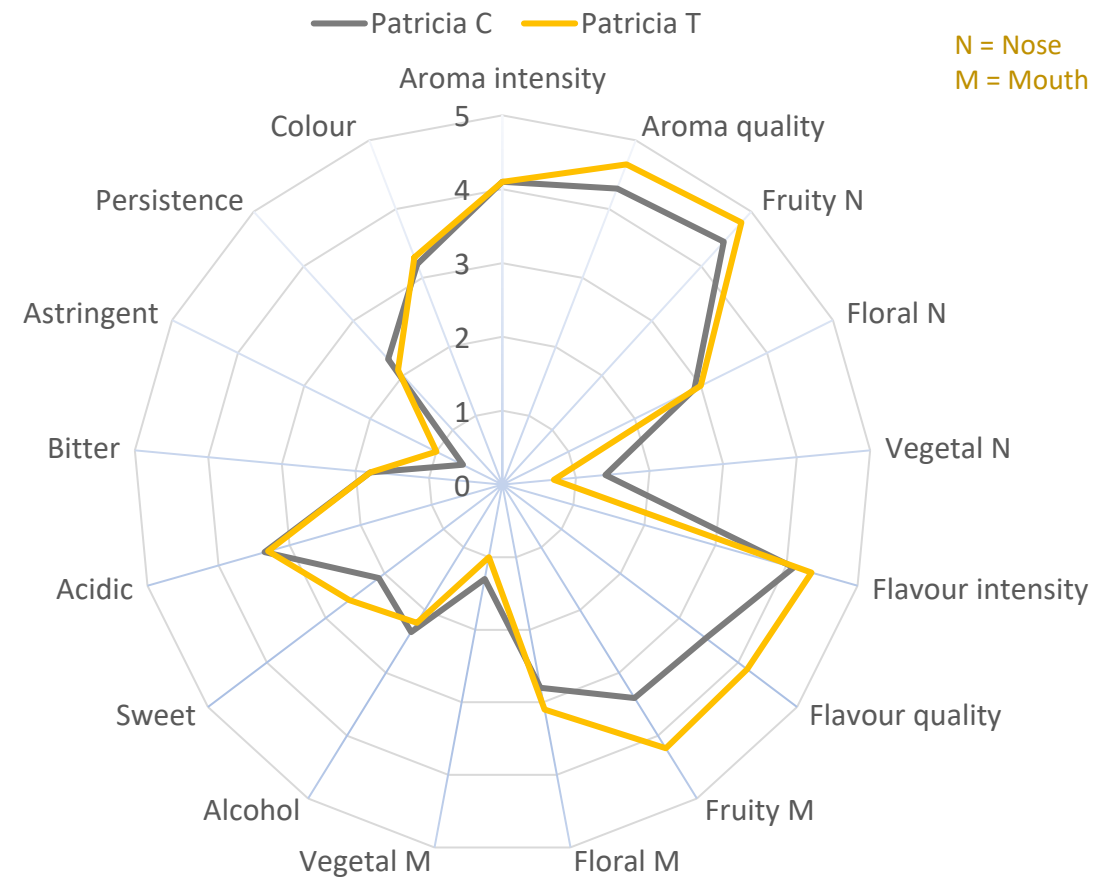
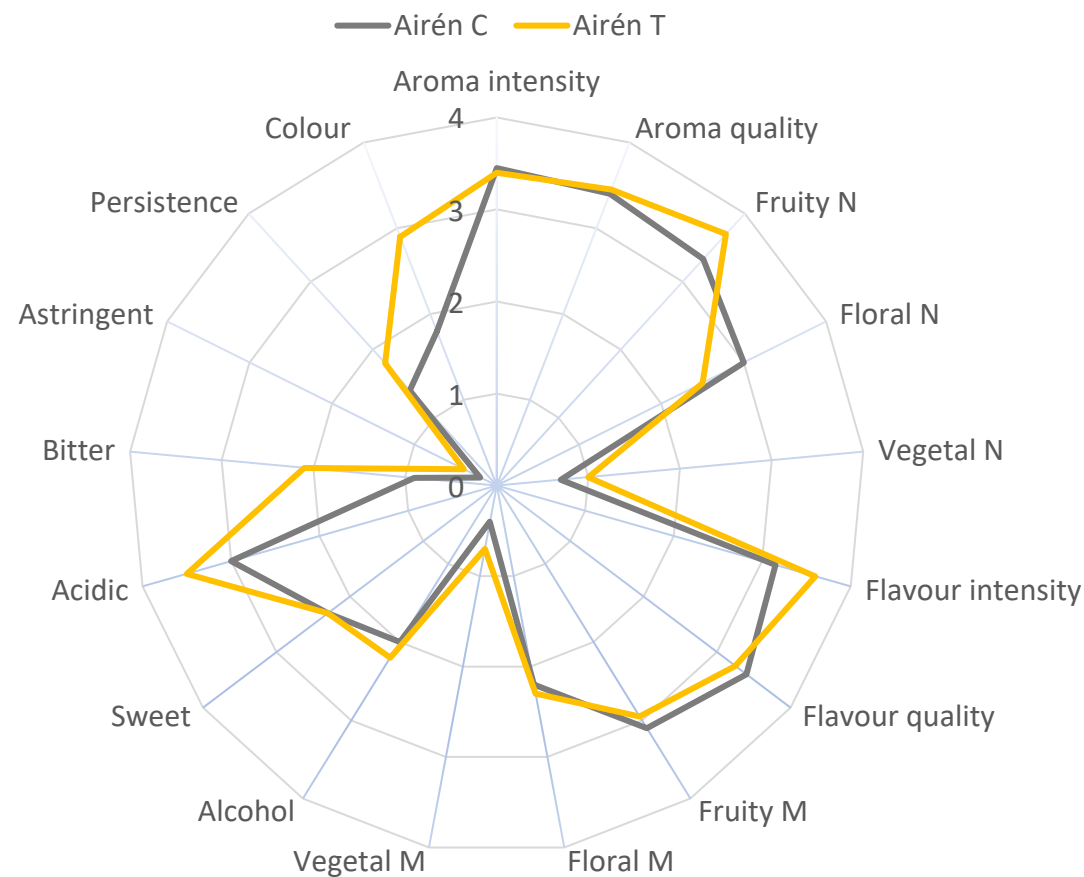
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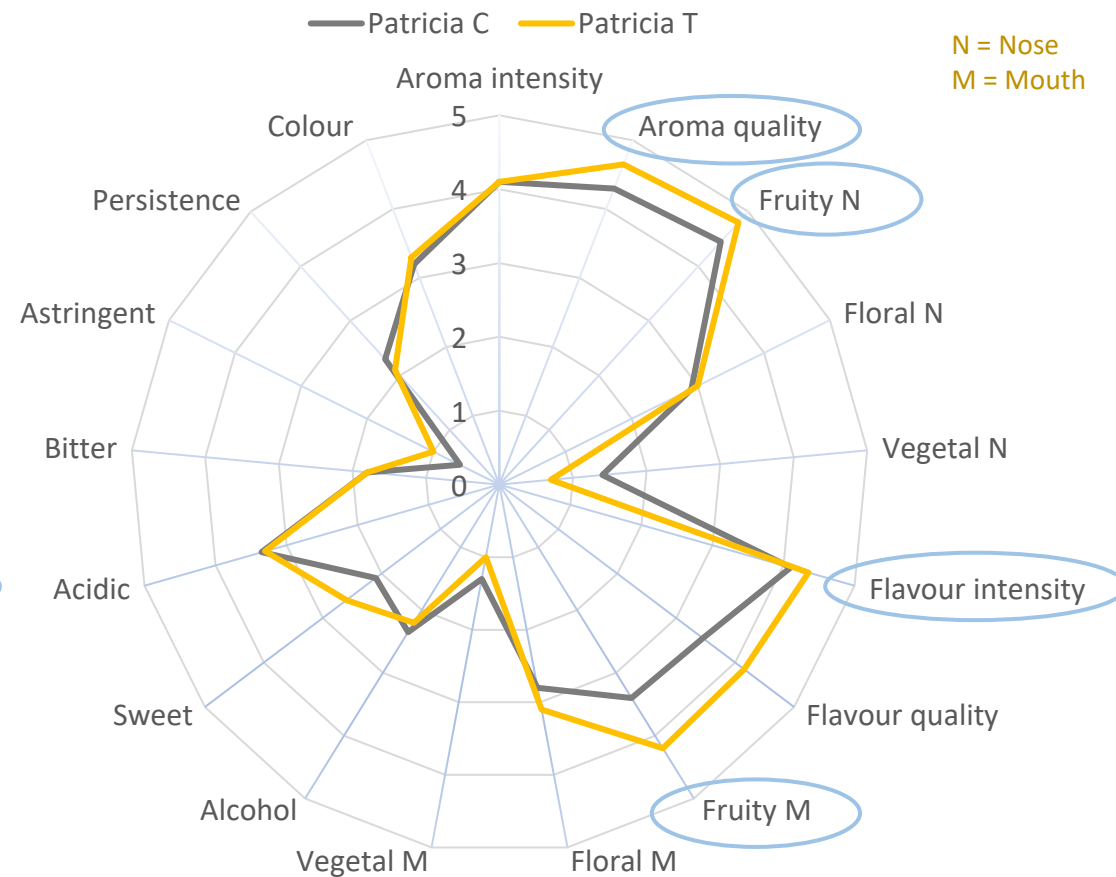
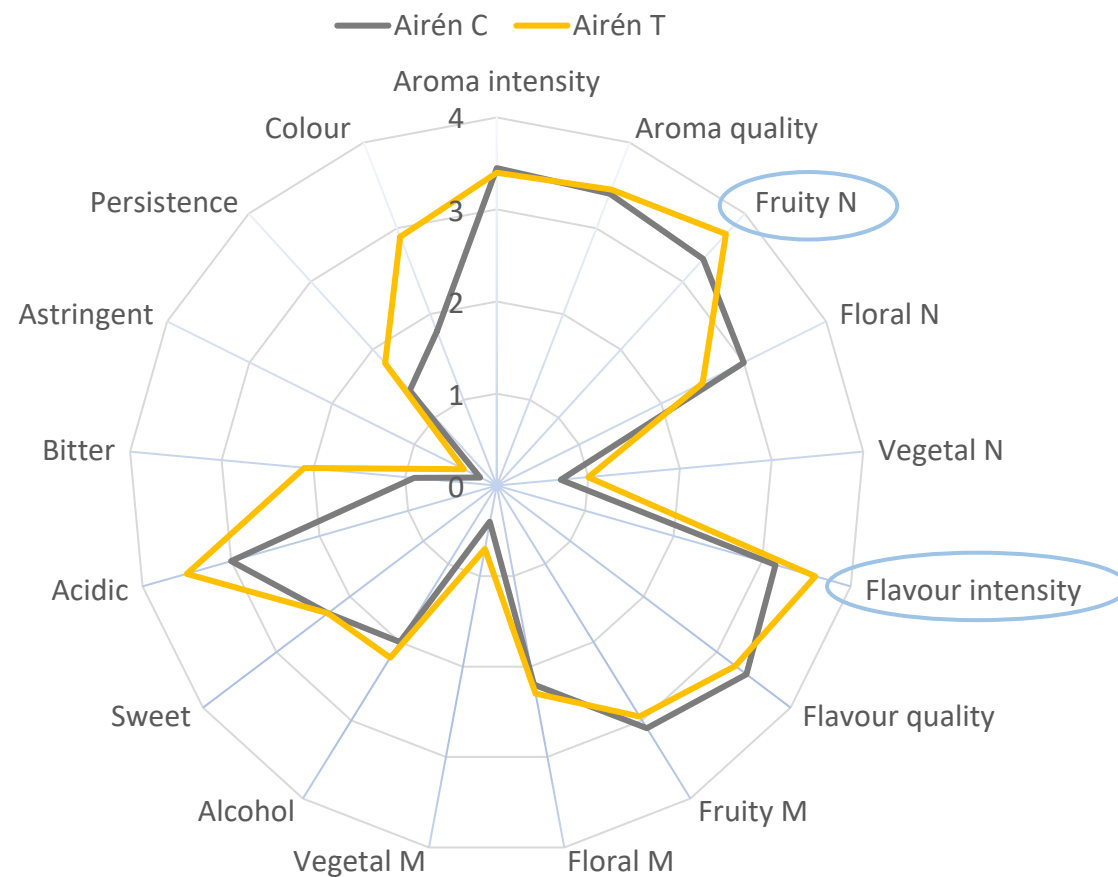


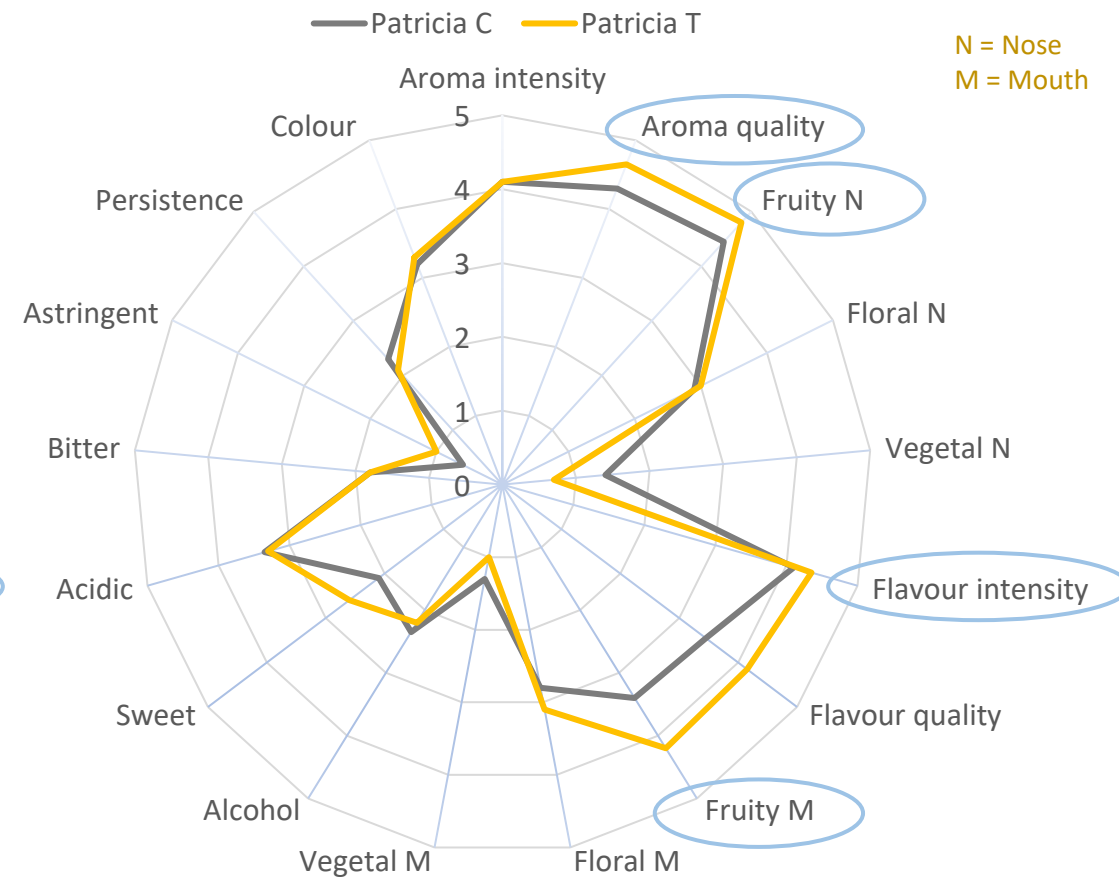
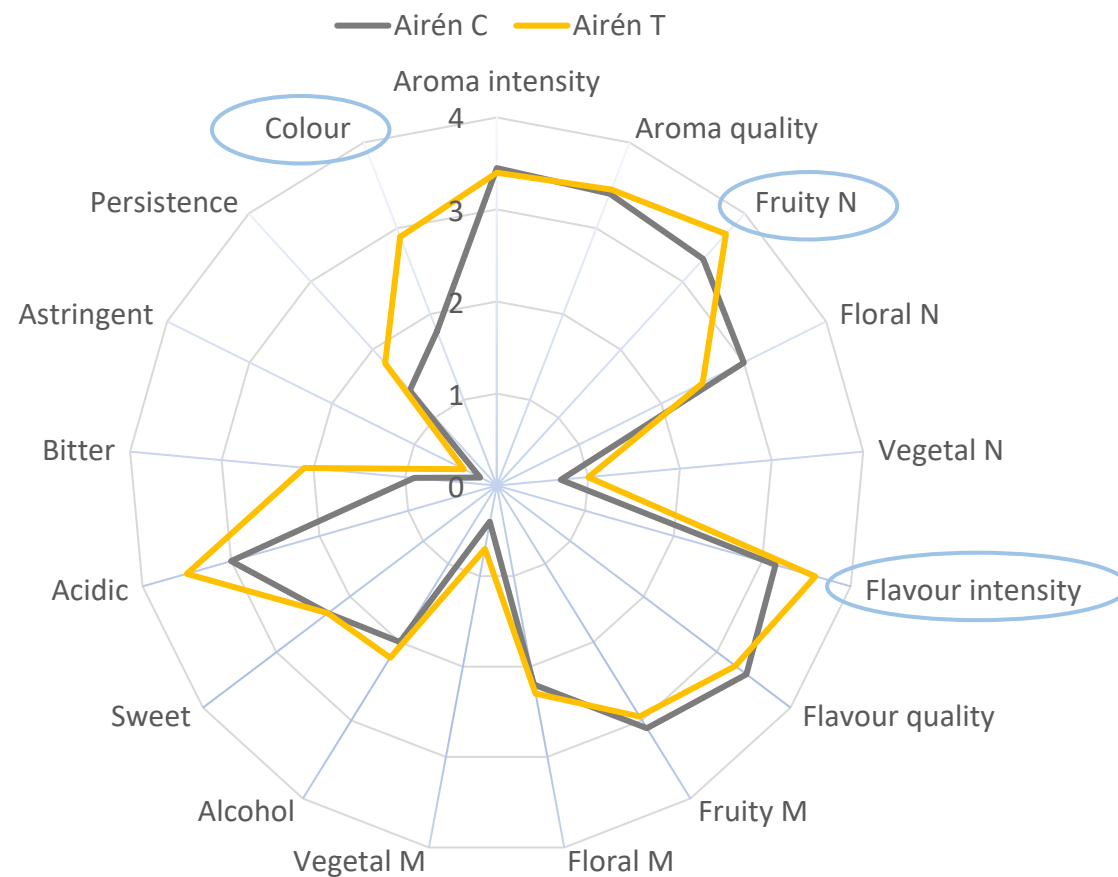
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Red varieties



	Tempranillo	Syrah
GRAPE		
mg/kg total tannin in grapes	1328.06 ± 172.76 a	1823.95 ± 75.92 b
mg/kg tannin in seeds	1268.34 ± 148.94 a	1814.04 ± 75.68 b
mg/kg tannin in skins	59.72 ± 26.18 b	9.91 ± 0.24 a
Total anthocyanins	1823.00 ± 173.60 b	1322.11 ± 149.78 a
Total flavonols	3.75 ± 0.36 a	11.14 ± 1.72 b
MUST		
Colour intensity	9.16 ± 0.07 b	8.88 ± 0.02 a
Hue	0.38 ± 0.00 a	0.51 ± 0.00 b
Total polyphenol index	13.48 ± 0.05 b	11.27 ± 0.25 a
Total anthocyanins	161.55 ± 0.41 b	132.95 ± 4.17 a
Precipitable tannins by methylcellulose	1405.29 ± 90.81 b	694.95 ± 150.40 a
Total tannins by phloroglucinolysis	1135.45 ± 17.13 b	416.18 ± 75.67 a
Average degree of tannin polymerisation	7.33 ± 0.04 b	2.61 ± 0.11 a

Although Syrah is richer in tannins in the grape, Tempranillo extracts more anthocyanins and achieves stronger color. This could be linked to higher acidity, which stabilizes anthocyanins in their flavylum form, enhancing colour intensity.

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	Tempranillo	Syrah
GRAPE		
mg/kg total tannin in grapes	1328.06 ± 172.76 a	1823.95 ± 75.92 b
mg/kg tannin in seeds	1268.34 ± 148.94 a	1814.04 ± 75.68 b
mg/kg tannin in skins	59.72 ± 26.18 b	9.91 ± 0.24 a
Total anthocyanins	1823.00 ± 173.60 b	1322.11 ± 149.78 a
Total flavonols	3.75 ± 0.36 a	11.14 ± 1.72 b
MUST		
Colour intensity	9.16 ± 0.07 b	8.88 ± 0.02 a
Hue	0.38 ± 0.00 a	0.51 ± 0.00 b
Total polyphenol index	13.48 ± 0.05 b	11.27 ± 0.25 a
Total anthocyanins	161.55 ± 0.41 b	132.95 ± 4.17 a
Precipitable tannins by methylcellulose	1405.29 ± 90.81 b	694.95 ± 150.40 a
Total tannins by phloroglucinolysis	1135.45 ± 17.13 b	416.18 ± 75.67 a
Average degree of tannin polymerisation	7.33 ± 0.04 b	2.61 ± 0.11 a



Although Syrah is richer in tannins in the grape, Tempranillo extracts more anthocyanins and achieves stronger color. This could be linked to higher acidity, which stabilizes anthocyanins in their flavylum form, enhancing colour intensity.

Red varieties

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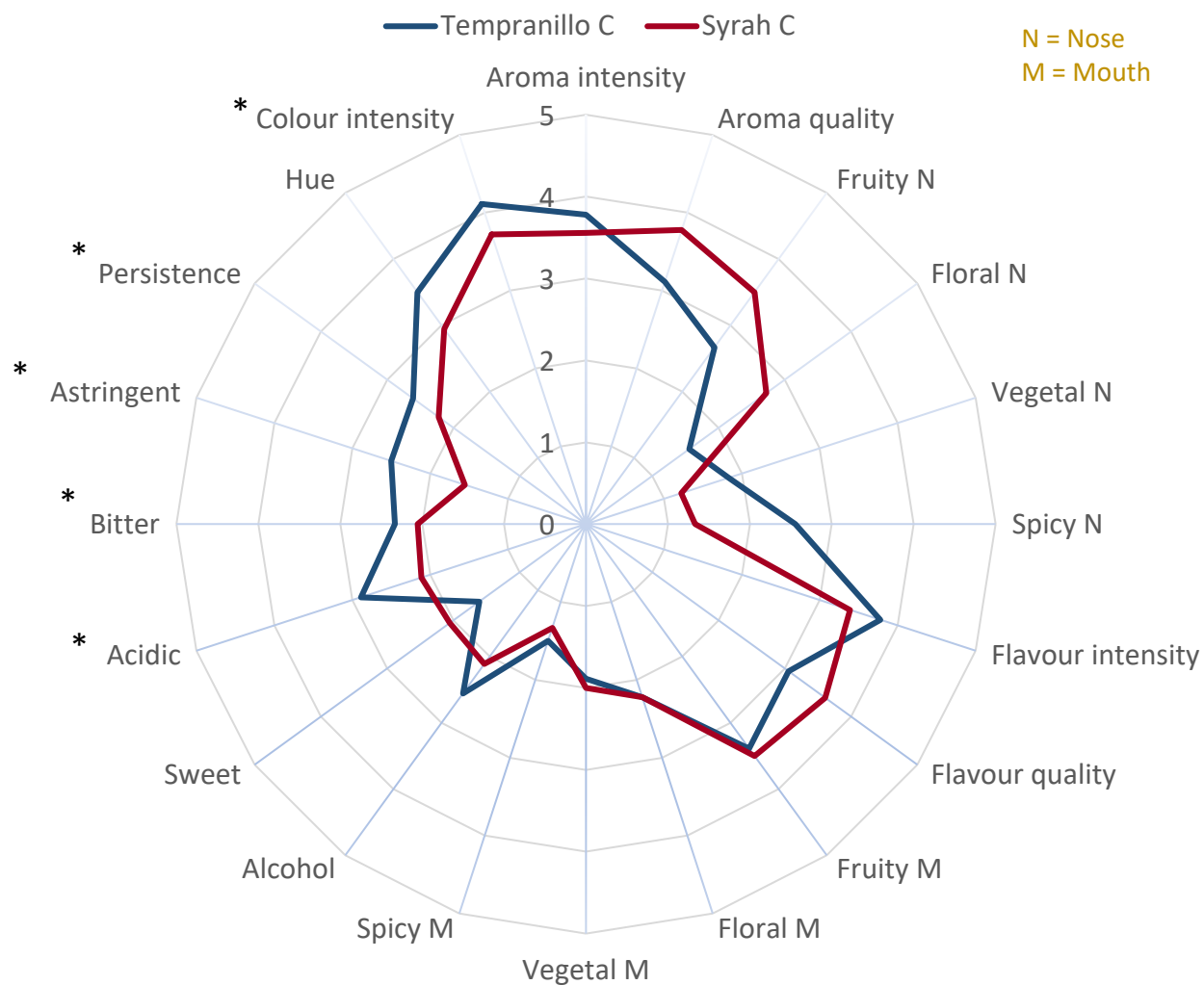
WINES	Tempranillo C	Tempranillo T	Syrah C	Syrah T
Colour intensity	9.58 ± 0.00 a	9.82 ± 0.04 b	7.77 ± 0.01 a	7.76 ± 0.01 a
Hue	0.40 ± 0.00 a	0.39 ± 0.00 a	0.64 ± 0.0 a	0.63 ± 0.0 a
Total polyphenol index	14.43 ± 0.09 b	13.98 ± 0.04 a	11.1 ± 0.02 a	10.98 ± 0.01 a
Total anthocyanins	135.25 ± 0.31 a	134.87 ± 0.87 a	120.00 ± 0.54 a	119.46 ± 1.14 a
Non-decolourable pigments	86.77 ± 1.24 a	90.07 ± 1.32 b	23.0 ± 0.04 a	23.16 ± 0.02 b
Polymeric anthocyanins	14.36 ± 0.07 b	16.06 ± 0.49 a	17.63 ± 0.71 a	19.13 ± 0.89 a
Total flavonols	77.06 ± 1.43 b	65.79 ± 1.26 a	69.16 ± 0.72 a	69.23 ± 0.11 a
Total phenolic acids	199.41 ± 0.72 a	201.46 ± 0.04 b	196.74 ± 0.41 a	196.04 ± 0.32 a
Total tannins	704.91 ± 3.92 a	862.85 ± 11.04 b	395.51 ± 4.8 a	414.7 ± 14.36 a
Average degree of tannin polymerisation	6.94 ± 0.30 a	7.33 ± 0.15 a	2.66 ± 0.05 a	2.72 ± 0.01 a
% Galloylation of tannins	2.13 ± 0.30 a	2.62 ± 0.12 a	4.17 ± 0.3 a	4.04 ± 0.0 a
% Epigallocatechin (skin tannin)	16.29 ± 0.17 a	17.57 ± 0.16 b	9.64 ± 0.47 a	9.12 ± 0.67 a



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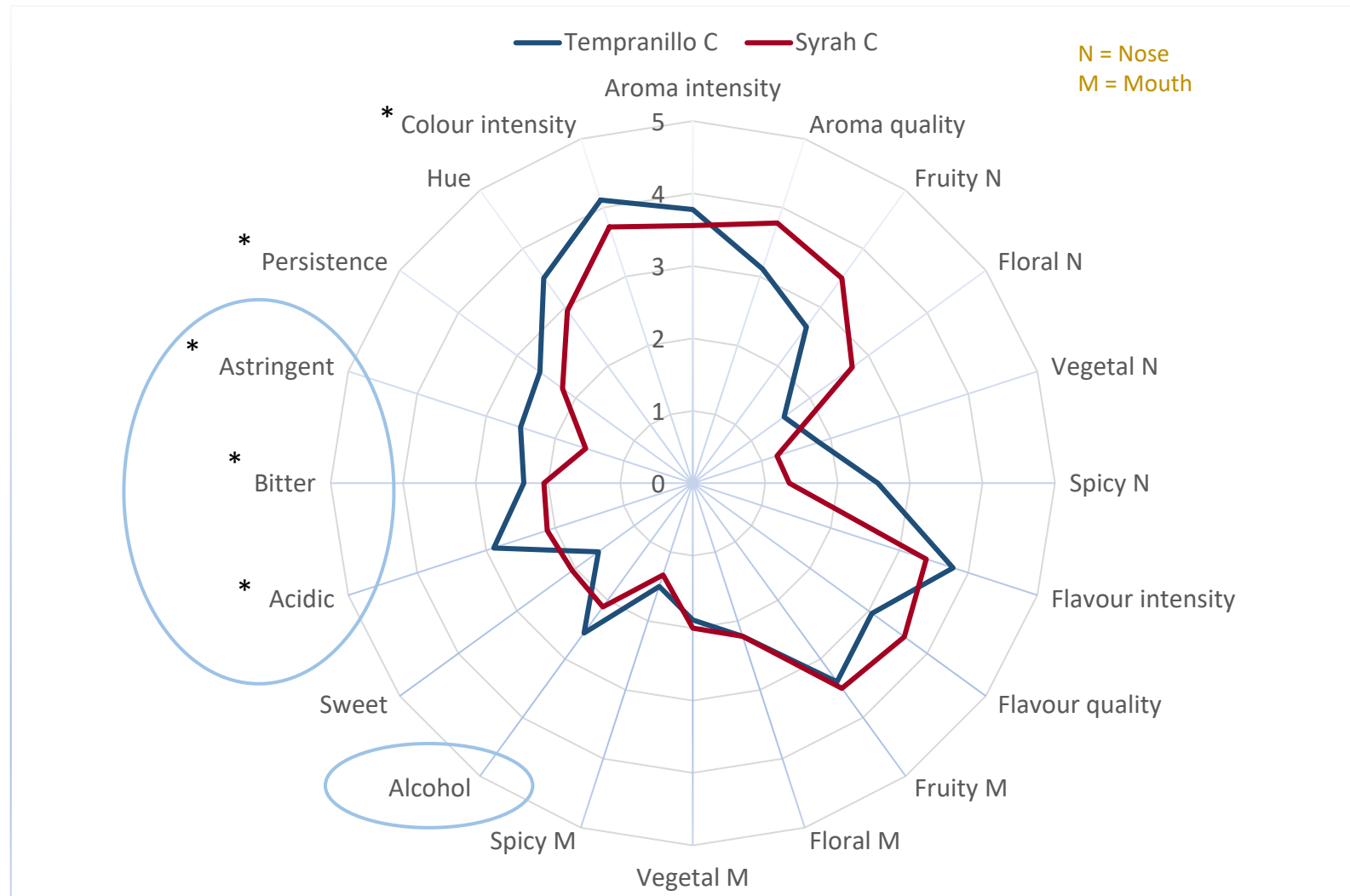


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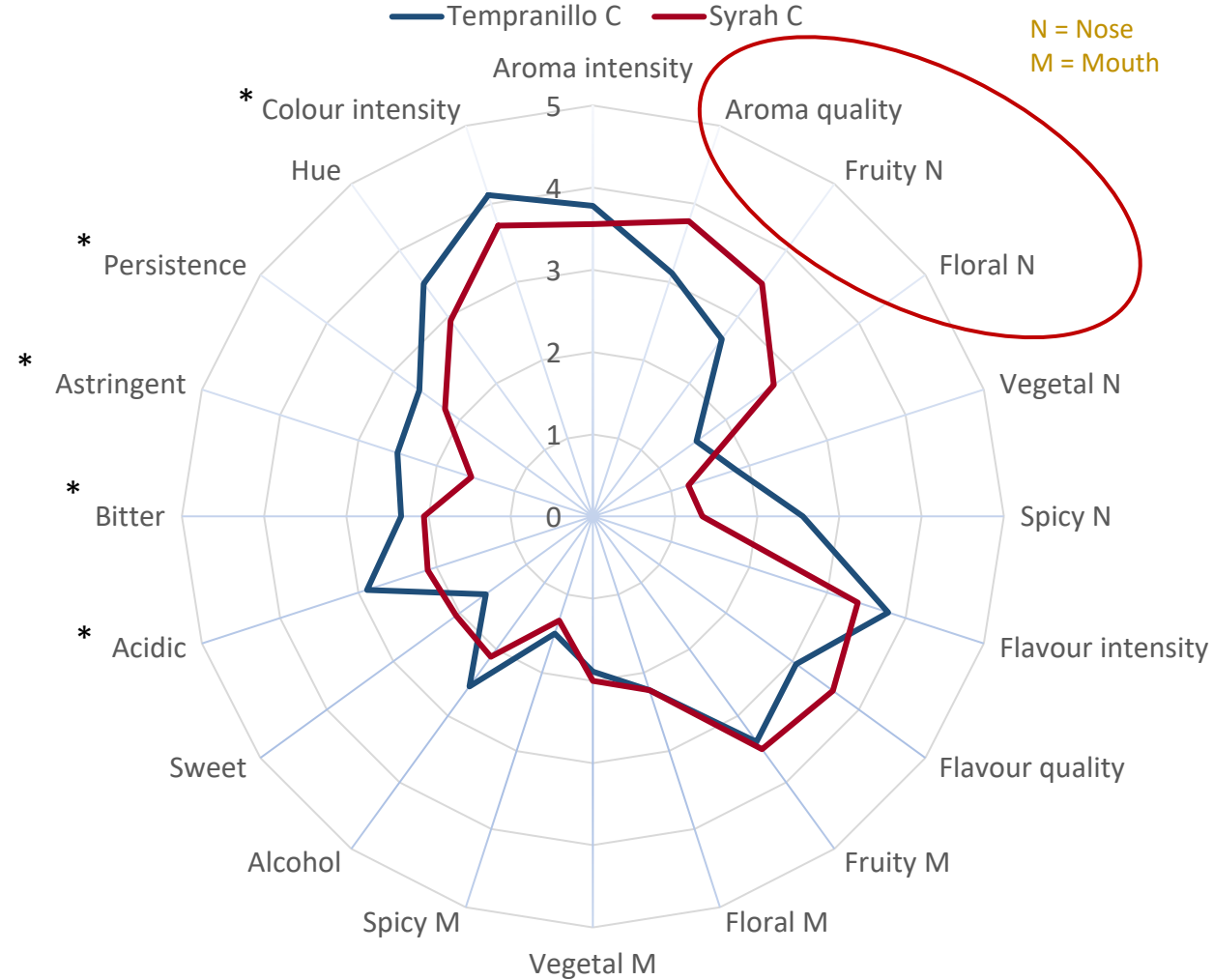
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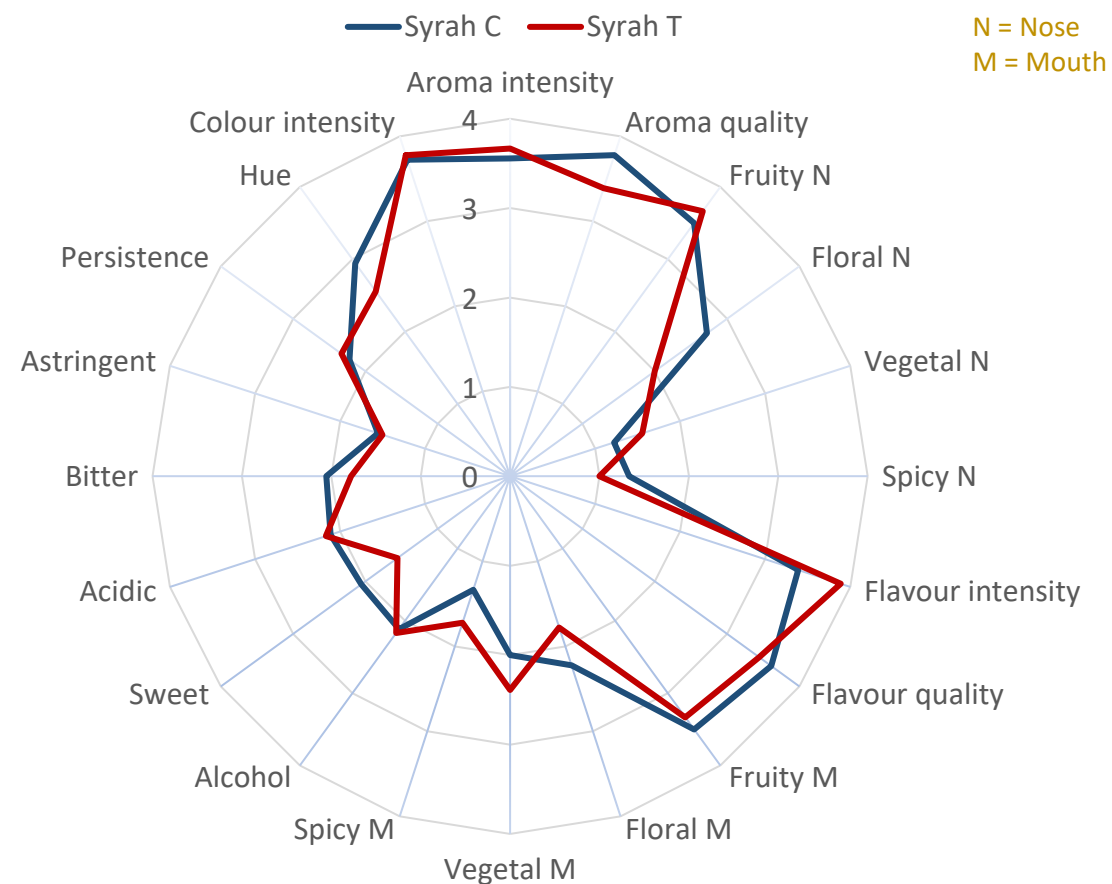
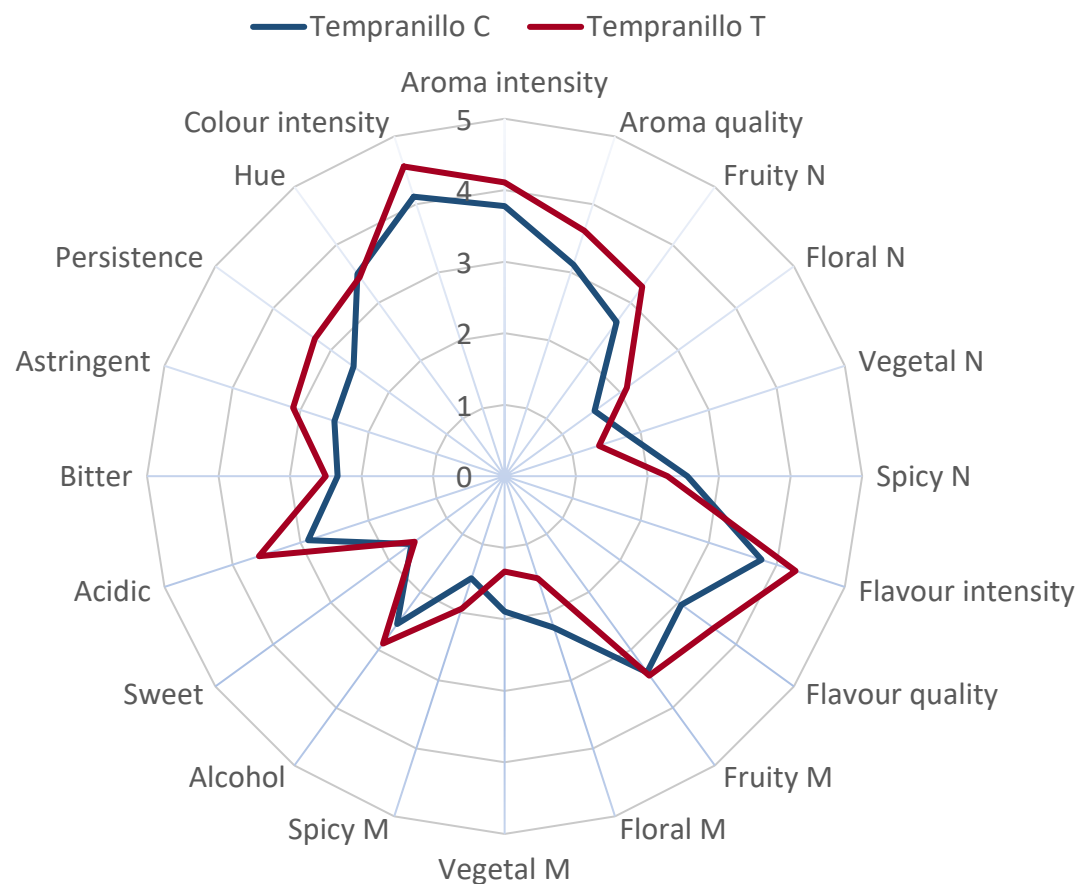
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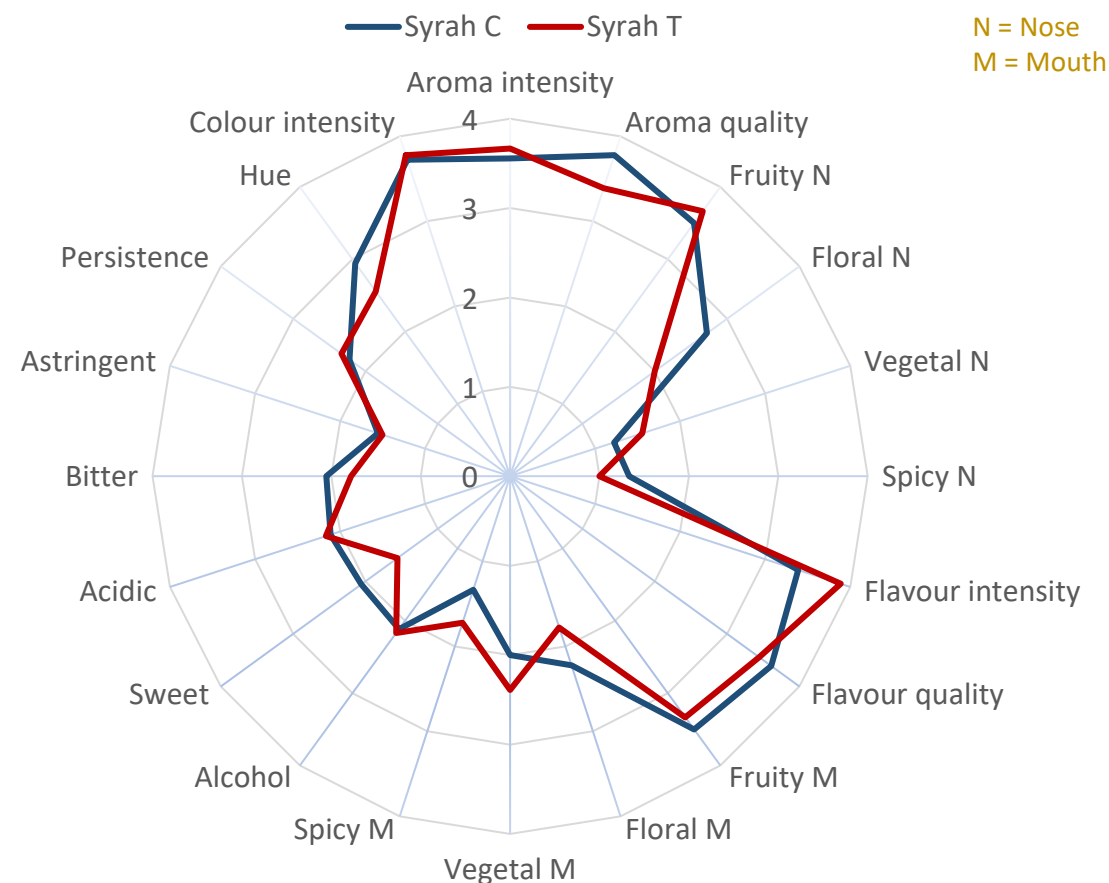
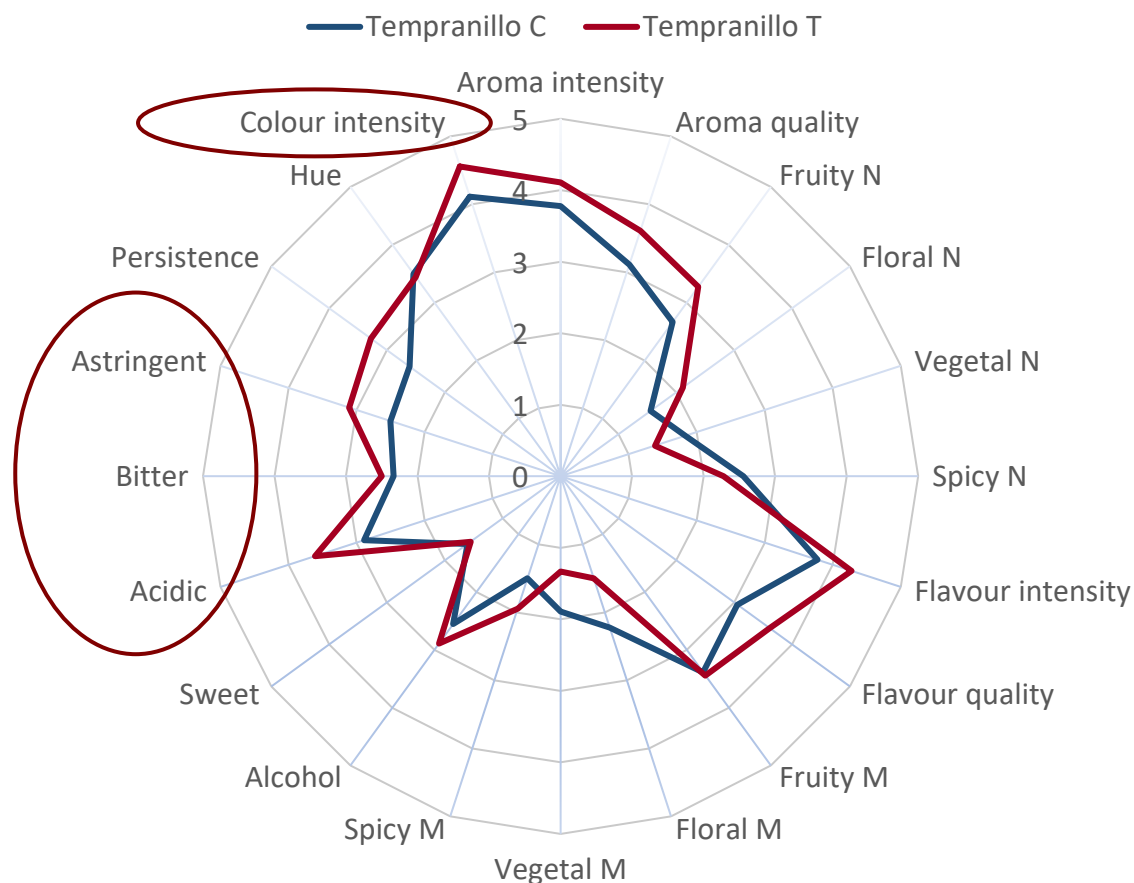


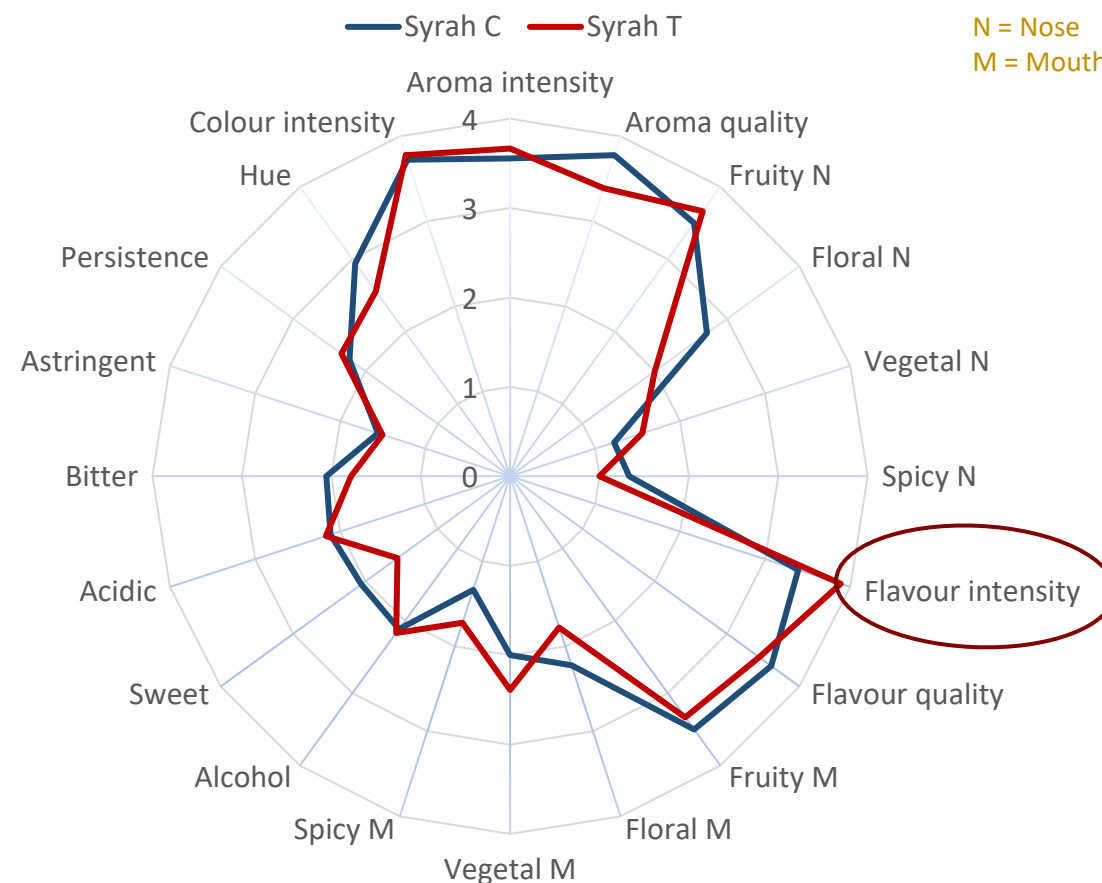
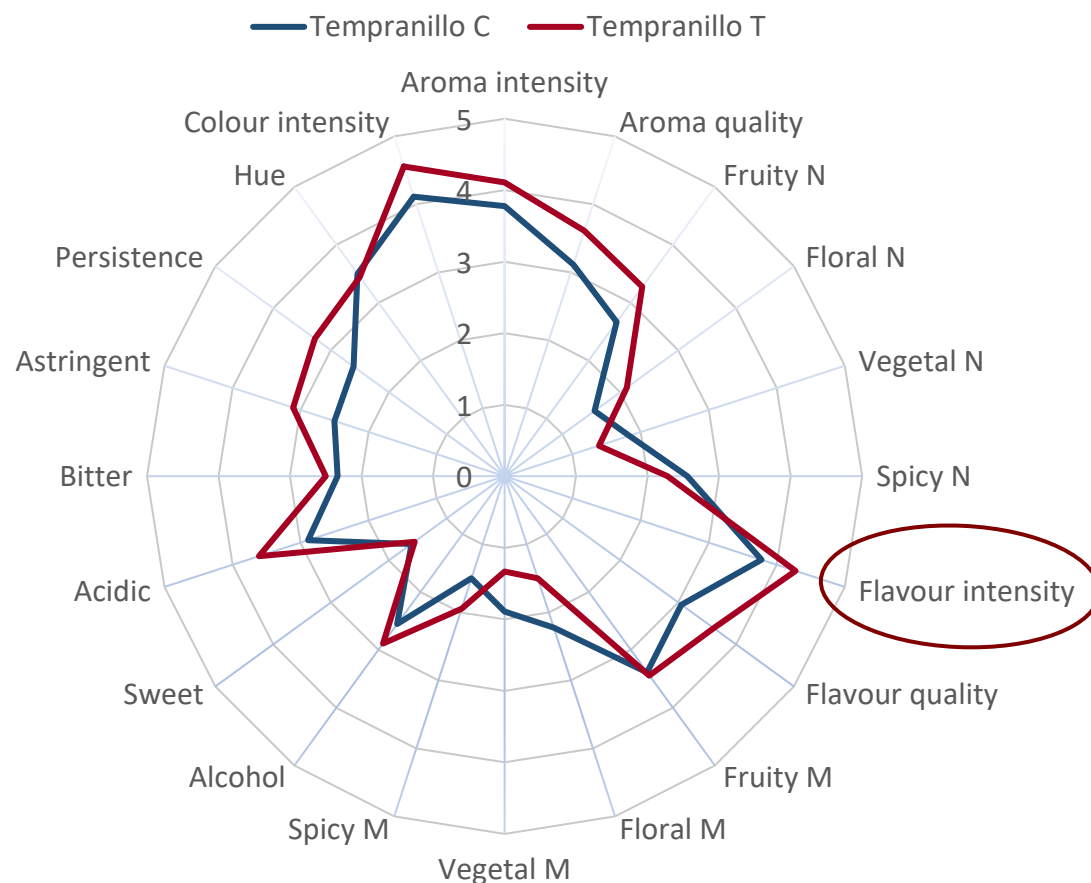
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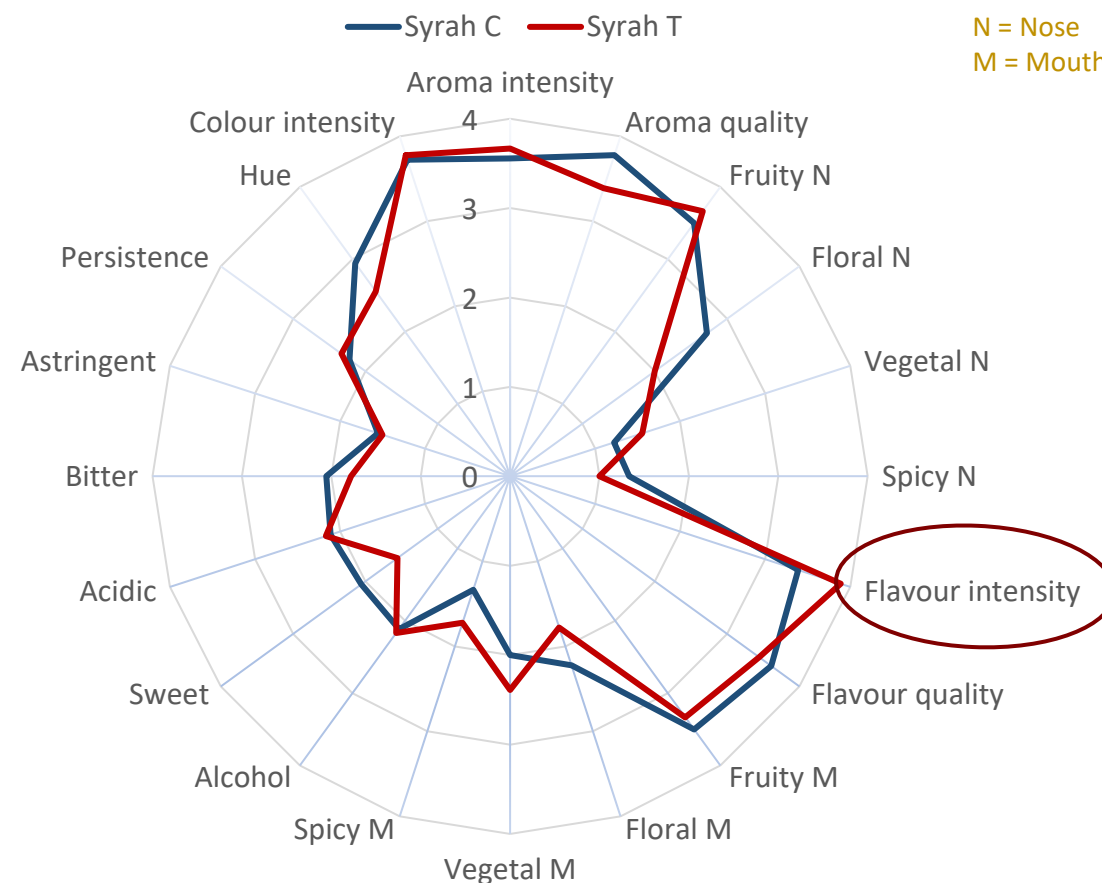
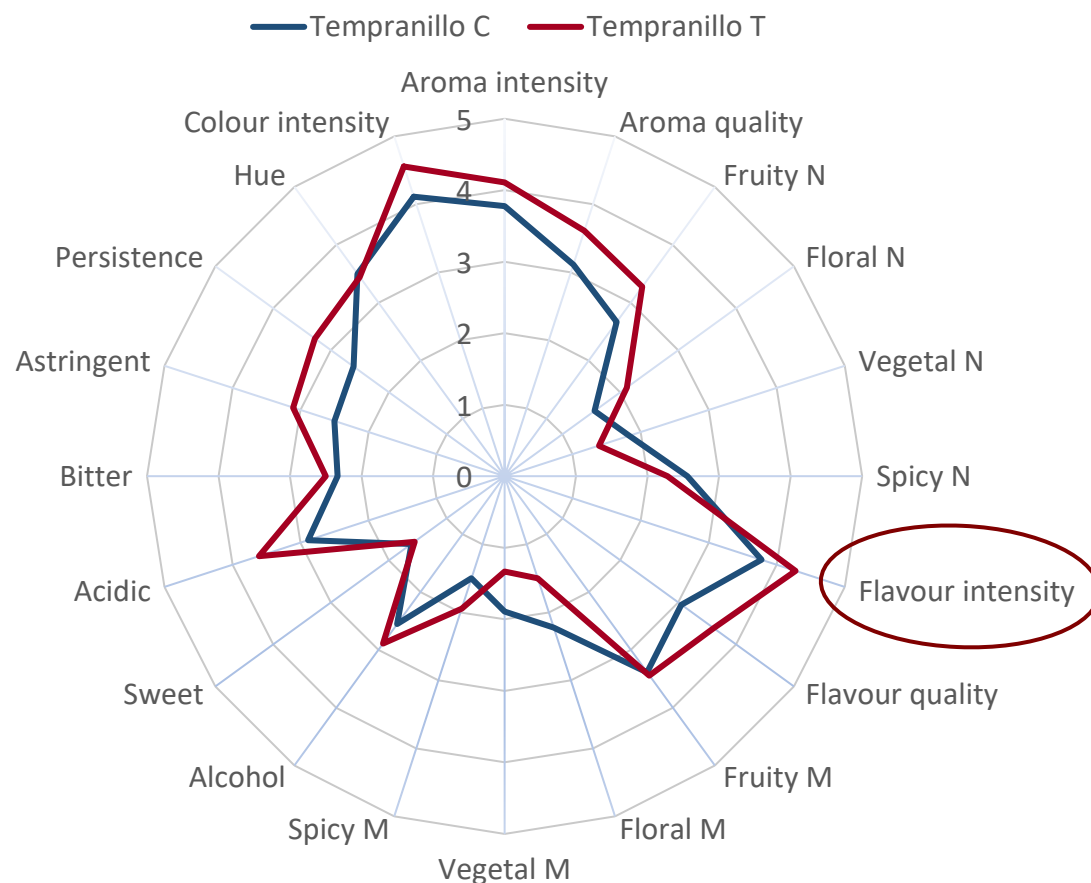


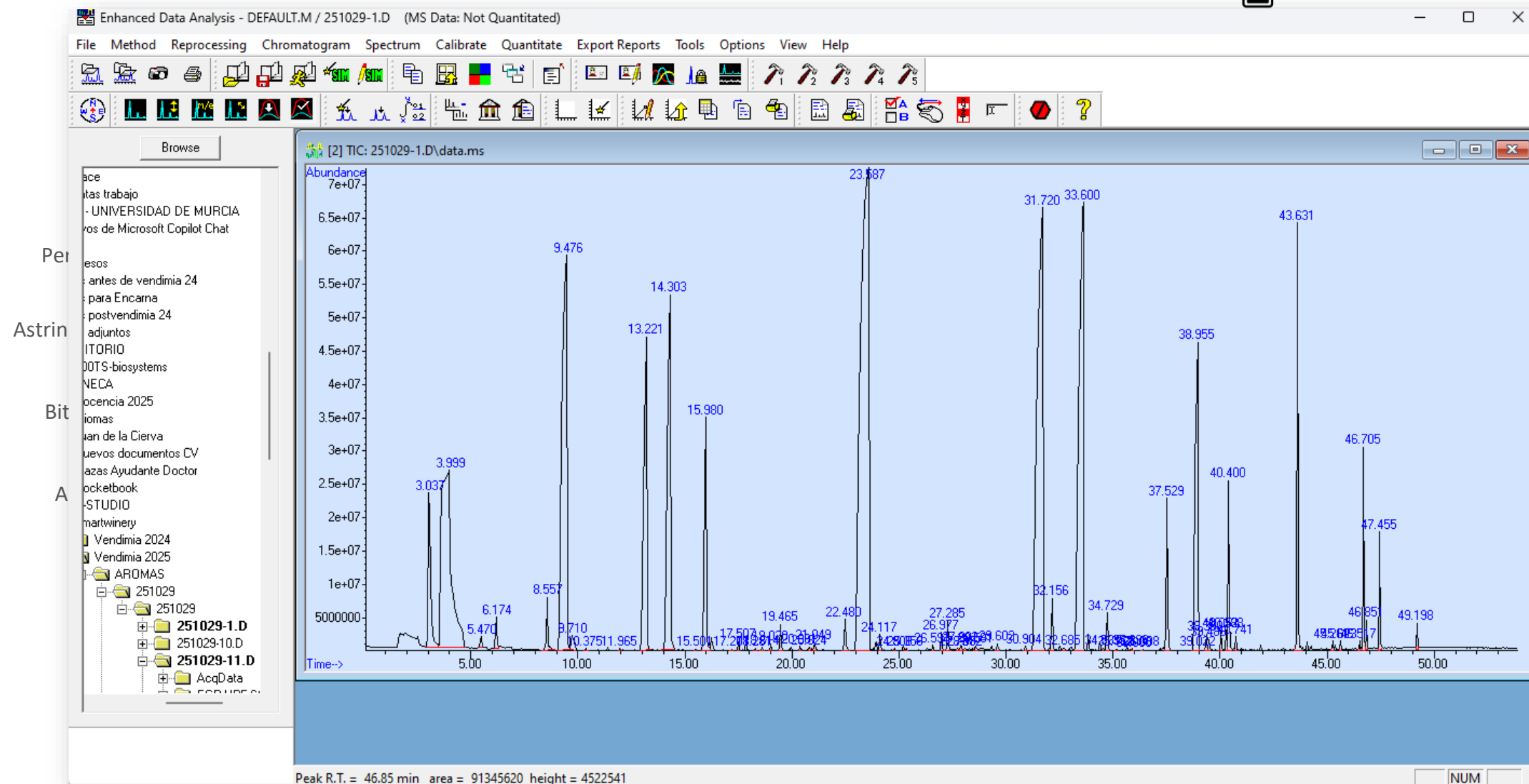
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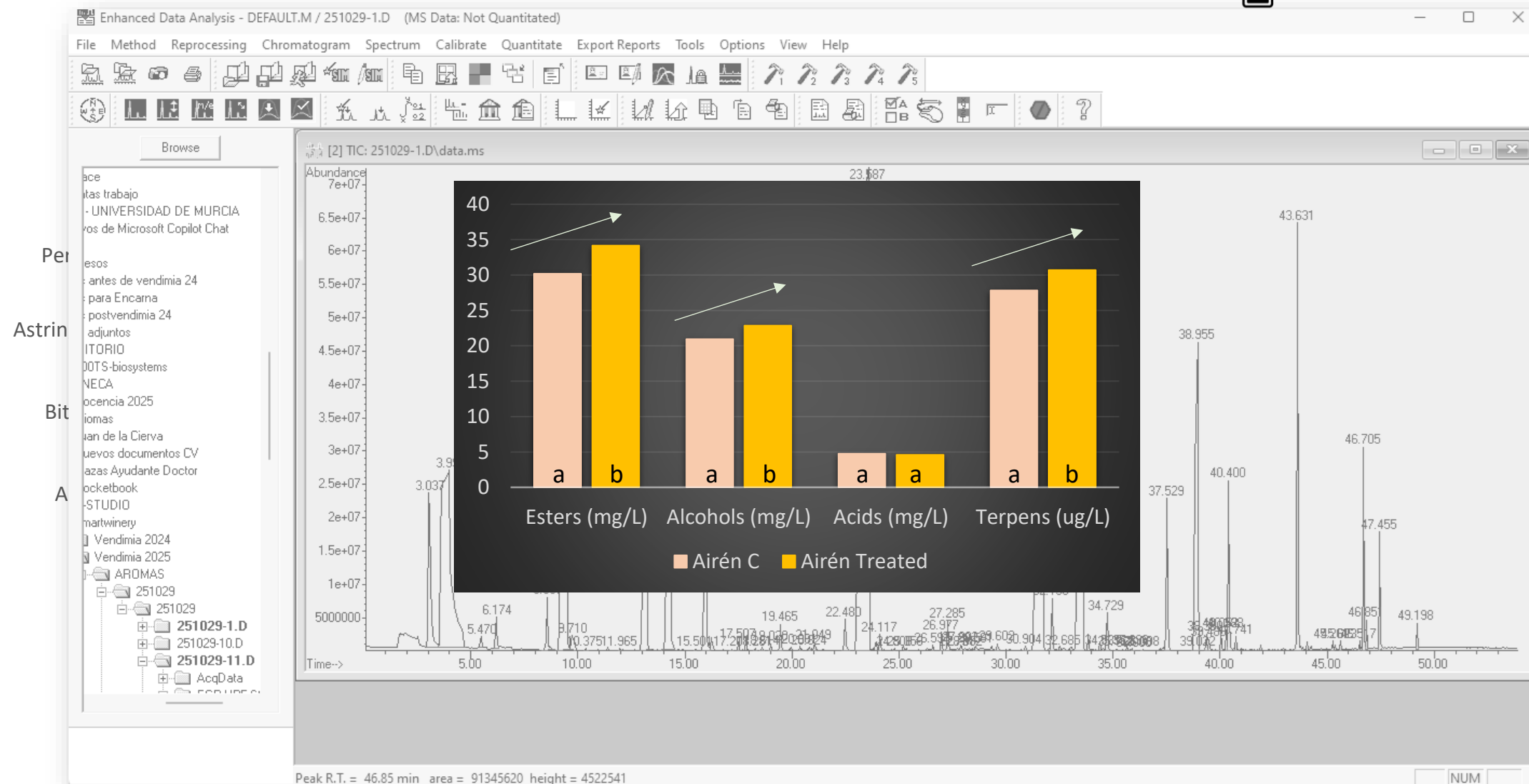












Jose
Mouth

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Union

Σας ευχαριστώ πολύ

Thank you very much

Muchas gracias