



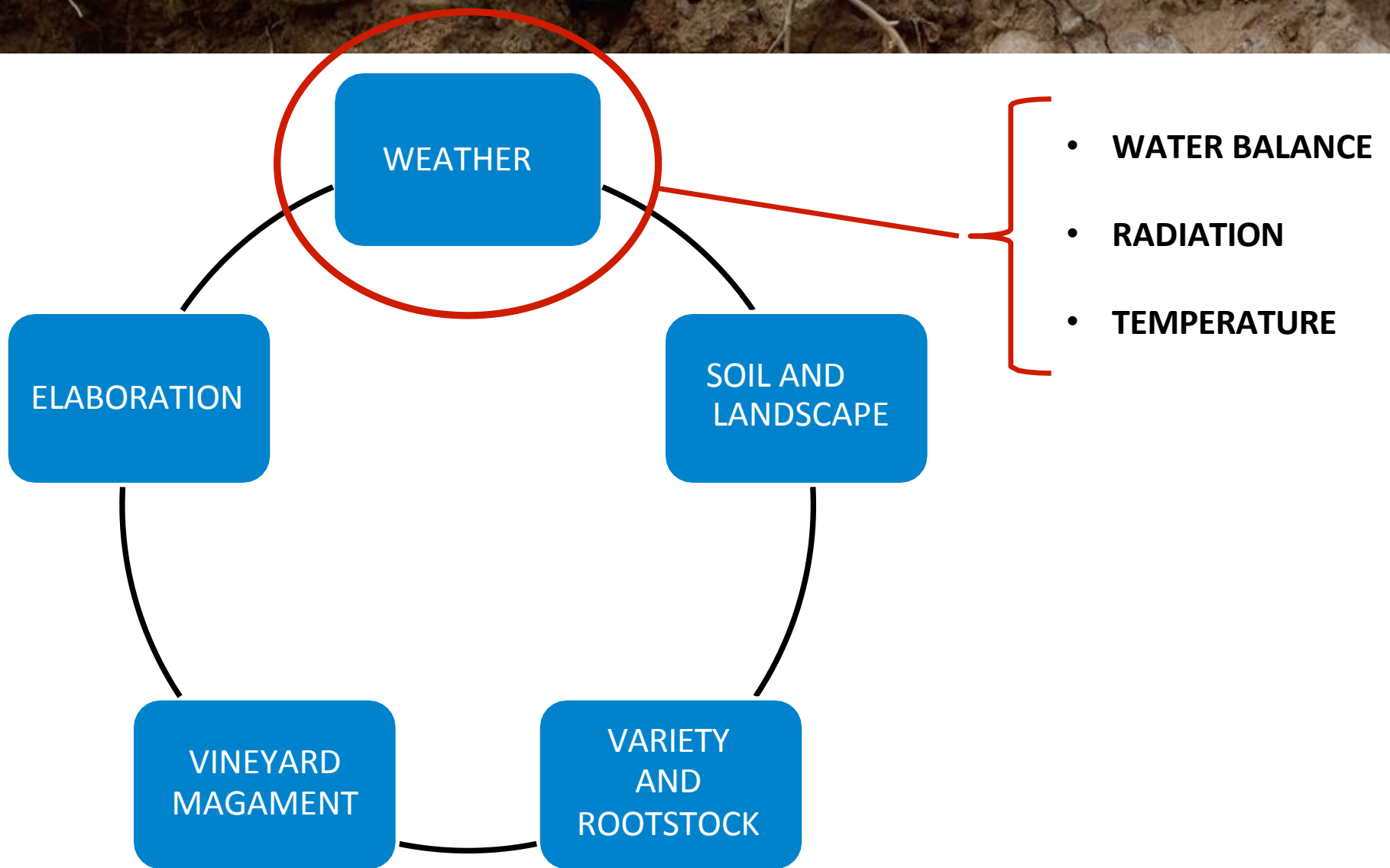
**Argentine Malbec: climate's
influence in the aromatic
compounds and in the
organoleptic profile..**

**Premium Tasting
July 18th, 2016**

Questions about the Argentine Malbec

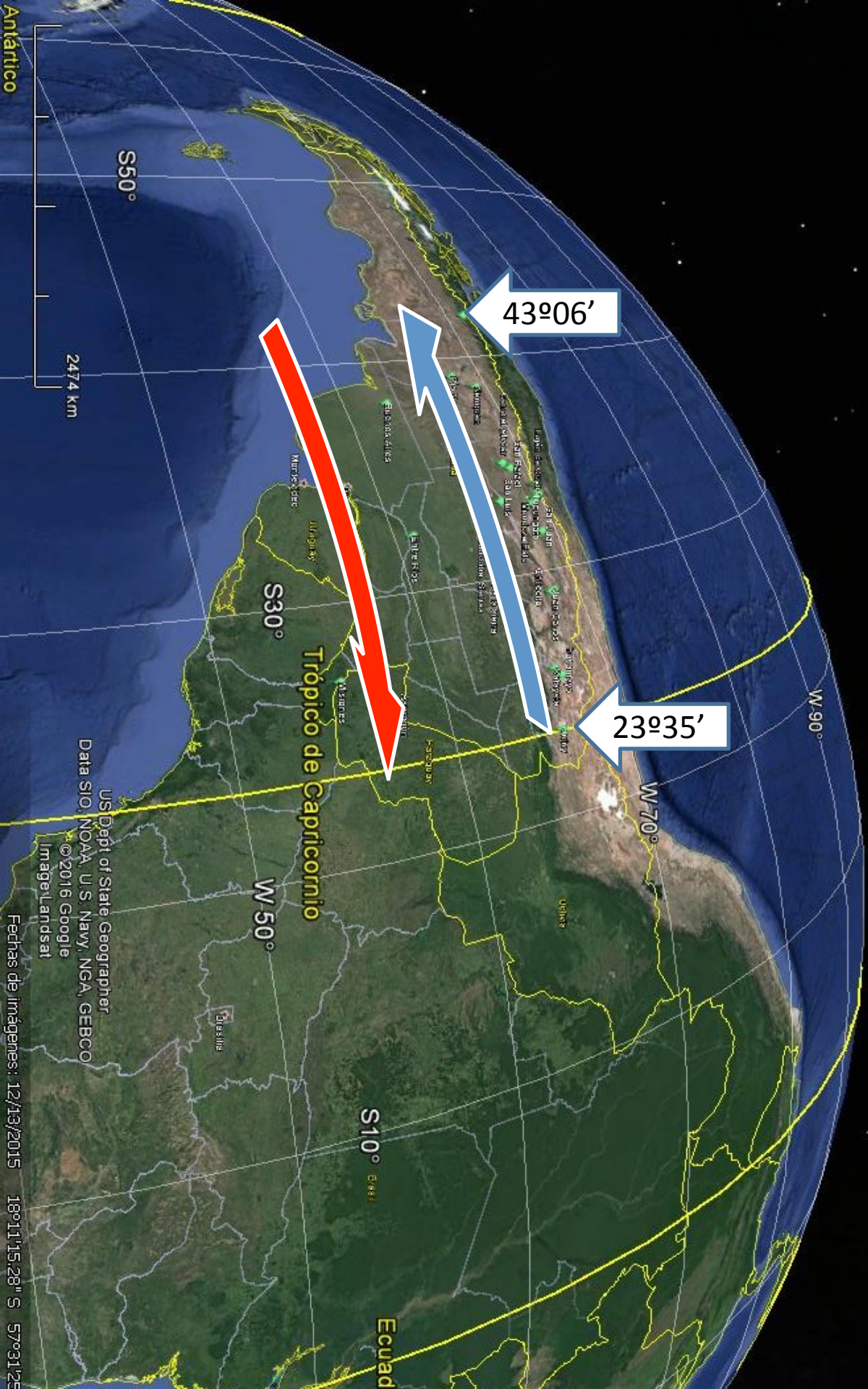
- **Is it possible to talk about regional identity?**
- **Which are the most important factors that determine the differences?**
- **What can we do to move forward in generating and spreading this type of knowledge?**

TERROIR



Temperature

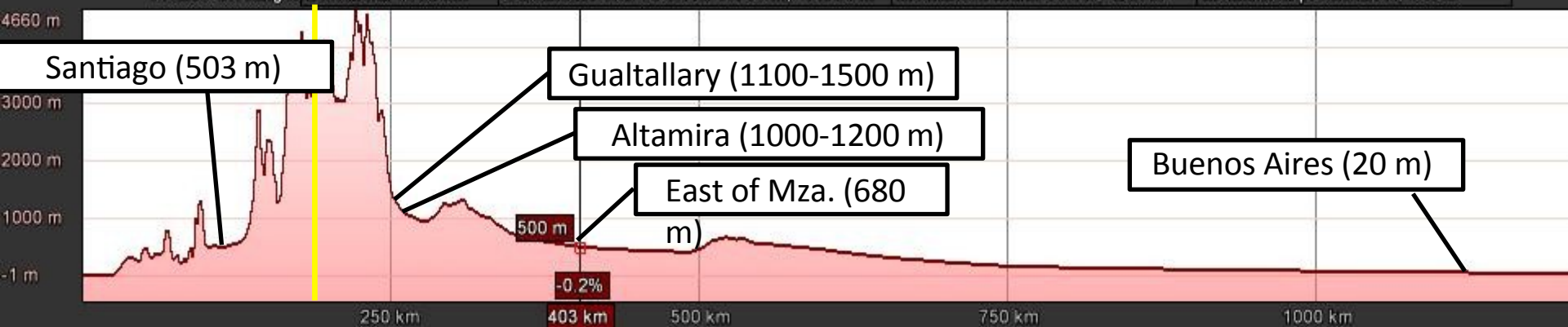
DP
DOÑA PAULA
ARGENTINA

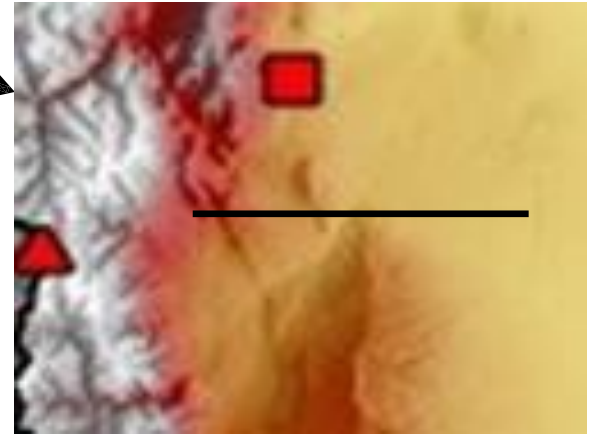
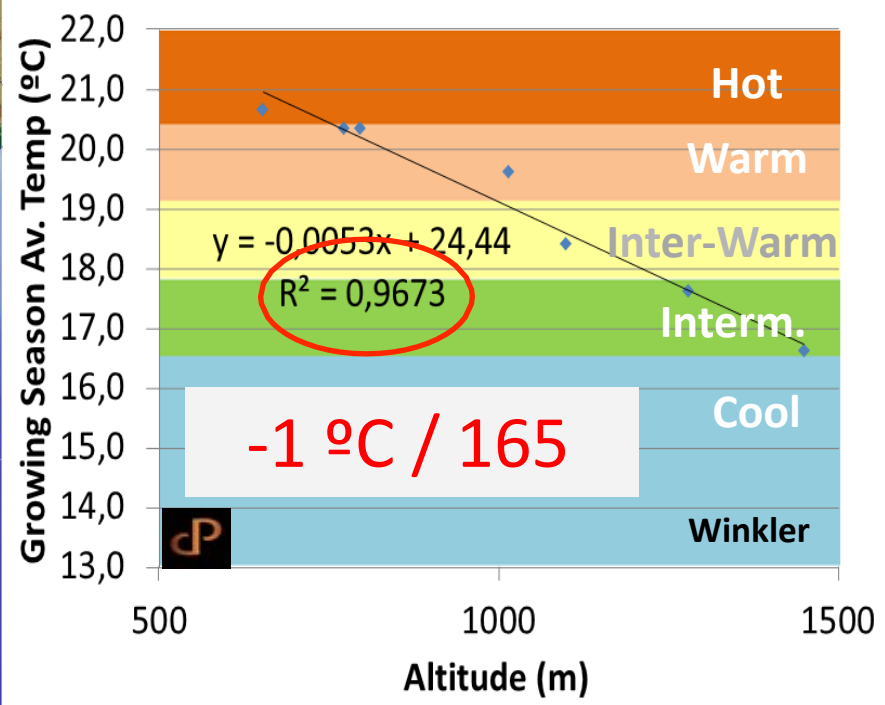
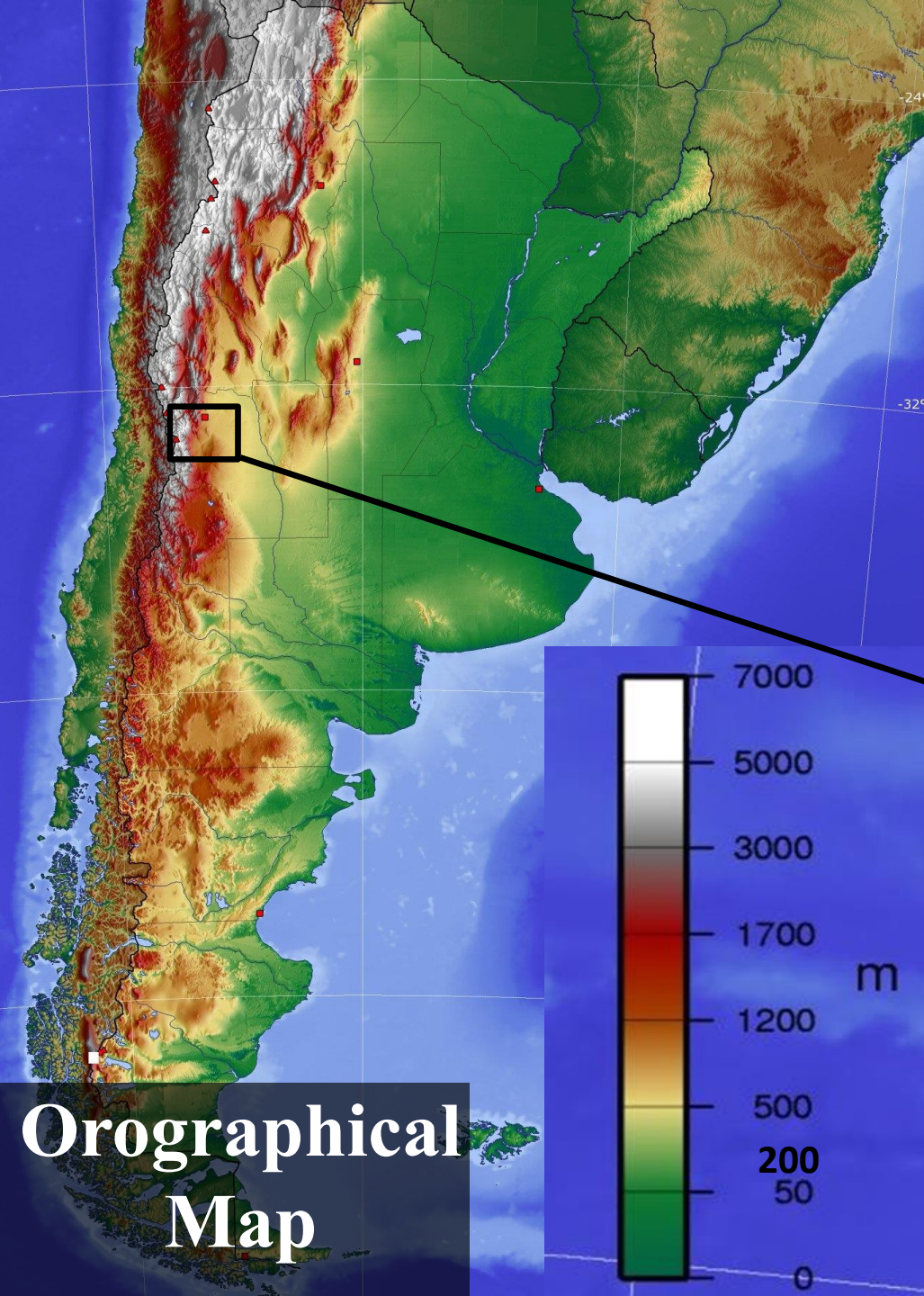


ALTITUD

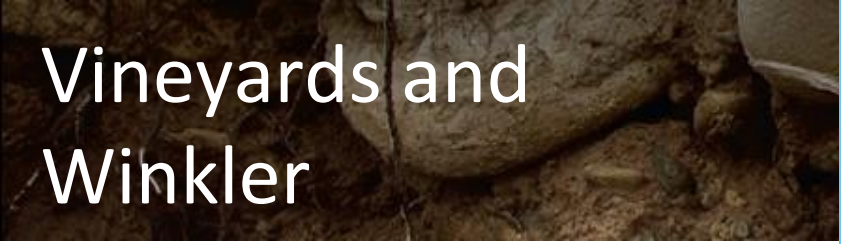


Gráfico: Min., Prom., Máx. Elevación: -1, 519, 4660 m
Totales del rango: Distancia: 1398 km Ganancia/Pérd. de elev.: 14705 m, -14705 m Inclinación máx.: 31.6%, -24.6% Inclinación prom.: 2.6%, -0.9%

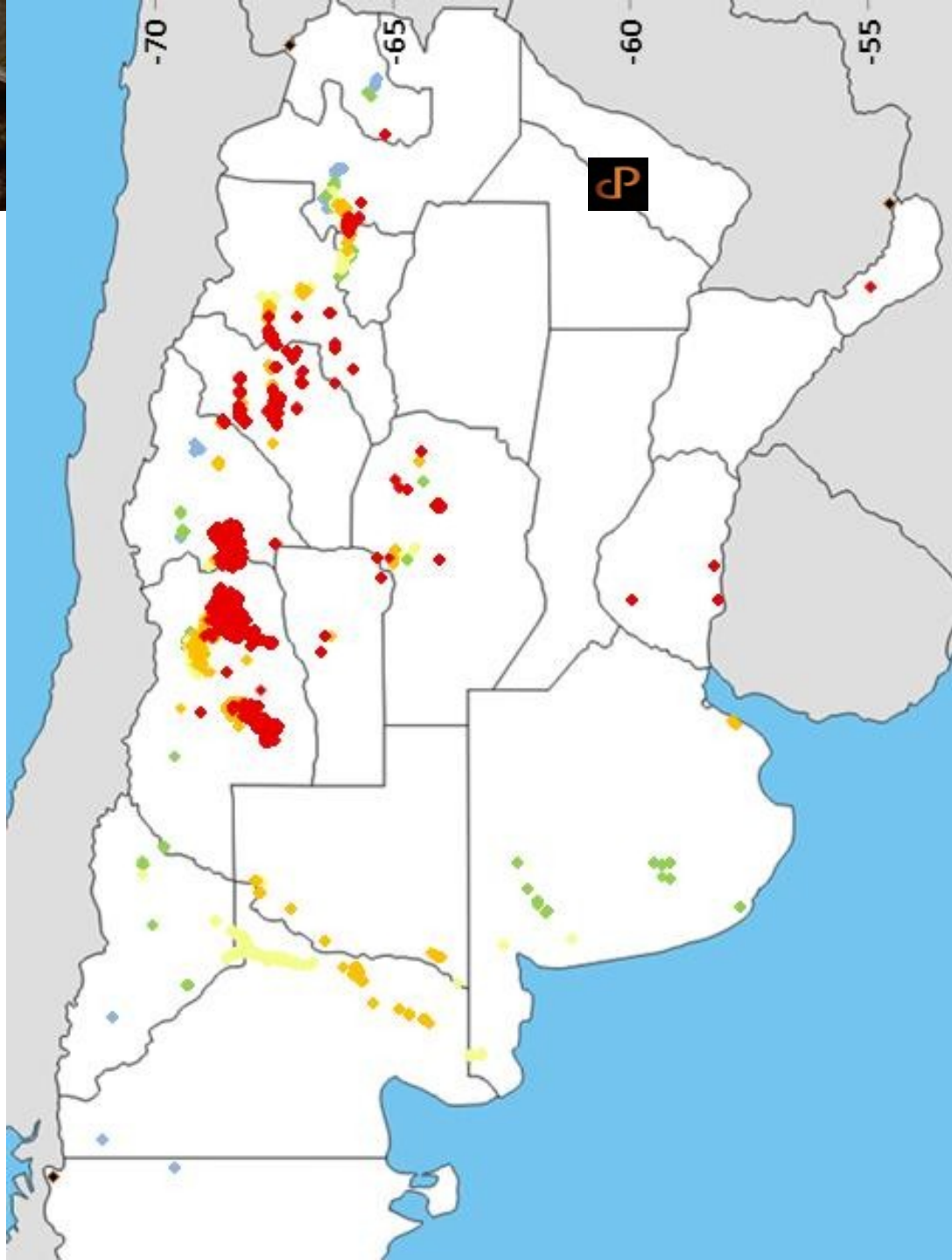




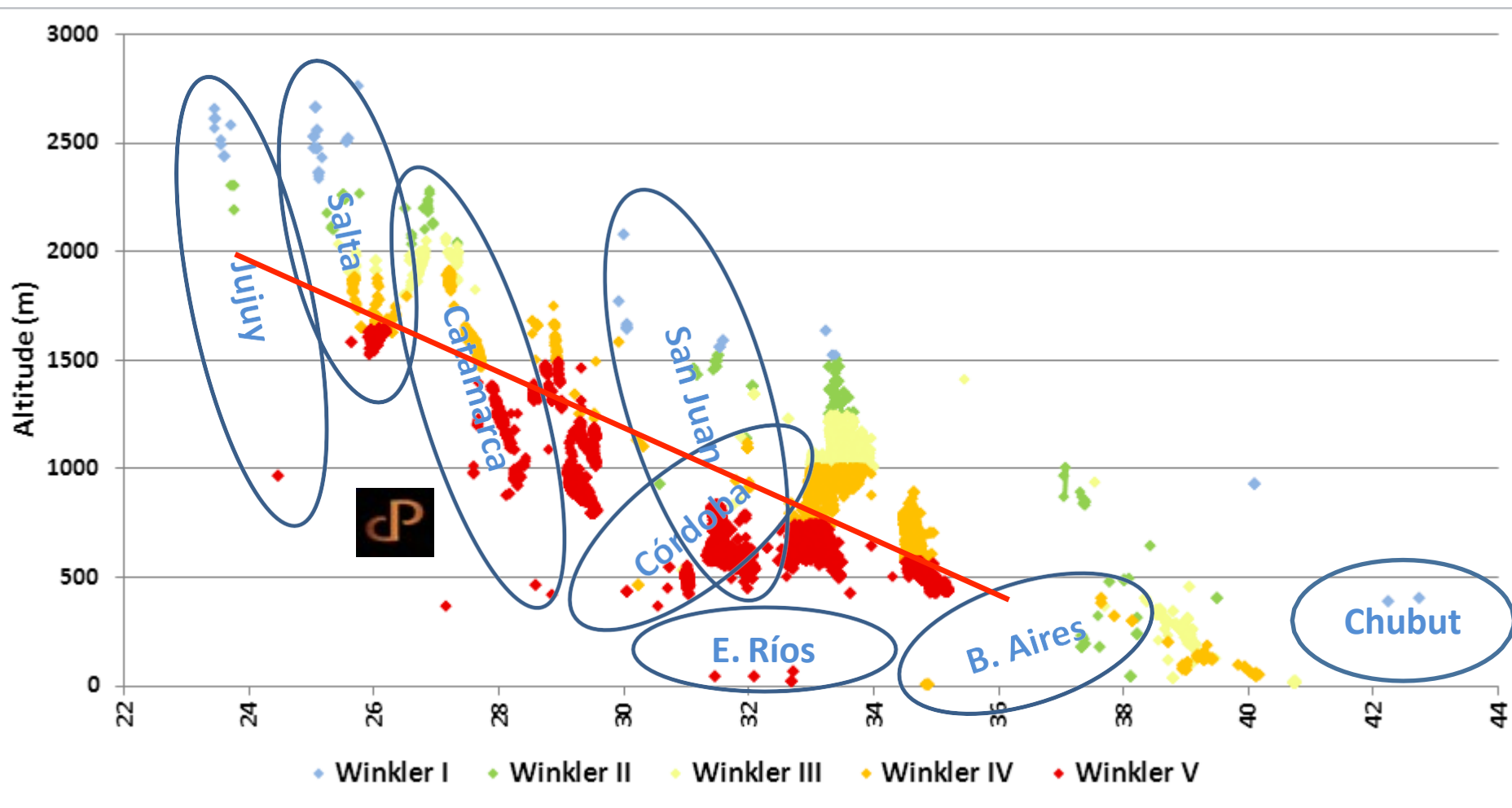
Vineyards and Winkler



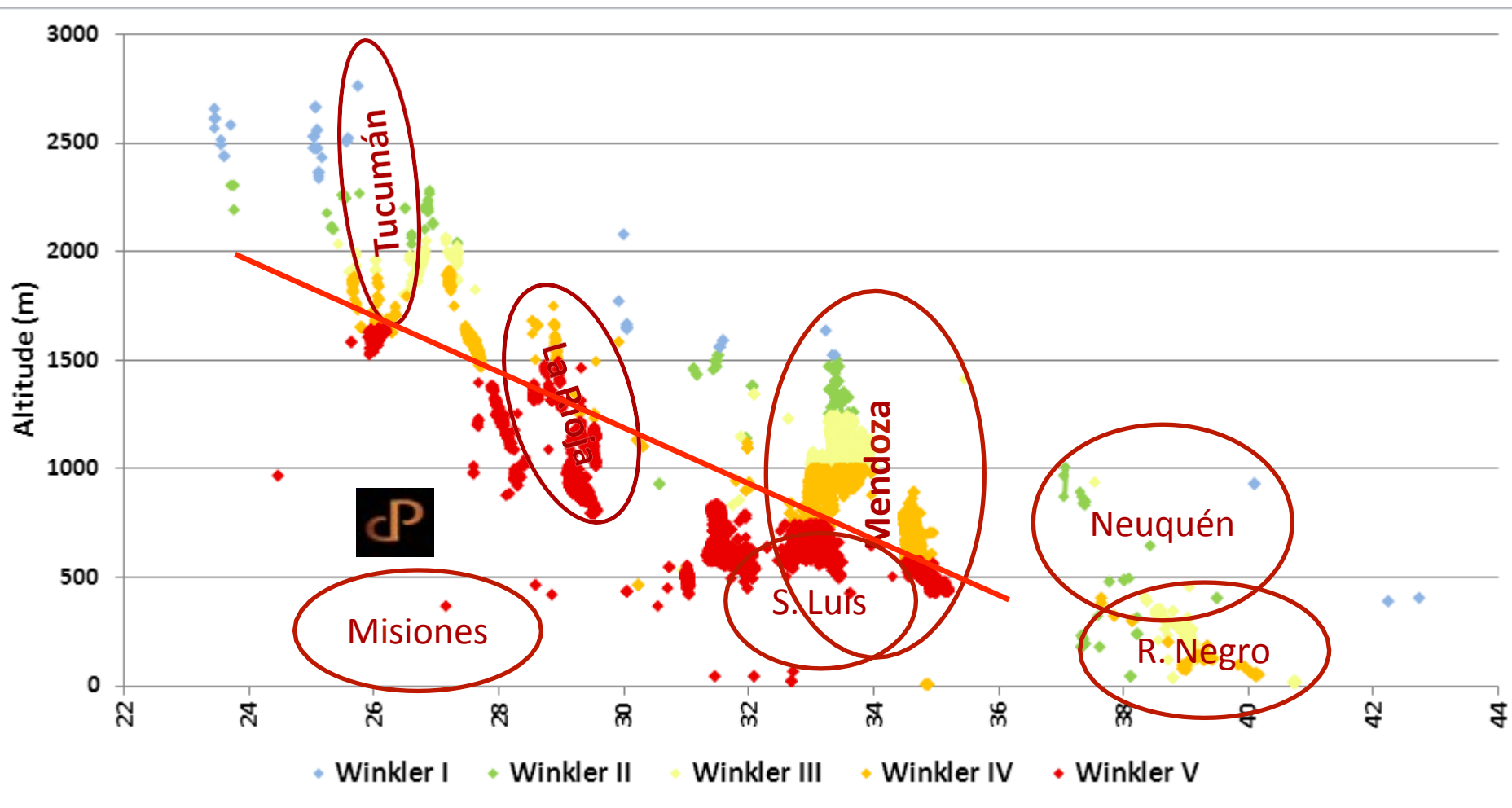
- Winkler Clas.
- I. Cool
 - II. Intermediate
 - III. Intermediate-
Warm
 - IV- Warm
 - V- Hot



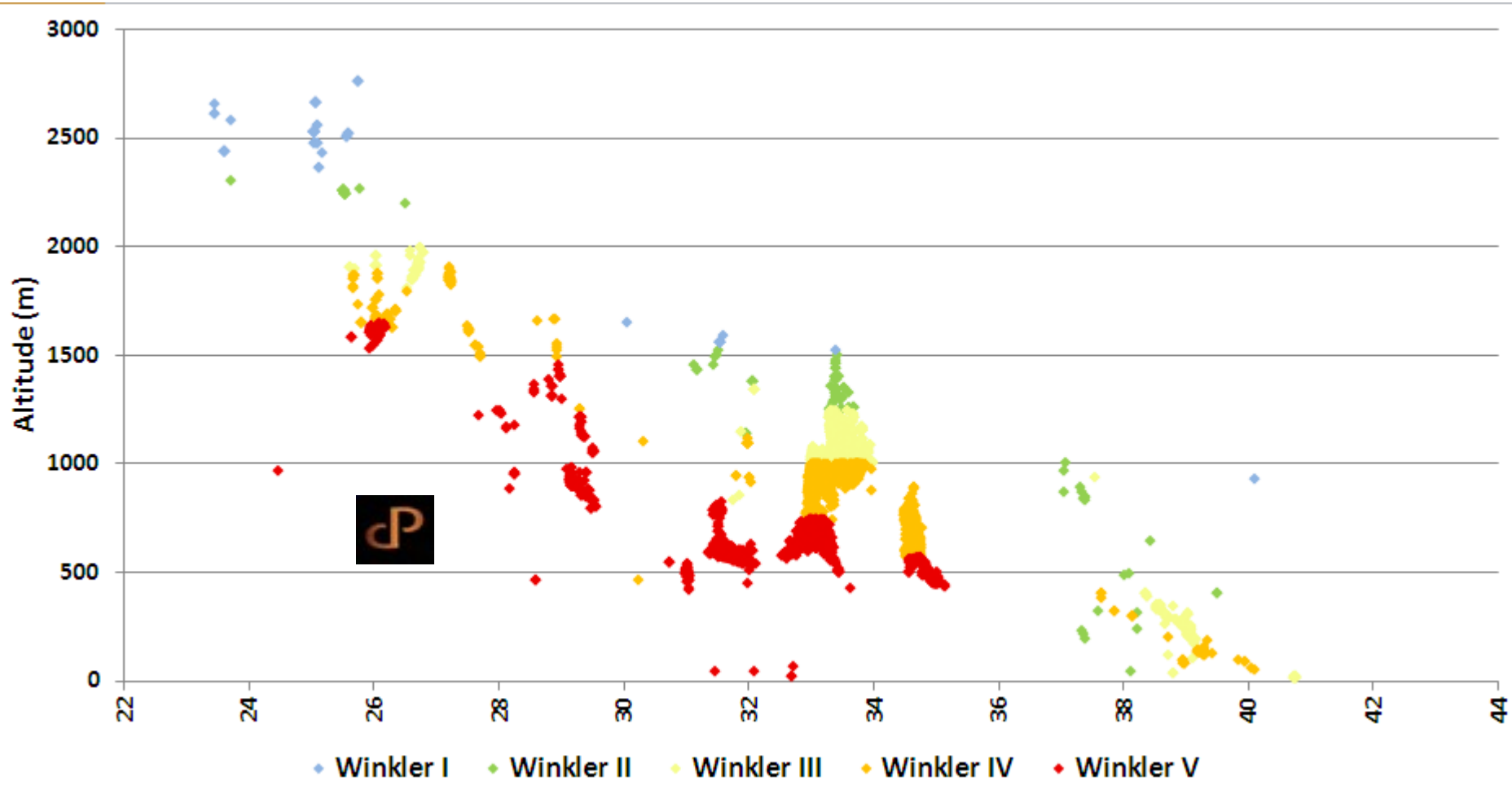
Temperature in Vineyards from Argentina



Temperature in Vineyards from Argentina



Temperature in Malbec Vineyards

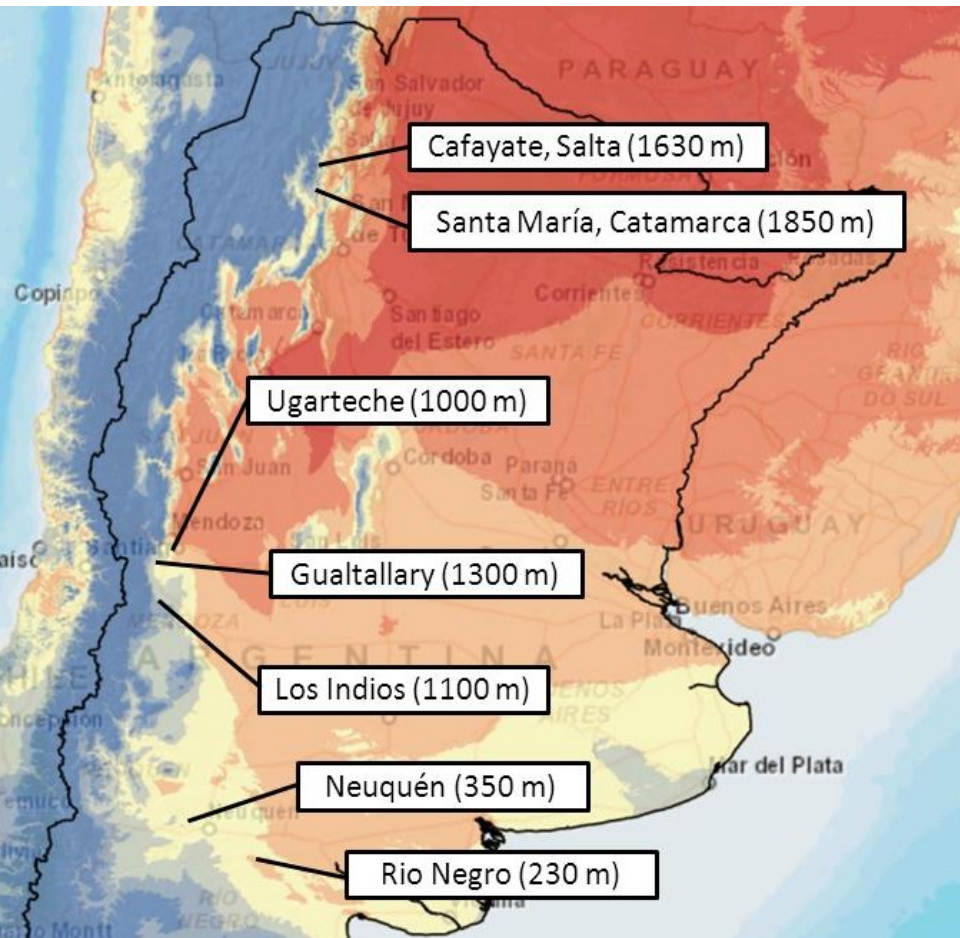


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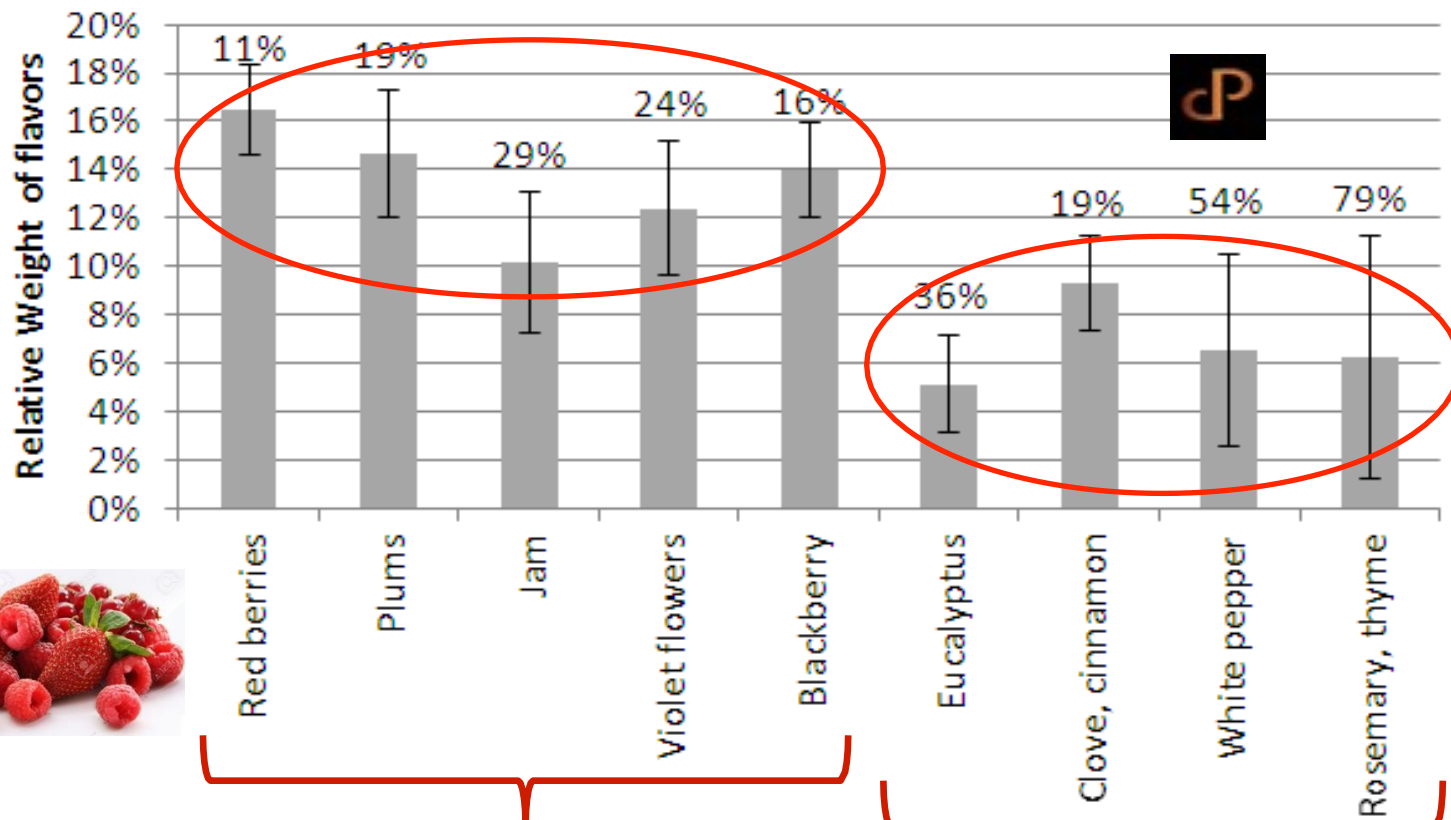
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Materials and Methods

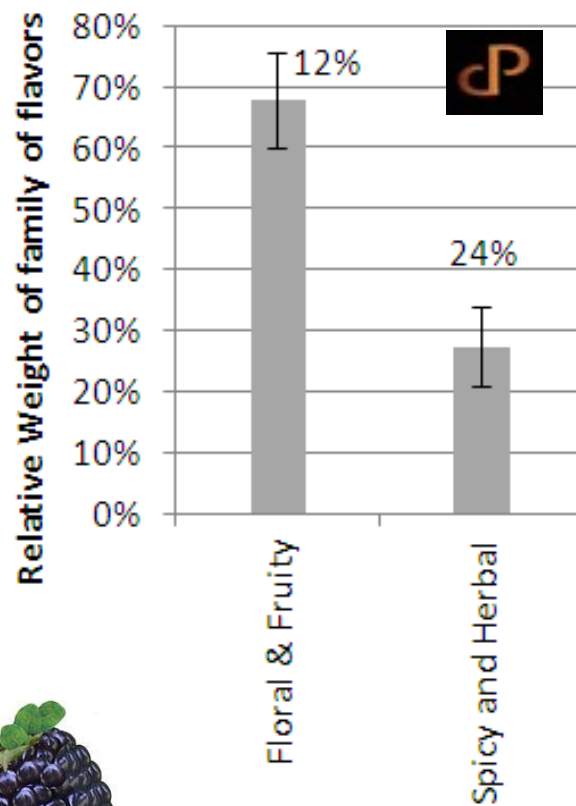


- Trellis system
- Orientation N-S
- 10-15 years
- Massal Selection
- 24 - 24,5°Br
- Deep clay loam soil (WHC 150 mm)
- Tasting by trained panelists and statistical analysis.
- Chromatography for volatile compounds.
- Smell identification test.

Malbec Aromatic Profile



Malbec Aromatic Profile




Malbec Flavor Profile



Flavor	Latitude	Altitude (m)	GST (°C)	Winkler Index	Av. Max. T° March	Av. Min. T° March	Max-Min °T March	Huglin Index
Red berries	0,222	-0,160	-0,403	-0,376	-0,087	-0,472	0,320	-0,496
Plums	0,460	-0,363	-0,673	-0,676	-0,181	-0,683	0,436	-0,659
Jam	0,301	-0,186	-0,628	-0,616	-0,172	-0,525	0,318	-0,654
Violet flowers	0,335	-0,179	-0,461	-0,463	-0,589	-0,076	-0,233	-0,152
Blackberry	0,437	-0,213	-0,751	-0,742	-0,720	-0,258	-0,158	-0,421
Eucalyptus	-0,120	0,111	0,298	0,296	-0,173	0,415	-0,405	0,503
Clove, cinnamon	0,787	-0,803	-0,394	-0,402	0,335	-0,899	0,857	-0,259
White pepper	-0,113	-0,004	0,492	0,482	0,646	0,305	0,086	0,447
Rosemary, thyme	-0,743	0,562	0,921	0,915	0,316	0,767	-0,433	0,751

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1° Flight

Región	Soil type	Latitude	Altitude (m)	Temp. Media	Grados Día	Winkler	Av. Max. Tº March	Av. Min. Tº March	Amplit. Term Marzo
1- Cafayate, Salta	Franco Arenoso	-26,02	1660	21	2345	V	28,3	15,6	12,7
2- Ugarteche, Luján	Franco Arenoso	-33,25	1015	20,1	2157	IV	26,5	14	12,5
3- Santa María, Catamarca	Franco Arenoso	-26,62	1850	19,9	2133	IV	26,0	14,5	11,5
4- Causse de Vidot, Terrasse	Aluvial: pied. y arc.	44,29	105	16,3	1319	I - II	23,1	11,3	11,8

Malbec of Cahors, the reference (Thanks Leo Erazo for sharing it)

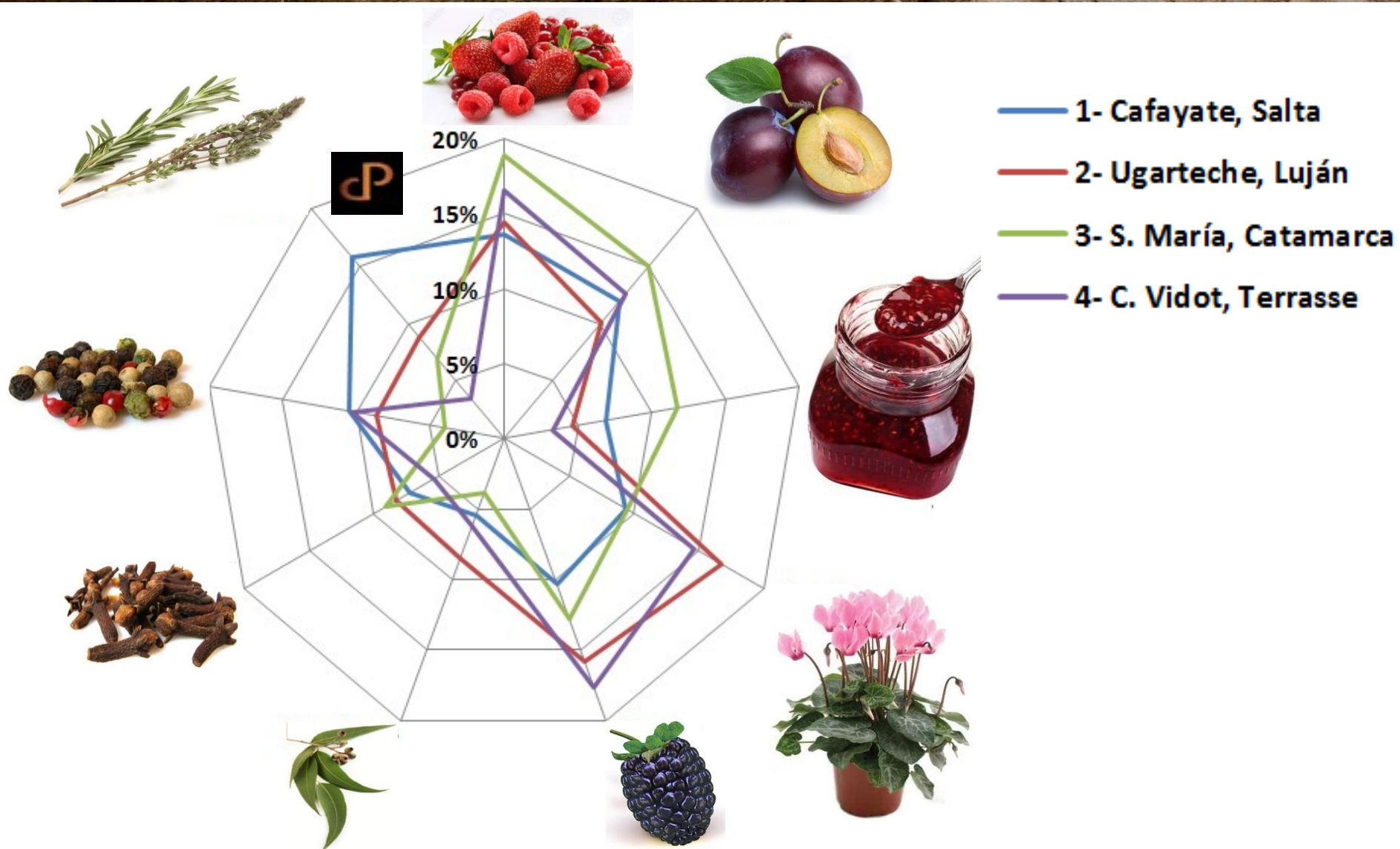


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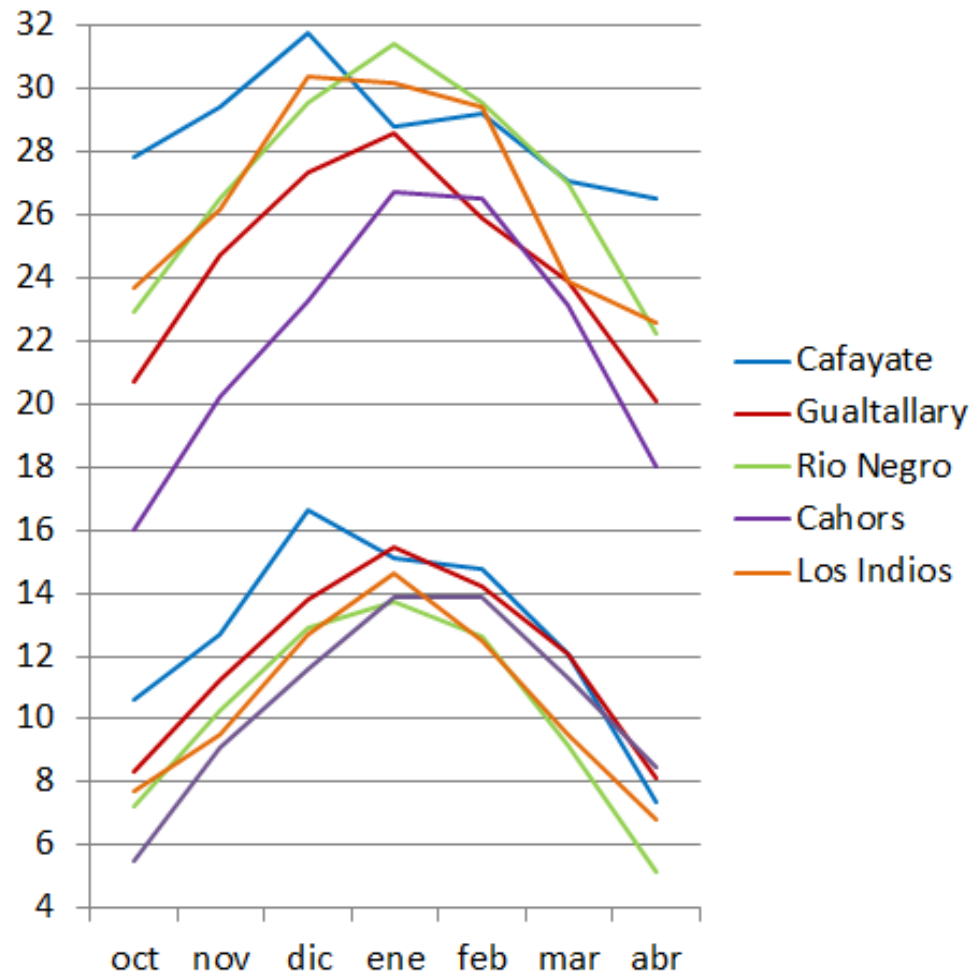
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Aromatic Profile Flight 1

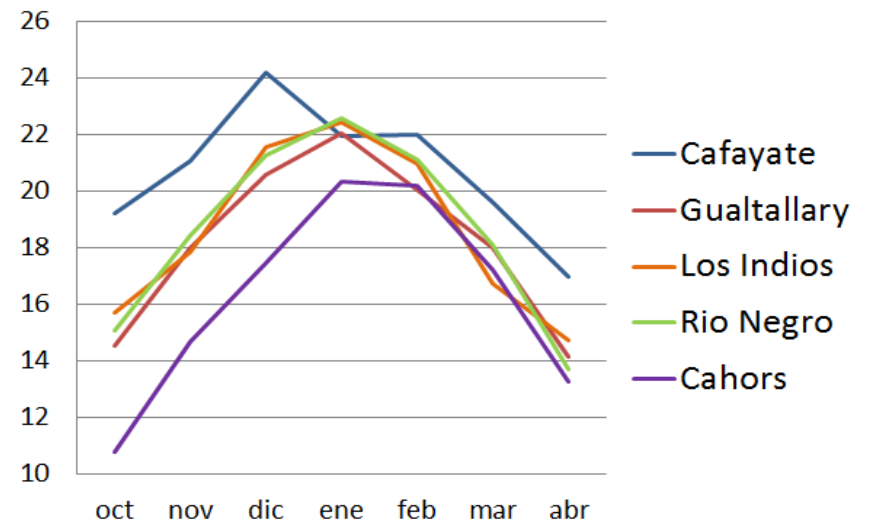


Temperatures

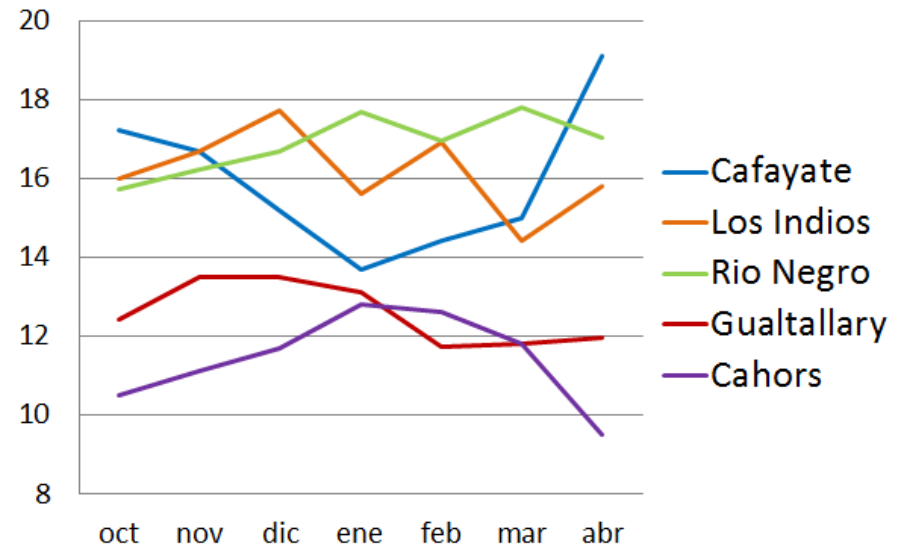
Temperaturas Máx y Mín Promedio (°C)



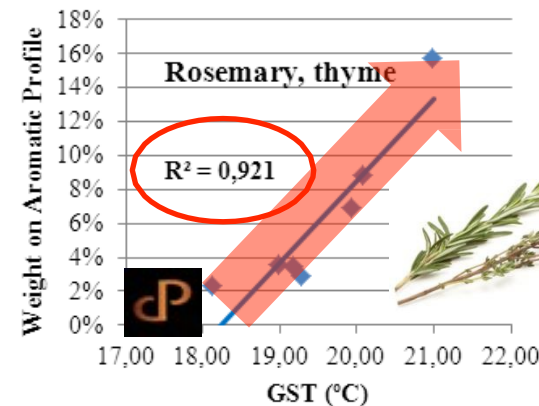
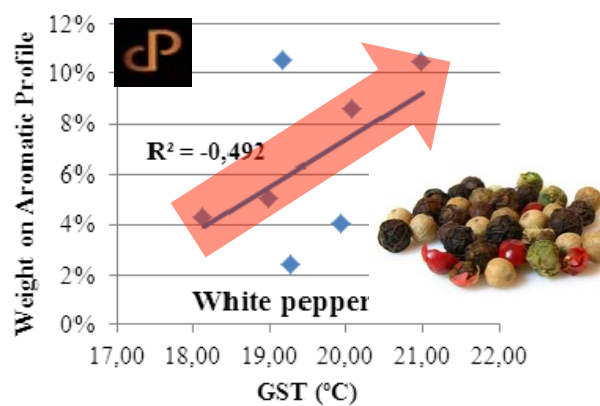
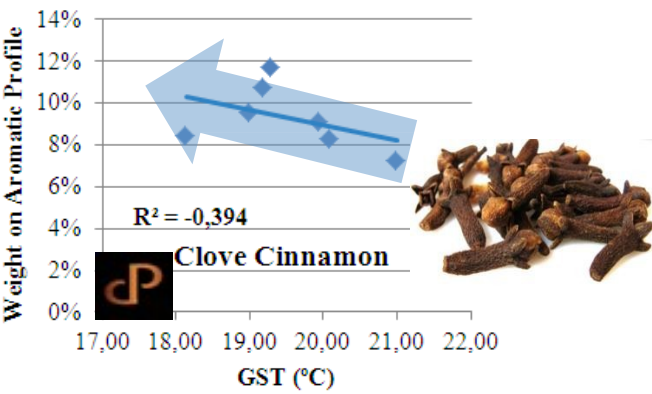
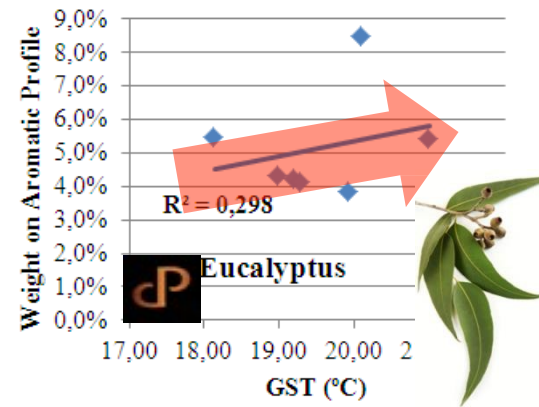
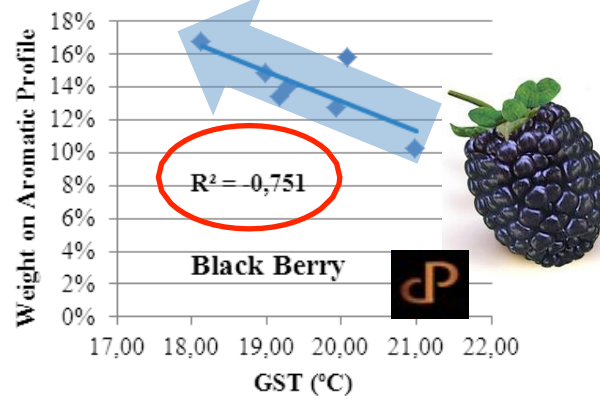
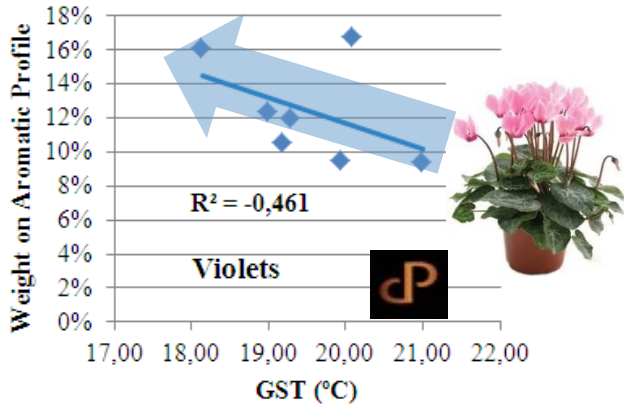
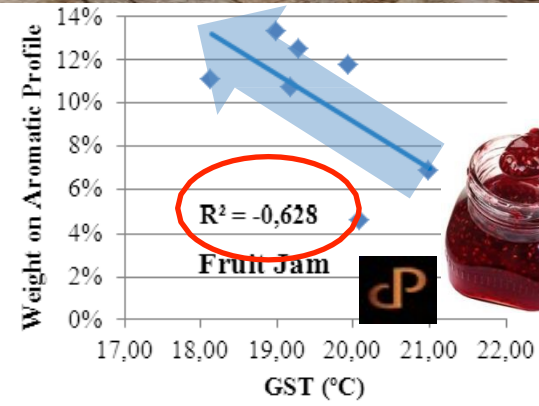
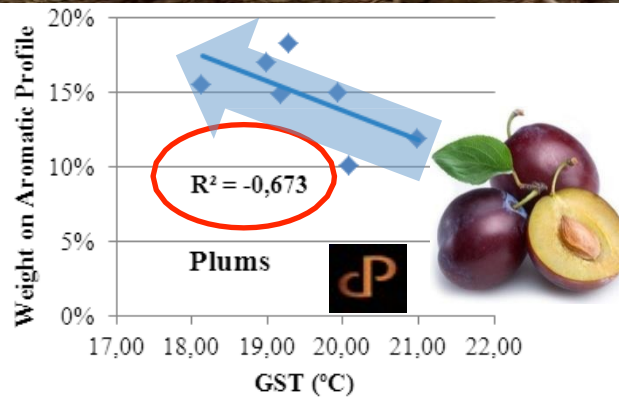
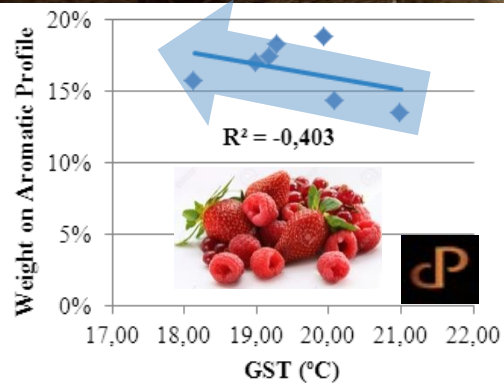
Promedio mensual (°C)



Amplitud térmica (°C)

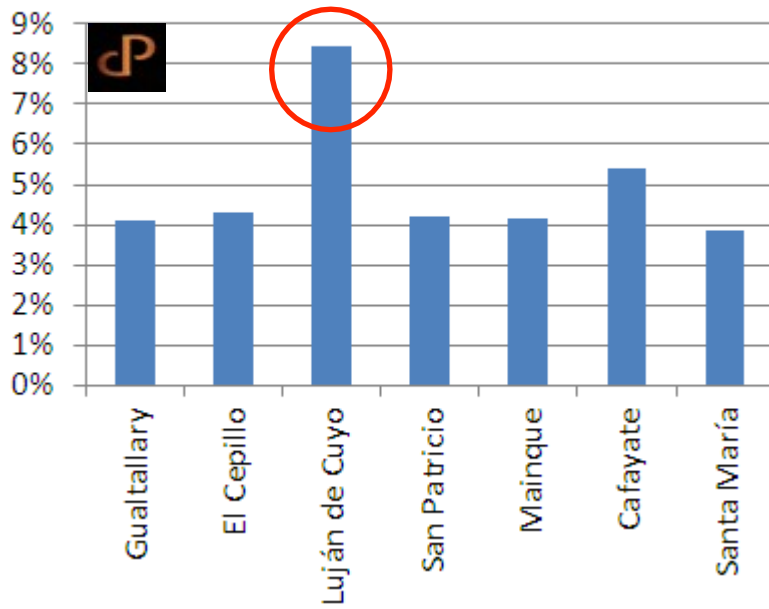


Aromas & Temperature

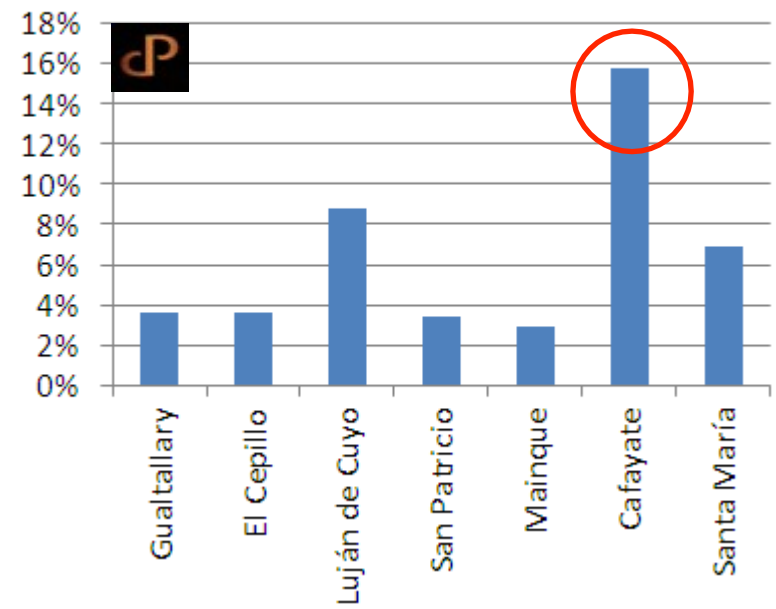


Aromas and Genuineness

Eucalyptus



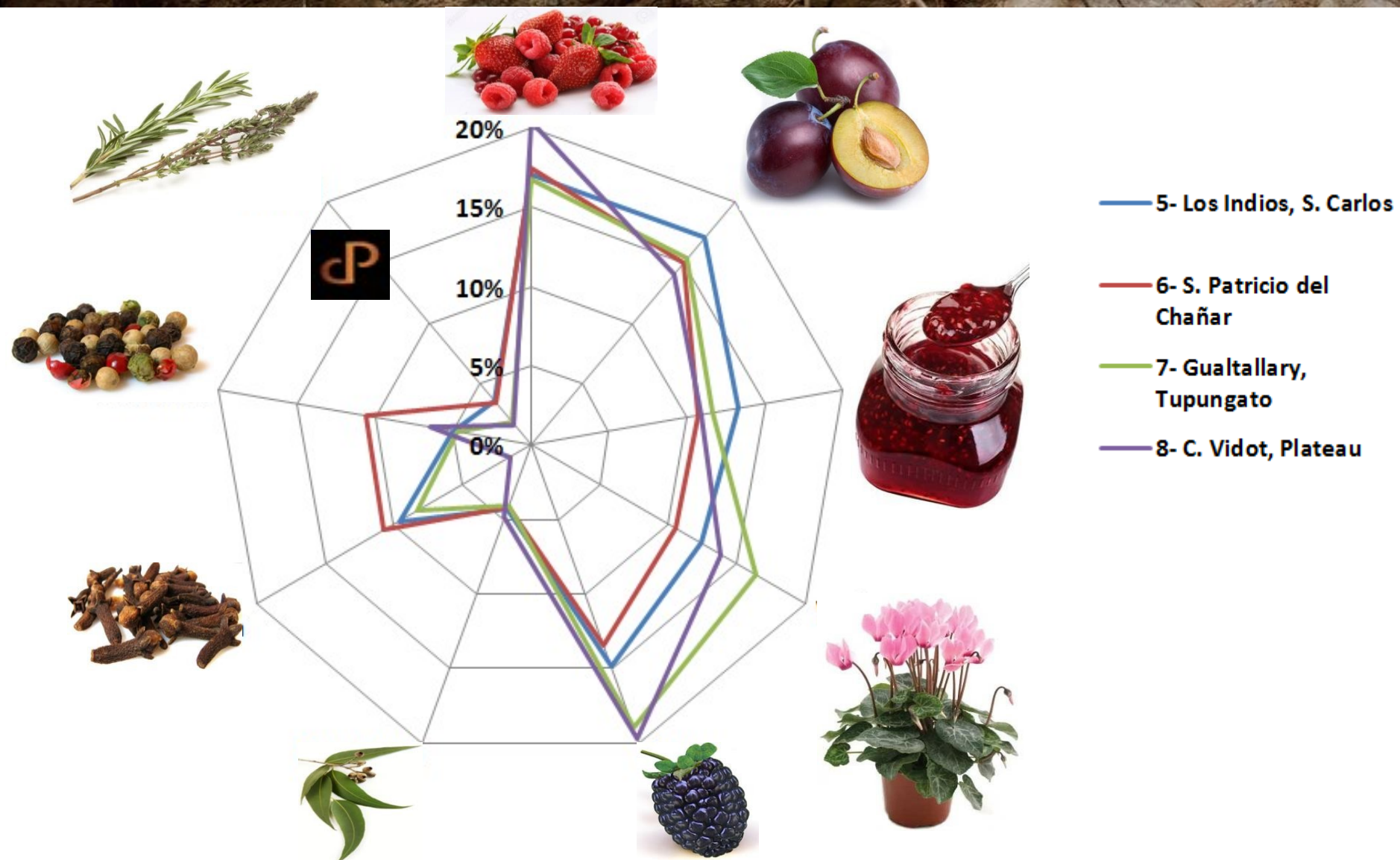
Romero, tomillo



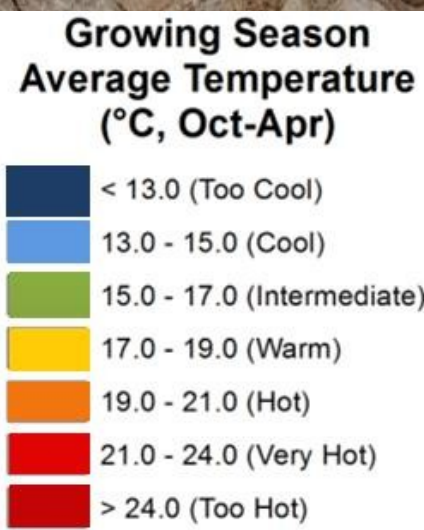
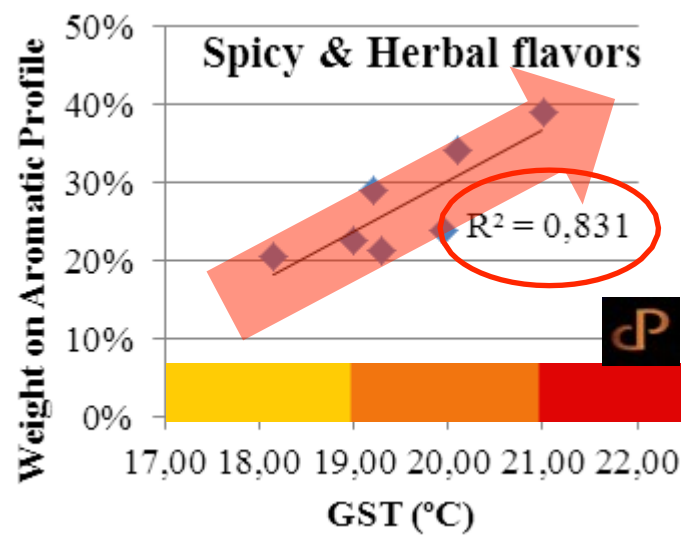
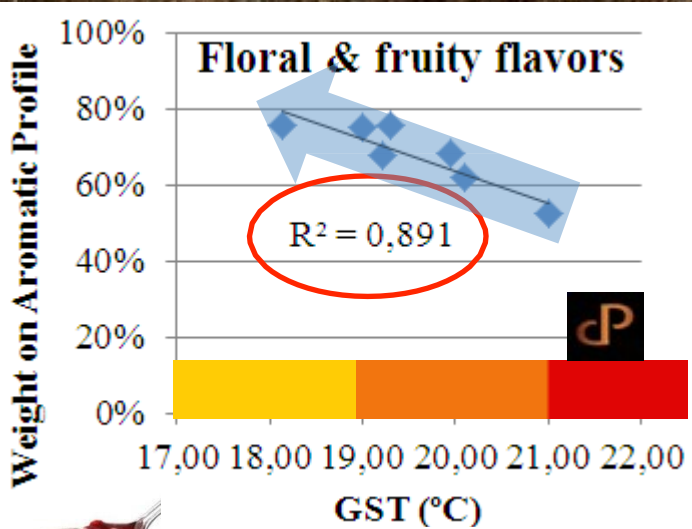
2° Flight

Región	Soil type	Latitude	Altitude (m)	Temp. Media	Grados Día	Winkler	Av. Max. Tº March	Av. Min. Tº March	Amplit. Term Marzo
5- Los Indios, S. Carlos	Franco Arenoso	-33,84	1100	19	1910	III	26,3	12,3	14,0
6- S. Patricio del Chañar	Franco Arenoso	-38,60	350	19,2	1951,6	III-IV	29,4	9,5	19,9
7- Gualtallary, Tupungato	Franco Arenoso	-33,37	1300	18,14	1707	III	23,90	12,10	11,8
8- C. Vidot, Plateau	Roca calcárea	44,29	212	16,3	1319	I - II	23,1	11,3	11,8

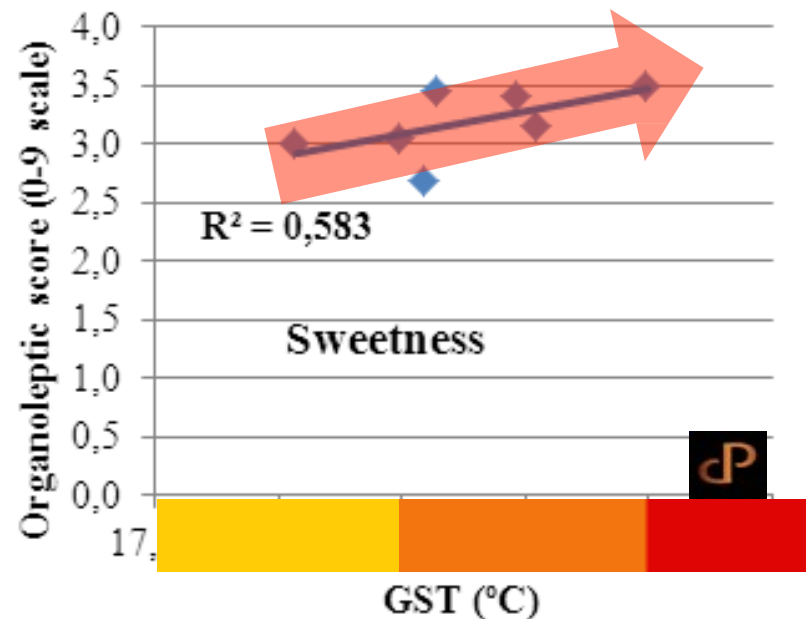
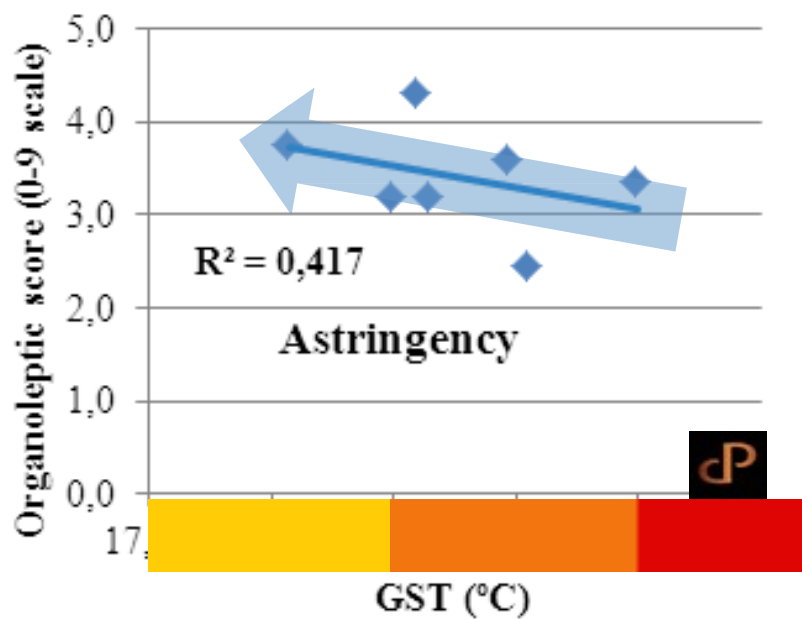
Aromatic Profile Flight 2



Aromas and Temperature families



Mouth sensation

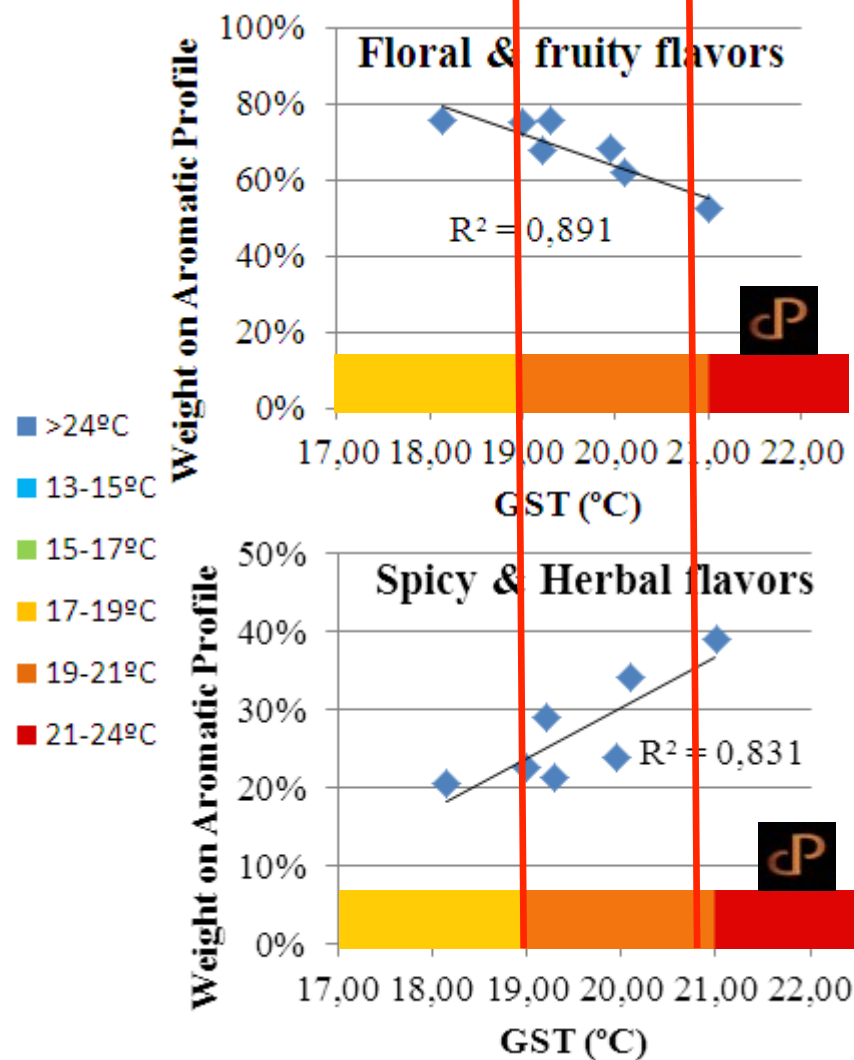
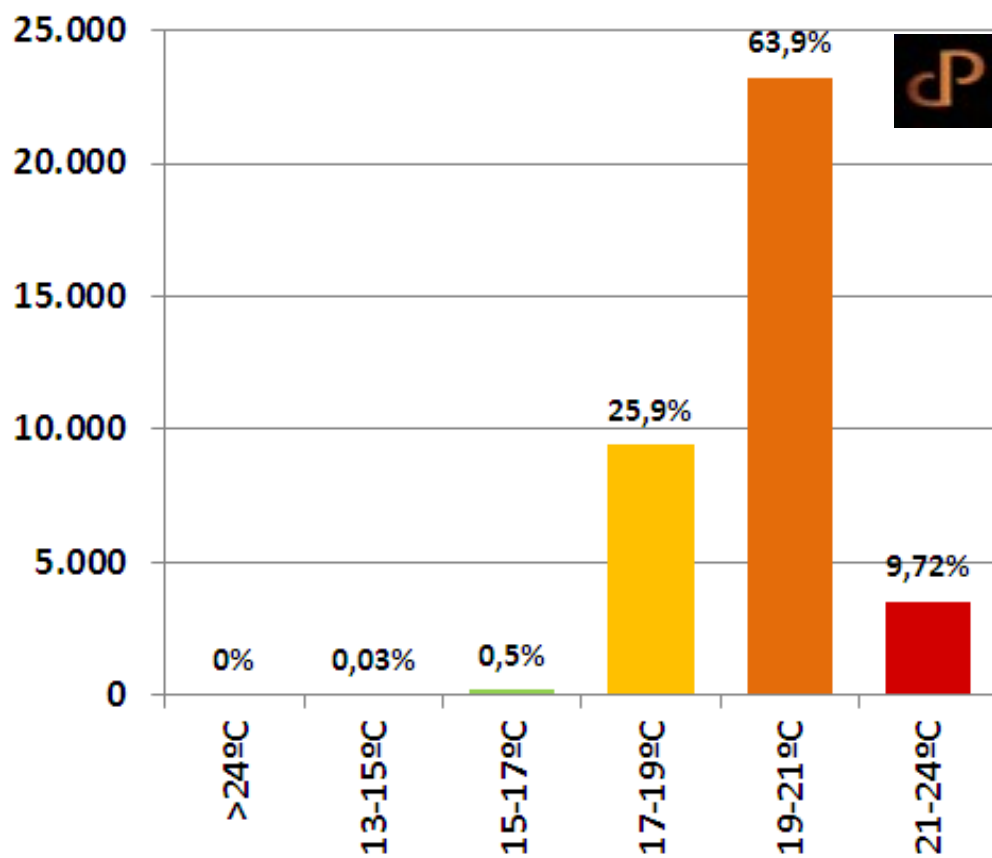


- Anthocyanin
- IPT
- Color

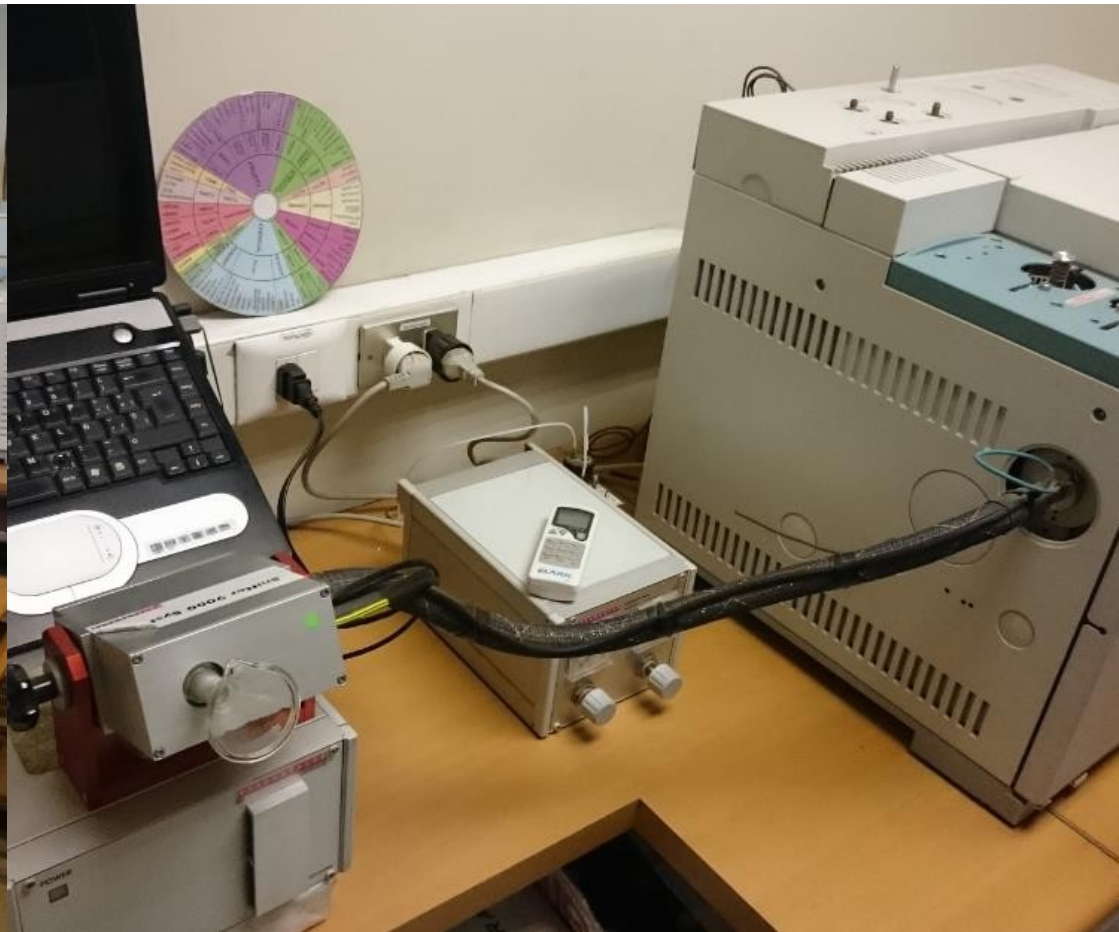
No clear correlation with T°

Malbec: surfaces according to the temperature

Surface of Malbec vineyards (ha) and temperature



Aromatic Compound Determinación



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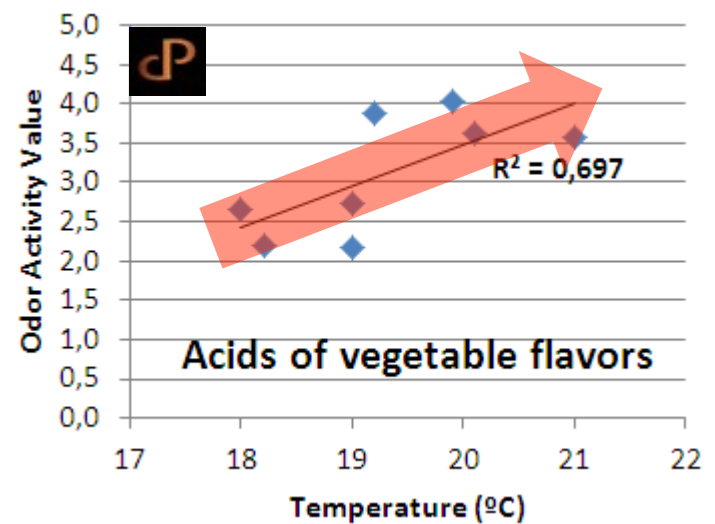
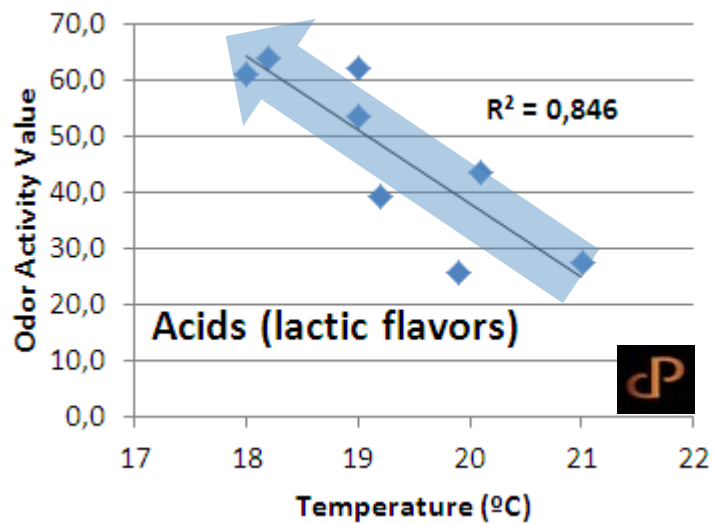
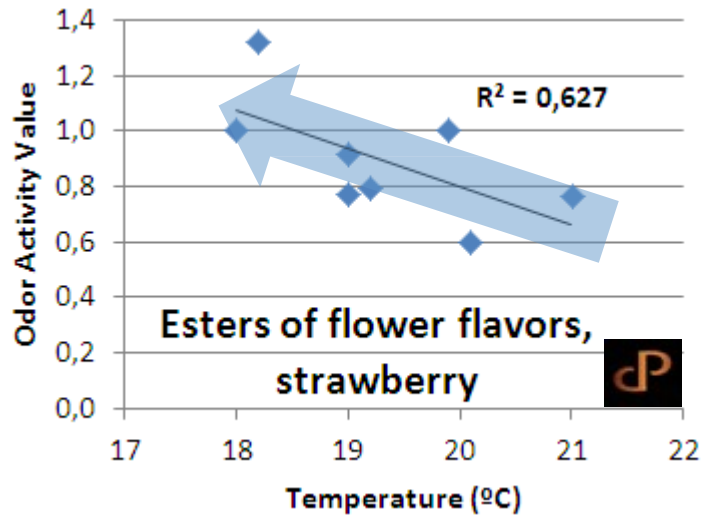
Smell Identification Test

Aromas with OAV > 0,2

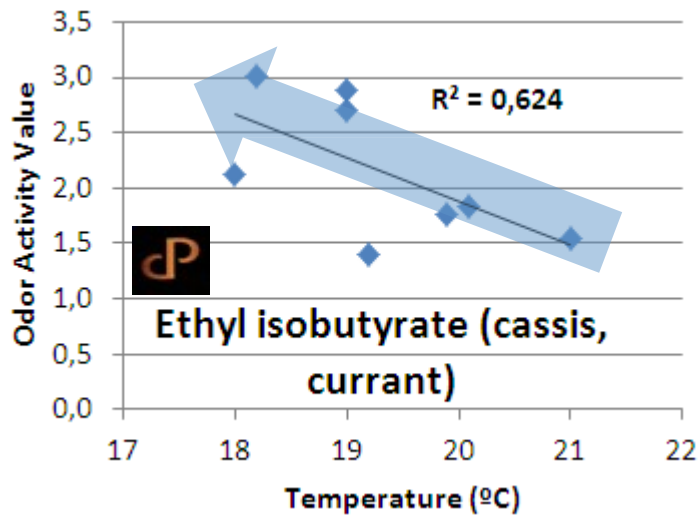
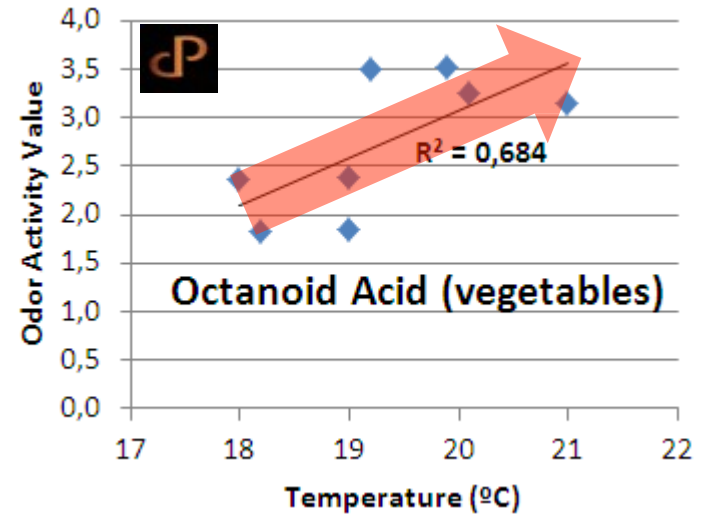
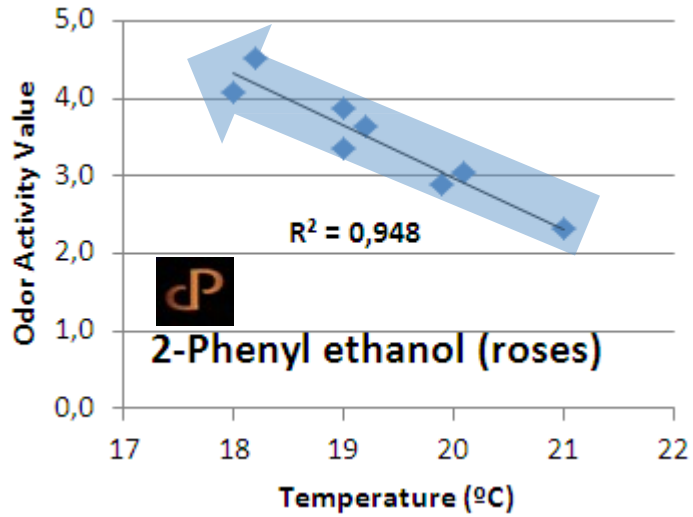
OAV	Compuesto	Umbral	PE23012	PE23016	PE23017	PE23018	PE23022	PE23015	N23013	N23015	N23023	N23025	N23027
Acids	Isobutyric Lactico,mantequilla	50	6	11	11	9	6	15	13	14	6	7	6
Acids	Butanoic Lactico, queso, habas cocidas	173	0,8	1,3	1,5	1,7	1,6	1,3	1,5	1,0	1,5	1,0	1,1
Acids	Isovaleric Queso, habas cocidas, láctico	33	17	30	25	20	12	27	29	30	18	18	10
Acids	2-Methyl b Enlatado cocido, queso	33	11	14	13	9	5	17	17	17	9	11	5
Acids	Hexanoic Lactico	420	1,6	3,4	2,3	3,9	3,2	2,9	3,1	2,8	4,3	3,7	3,0
Acids	Octanoic Legumbre cocida	500	1,2	2,4	1,9	3,3	3,2	2,4	2,2	1,8	3,5	3,7	3,5
Acids	Decanoic Enlatado cocido, vegetativo	1000	0,1	0,2	0,2	0,3	0,4	0,2	0,2	0,2	0,3	0,5	0,4
Acids	Phenylacet Vegetativo, seco	1000	0,1	0,1	0,2	0,1	0,1	0,2	0,2	0,1	0,1	0,1	0,1
Alcohols	Isobutanol Químico, plásticos	40000	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Alcohols	1-Penten-3 Té, seco	400	0,1	0,2	0,2	0,2	0,1	0,2	0,1	0,1	0,2	0,0	0,1
Alcohols	Isoamyl alc Cola fría, láctico, plástico, quí	30000	1,0	1,1	1,1	1,0	0,9	0,8	1,2	1,1	0,9	0,9	0,7
Alcohols	2-Phenylet Floral, rosa	10000	5	4,1	3,8	3,0	2,3	3,4	3,8	4,5	3,6	3,8	2,9
Alcohols	Heptanol Químico, alcohol	3	3,2	9,8	3,3	3,3	2,7	4,4	3,4	8,1	3,3	4,6	4,6
Esters	Ethyl isobu Frutoso, grosella, casis	15	5,0	2,1	3,3	3,3	2,7	3,0	3,0	3,0	2,3	1,8	1,8
Esters	Ethyl aceta Caramelado, mantequilla, floral	12270	0,09	0,09	0,13	0,11	0,7	0,13	0,10	0,12	0,07	0,09	0,08
Esters	Ethyl 2-mel Frutoso, frutilla, piña	18	1,0	0,3	0,4	0,2	0,1	0,4	0,3	0,3	0,2	0,3	0,2
Esters	Ethyl pheni Frutoso durazno, floral, rosas	250	0,3	0,6	0,4	0,3	0,5	0,3	0,5	0,9	0,5	1,5	0,8
Esters	Ethyl isova Caramelado, frutado	3	4,9	1,7	1,9	1,0	0,8	1,7	1,6	1,9	1,0	1,4	0,9
Esters	Ethyl butyre Frutoso, frutilla, manzana	20	2,9	3,6	4,1	4,4	4,2	2,3	2,9	1,8	3,6	2,5	3,2
Esters	Ethyl hexar Dulce, frutas secas	62	1,8	2,6	2,1	2,6	2,5	1,7	2,5	1,9	2,9	2,1	1,9
Esters	Ethyl lactat Frutado, dulce	154000	0,4	0,2	0,2	0,3	0,2	0,2	0,1	0,2	0,1	0,2	0,2
Esters	Ethyl octar Frutoso, fruta madura	2	63	107	75	109	126	77	94	79	136	112	143
Esters	Ethyl decar Frutoso, piña	510	0,1	0,2	0,1	0,1	0,3	0,1	0,2	0,1	0,2	0,3	0,4
Ketones	2,3-Butane mantequilla, caramelizado, vain	100	35	9	15	0	11	0	23	12	21	20	22
Lactones	Z-Whiskey Seco	67	1,0	0,4	0,3	0,4	0,5	1,8	0,5	0,7	0,3	0,1	1,2
Terpenes	linalool Floral, rosas	25	0,2	0,1	0,1	0,1	0,2	0,2	0,1	0,1	0,2	0,2	0,2
Norisopr	b-Damasco Frutoso, mermeladas, Té	0,05	109	84	99	98	85	118	94	81	106	130	106
Phenolic	4-Ethylguai Químico, alcohol	15	0,0	0,2	0,2	0,0	0,0	0,3	0,0	0,0	0,2	0,6	0,0
Phenolic	4-Ethyl phe Químico, alcohol	440	0,0	0,0	0,0	0,0	0,0	0,3	0,0	0,0	0,0	0,0	0,0
Phenolic	4-Vinylgaia Vainilla, tostado, químico	40	0,6	0,9	0,4	0,4	0,5	1,2	0,2	0,4	0,6	0,6	0,7
Phenolic	4-Vinylphen Caramelo dulce, té, tostado	180	1,1	0,6	0,6	0,5	0,5	0,3	0,1	0,3	0,4	0,1	0,2
Sulfurs	Methionol Vegetal cocido	1000	0,6	0,2	0,3	0,4	0,2	0,3	0,4	0,2	0,5	0,2	0,2
Thiols	FFT Café, madera ahumada	12	0,8	0,4	0,3	0,3	2,9	0,3	0,8	0,4	0,2	0,6	4,5
Thiols	BTM Piedra de fusil, pólvora, ahuma	2000	0,1	0,1	0,1	0,1	0,1	0,0	0,1	0,0	0,1	0,1	0,1
Thiols	4MMMP Pipí de gato, boj, ruda, hoja de t	0,8	0,0	0,0	0,0	0,0	15,0	0,0	0,0	0,0	13,9	0,0	17,5
Thiols	3MH Pomelo	60	7	4	10	6	4	4	4	7	8	7	3
Thiols	Ac3MH Maracujá, guayaba, frutos exót	4,0	45	19	20	15	27	235	49	22	215	32	26

37 compounds

Families of Aromatic Compounds & Temperature



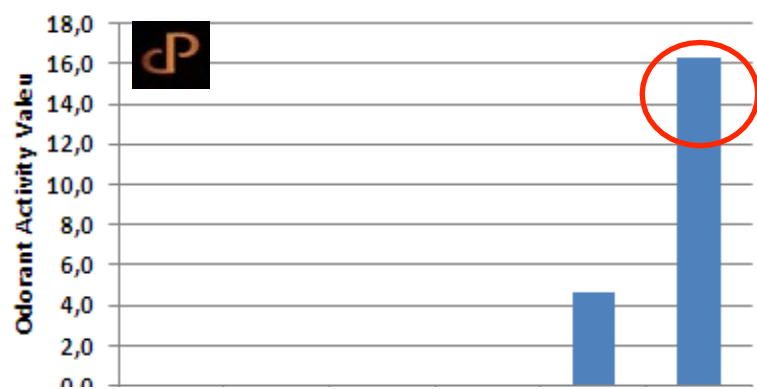
Aromatic Compounds & Temperature



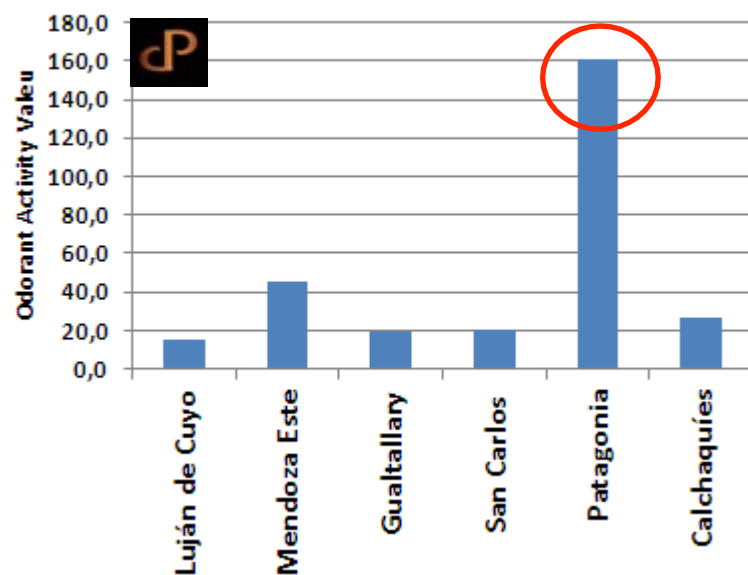
Qué sucede con la b-ionona?

Compounds and Genuineness

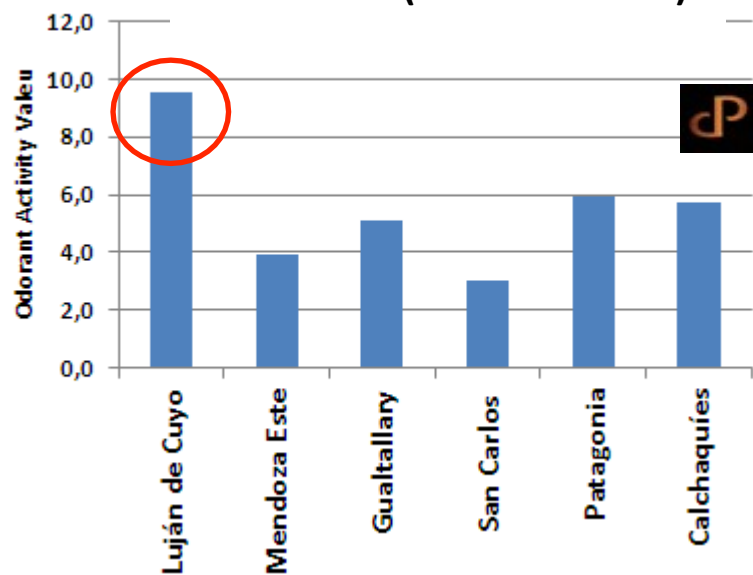
4MMP (ruda, hojas de tomate, grosellas rojas)



Ac3MH (maracuyá, guayaba)



Hexen 1-ol (aromas a heno)



Conclusions

- Is it possible to talk about regional identity? **Yes. Especially as from the aromatic profile.**
- Which are the most important factors that determine the differences?
- **Temperature plays the main role, then altitude and latitude. Aromatic compounds play a role in these differences as well.**
- What can we do to move forward in generating and spreading this type of knowledge?

Work together: industry, research centers and communicators.


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THANKS

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