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Consejería de Agricultura, Ganadería  
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## INFORME FINAL-Anexo actividades de difusión

R-PGI-05-02  
Edición 3  
Fecha: 03/07/09  
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### Anexo actividades de difusión

## POLIAMINAS COMO INDICADORES DE ESTRÉS EN VIÑEDO Y SU RELACIÓN CON LA MICROBIOTA 2022-2024



Unión Europea

Fondo Europeo Agrícola  
de Desarrollo Rural

*Europa invierte en las zonas rurales*

TÍTULO CORTO: POLIAMINAS UVA

Duración: 2022 — 2024



## ACTIVIDADES DE DIFUSIÓN DEL PROYECTO

### 1. TRANSFERENCIA DE LOS RESULTADOS: COMUNICACIONES A CONGRESOS

Autores: Pérez-Magariño, S.; Sampedro-Marigómez, I.; Cano-Mozo, E.; Albors, C.; López, L.; Navascués, E.

Título: Effect of abiotic stress and grape variety on amino acid and polyamine composition of red grape berries

Tipo de participación: Poster, IVES Conference Series, ICGWS 2023.

Congreso: II International Congress on Grapevine and Wine Sciences

Lugar celebración: Logroño (España), Noviembre 2023

### EFFECT OF ABIOTIC STRESS AND GRAPE VARIETY ON AMINO ACID AND POLYAMINE COMPOSITION OF RED GRAPE BERRIES

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#### INTRODUCTION

Vines are exposed to environmental conditions that provoke abiotic stress on the plant. The metabolic pathways associated with amino acid and polyamine metabolism play fundamental roles in physiological processes, as in plant response to stress. Therefore, it is expected that stressful conditions alter grape composition. In addition, grape variety can influence the profile and amount of amino acids and polyamines found in grapes.

#### OBJECTIVE

- Study the effect of abiotic stress on grape's polyamine and amino acid composition
- Study the effect of grape variety

#### MATERIALS

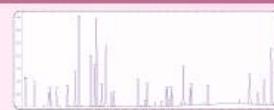
- 42 samples from different vineyards
- Cabernet Sauvignon
- Merlot
- Tempranillo



#### METHODS

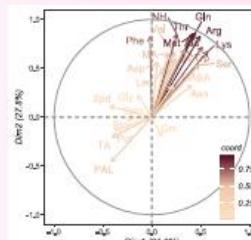
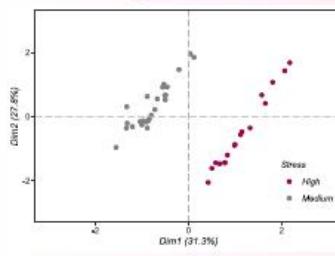
- Amino acids and polyamines → Reverse phase UPLC - DAD
- Enological parameters
- RStudio → Multifactor analysis (MFA)

Qualitative variable: stress



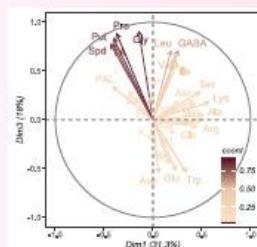
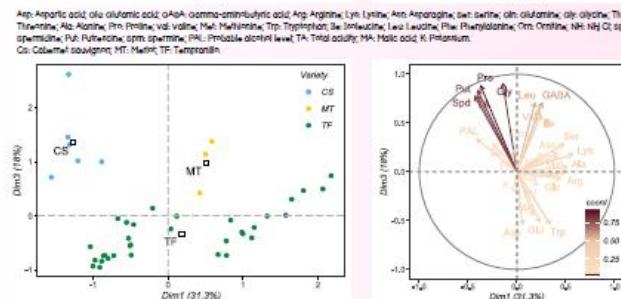
#### RESULTS

MFA allowed to differentiate grape samples by abiotic stress and grape variety



#### High stressed vineyards

- Increased amount of most amino acids
- Arginine, Alanine, Glutamine, Methionine, Lysine and Threonine were present in the highest concentration
- Torres et al. (2017) related the raise of amino acids in grape skin to warm temperatures. Moukarzel et al. (2023) detected greater concentrations of Ala, Thr, Gln and Ser when maximum temperatures were higher.



#### Cabernet Sauvignon and Merlot grapes

- Lower content in most amino acids (Trp, Glu, Asp, Arg, Ala, Gln, Met)
- Higher content of Proline, Putrescine, Spermidine

	mg/L	Pro	Put	Spd
CS	214	10.8	6.36	
MT	155	5.48	3.49	
TF	480	0.82	2.91	

#### CONCLUSION

Grape variety and abiotic stress influence polyamine and amino acid content in grape berries. Polyamine concentration seems to be more related to grape variety than to stress. Further studies are needed to assess the evolution of these compounds during ripening and fermentation since amino acids are an important source of nitrogen for yeast growth and they are volatile compound precursors.

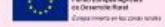
RePrinted from:  
Torres et al. J. Food Comp. Anal. 2017; 51-62 (2017); Moukarzel et al. Plant. Physiol. 2023; 182(4):662-673.

#### ACKNOWLEDGEMENTS

This study was supported by the project 2022/474 from "Rural Development Program (PDR) of Castilla y León 2014-2020" and financed with FEADER funds



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Autores: Pérez-Magariño, S.; Sampedro-Marigómez, I.; Cano-Mozo, E.; Albors, C.; López, L.; Navascués, E.

Título: Factors influencing the amino acid and polyamine composition of red grape berries

Tipo de participación: Poster.

Congreso: 45º Congreso Mundial de la Viña y el Vino

Lugar celebración: Dijon (Francia), Octubre 2024



## FACTORS INFLUENCING THE AMINO ACID AND POLYAMINE COMPOSITION OF RED GRAPE BERRIES

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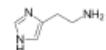
### INTRODUCTION

Grape amino acids (AAs):

- Source of nitrogen for yeast during fermentation
- Precursors of important wine aroma compounds
- Change during the ripening process



Climatic conditions can influence the concentration of compounds found in grapes.



Polyamines (PAs) are synthesised by the plant as growth regulators.

Objective: study the influence of different factors as grape variety, degree of ripeness and vintage on the concentrations of amino acids and polyamines.

### METHODOLOGY

55 samples

- 3 different stages of ripeness
  - Sampling 1 (15-20 days before harvest)
  - Sampling 2 (7-10 days before harvest)
  - Optimum ripeness (harvest)
- 2 vintages (2022 and 2023)
- 8 vineyard plots groups
- 3 red grape varieties
  - Tempranillo (TF), Cabernet Sauvignon (CS) and Merlot (MT)



Amino acids (AAs) and polyamines (PAs) were analysed by derivatization and using reverse-phase HPLC-DAD.

Climatic data



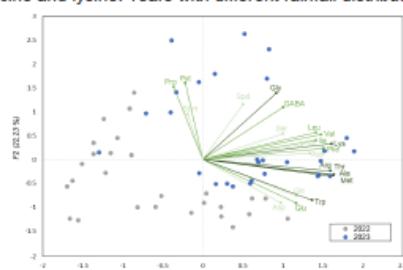
Data analysis: MANOVA and PCA

### RESULTS

During the ripeness process, PA content of grapes increased

Degree of ripeness	Sampling 1	Sampling 2	Harvest
Spd	2.29a	2.35a	4.12b
Spm	0.86a	1.18a	2.43b
Put	5.19a	6.64b	6.72b

Content of most AAs was higher in 2023, specially GABA, glycine and lysine. Years with different rainfall distribution.



### CONCLUSIONS

- Grape variety and vintage have the greatest influence on AA concentrations
- PAs are most influenced by ripeness and grape variety

Plot group	PDC-CS	Terrazas-CS	Vallejosa-MT	PDC-MT	A-TF	E-TF	PSTM-TF
Pro	1867d	1558c	1584c	1146b	338a	444a	445a
Put	10.8c	10.3c	8.17b	7.92b	2.49a	1.89a	1.79a
Spm	2.32c	0.95a	2.52c	2.05bc	0.51a	1.25ab	0.85a
Tip	11.2a	5.28a	10.8a	7.21a	31.4b	31.9b	42.6c
Ala	50.7bc	21.1a	52.4c	31.7ab	63.8c	80.9d	91.9d
Arg	233bc	55.5a	247c	130ab	241c	357d	426d
Gln	236abc	76.7a	174ab	103a	334bc	363c	527d

### ACKNOWLEDGEMENTS

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### 2. NOTAS DE PRENSA/PUBLICACIONES EN WEB

El proyecto se encuentra en la **página web del ITACyL**, donde se recogen los objetivos, resultados y difusión que se ha llevado a cabo hasta el momento.

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### POLIAMINAS COMO INDICADORES DE ESTRÉS EN VIÑEDO Y SU RELACIÓN CON LA MICROBIOTA

El objetivo principal de este proyecto es establecer unos indicadores de estrés en viñedo, mediante la evaluación del contenido de poliaminas en uva y vino, así como estudiar su relación con diferentes factores de viñedo, climatología, suelo y microbiota de la uva y el vino. Se lleva a cabo en cooperación con las bodegas Pago de Carraovejas y Milsetentayseis.

#### IMPACTO

Determinar unos indicadores que sirvan de alerta para evaluar el estado de la viña, especialmente el asociado a los efectos del cambio climático y que repercute en la calidad de la uva y en la del vino final. El estudio de las poliaminas sobre las condiciones de estrés del viñedo permitirá mejorar el desarrollo, el crecimiento y el rendimiento de la planta por encima de los límites óptimos. Por otro lado, el estudio de la microbiota permitirá optimizar las condiciones de los diferentes procesos de elaboración y mejorar la calidad de los vinos.

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WEBS DE LAS BODEGAS

<https://www.pagodecarraovejas.com/estudio-de-poliaminas-como-indicadores-de-estres-en-vinedo-y-su-relacion-con-la-microbiota/>

<https://www.milsetentayseis.com/estudio-de-poliaminas-como-indicadores-de-estres-en-vinedo-y-su-relacion-con-la-microbiota/>

El Coordinador del Proyecto:

Fdo: Silvia Pérez-Magariño

FECHA: 9 de abril de 2025