

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

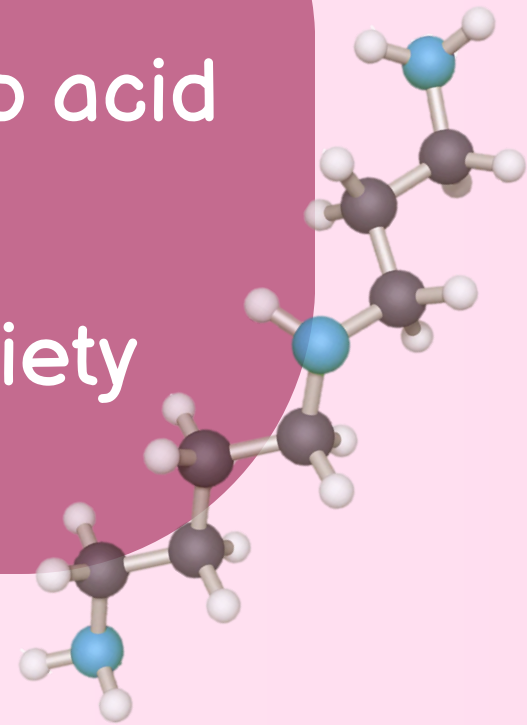
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## INTRODUCTION

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



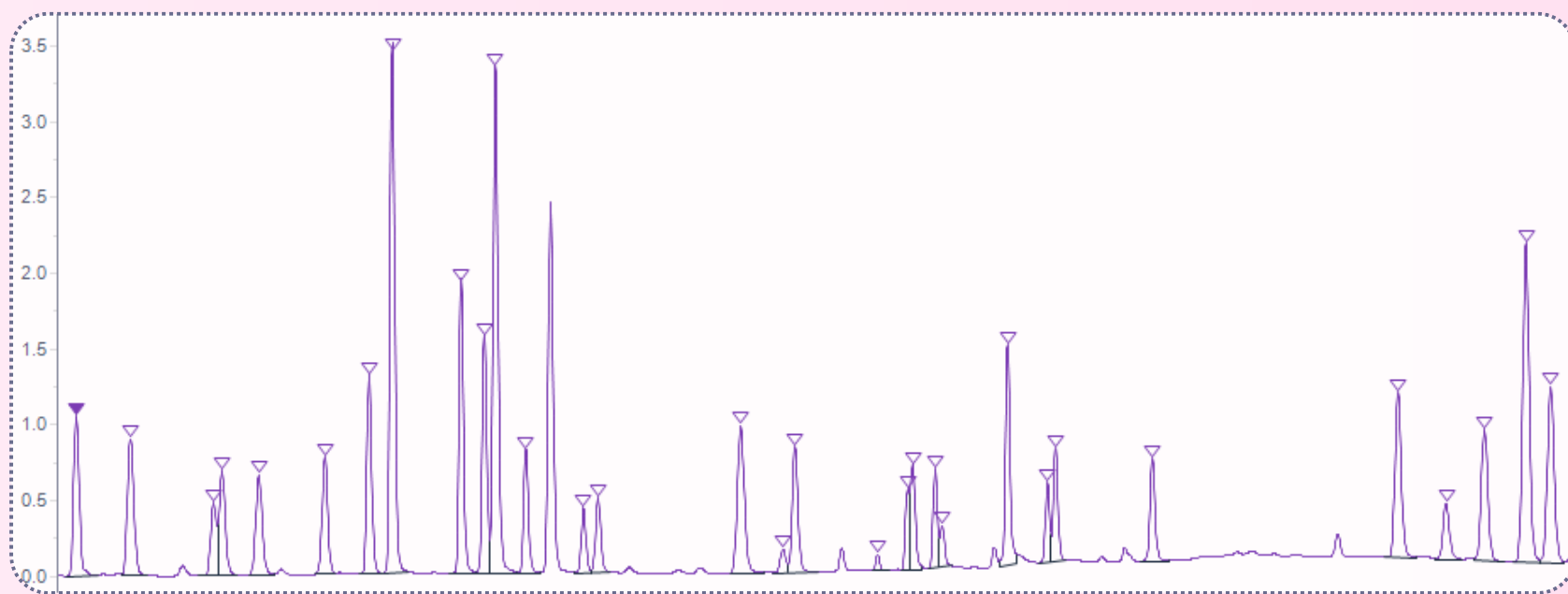
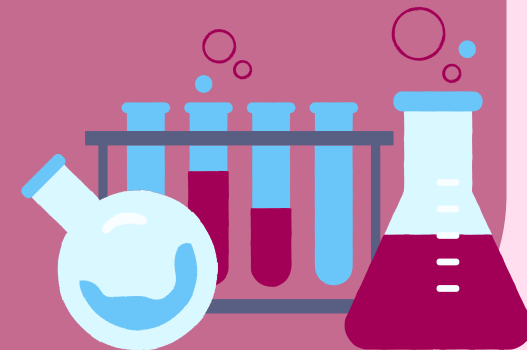
42 samples from different vineyards

- Cabernet Sauvignon
- Merlot
- Tempranillo



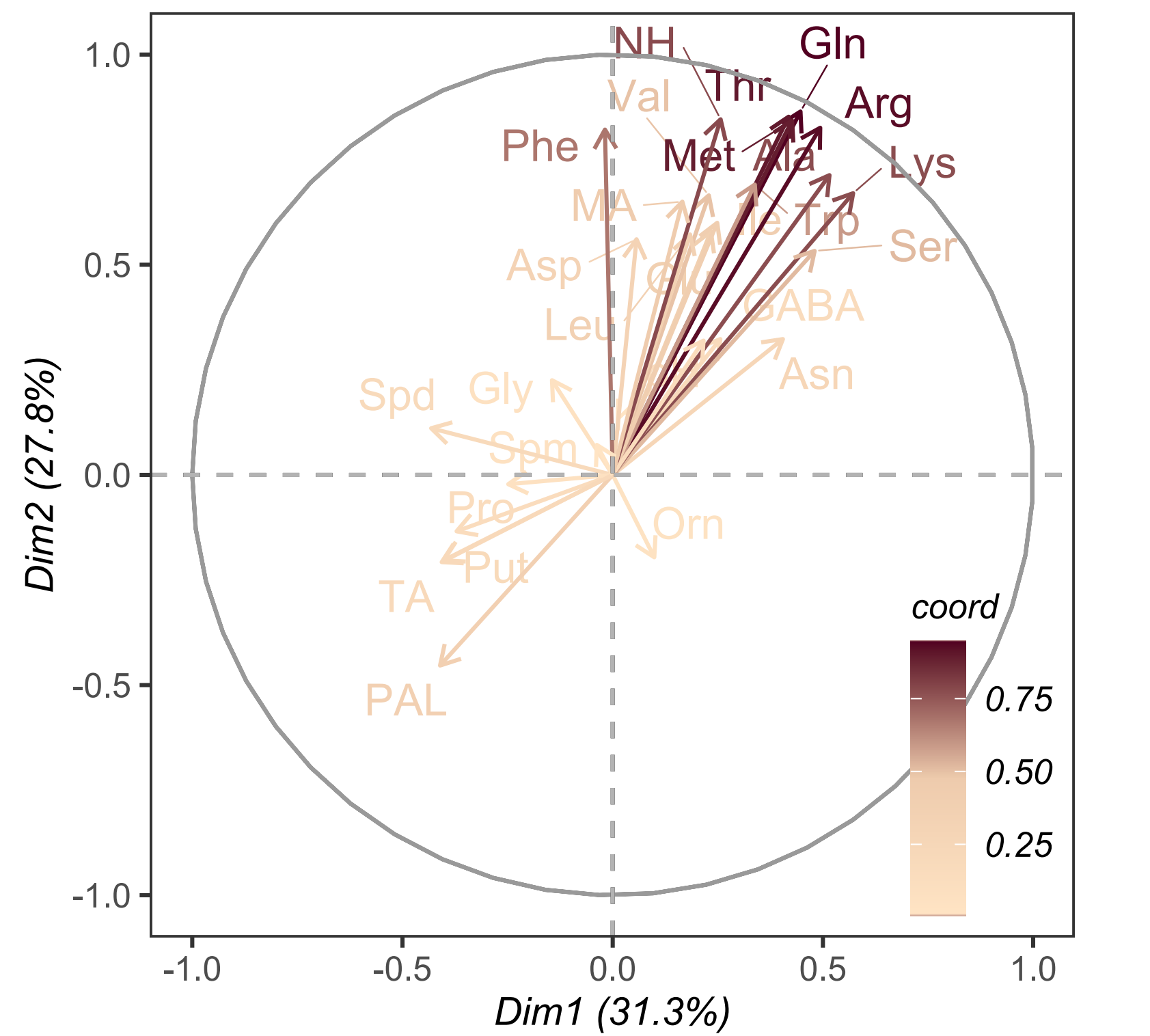
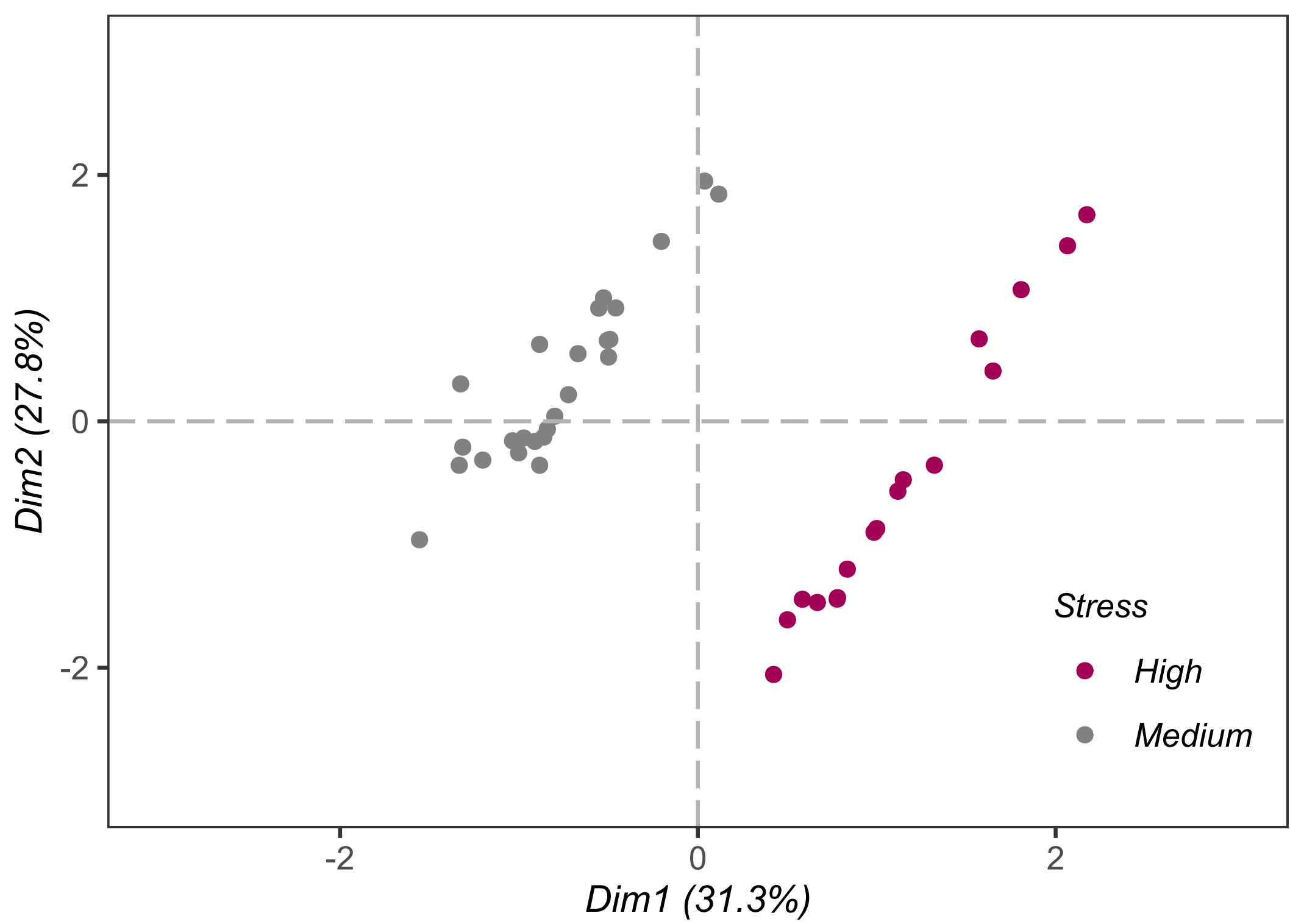
## METHODS

- Amino acids and polyamines --> Reverse phase UPLC - DAD
  - Enological parameters
  - RStudio --> Multifactor analysis (MFA)
- Qualitative variable: stress

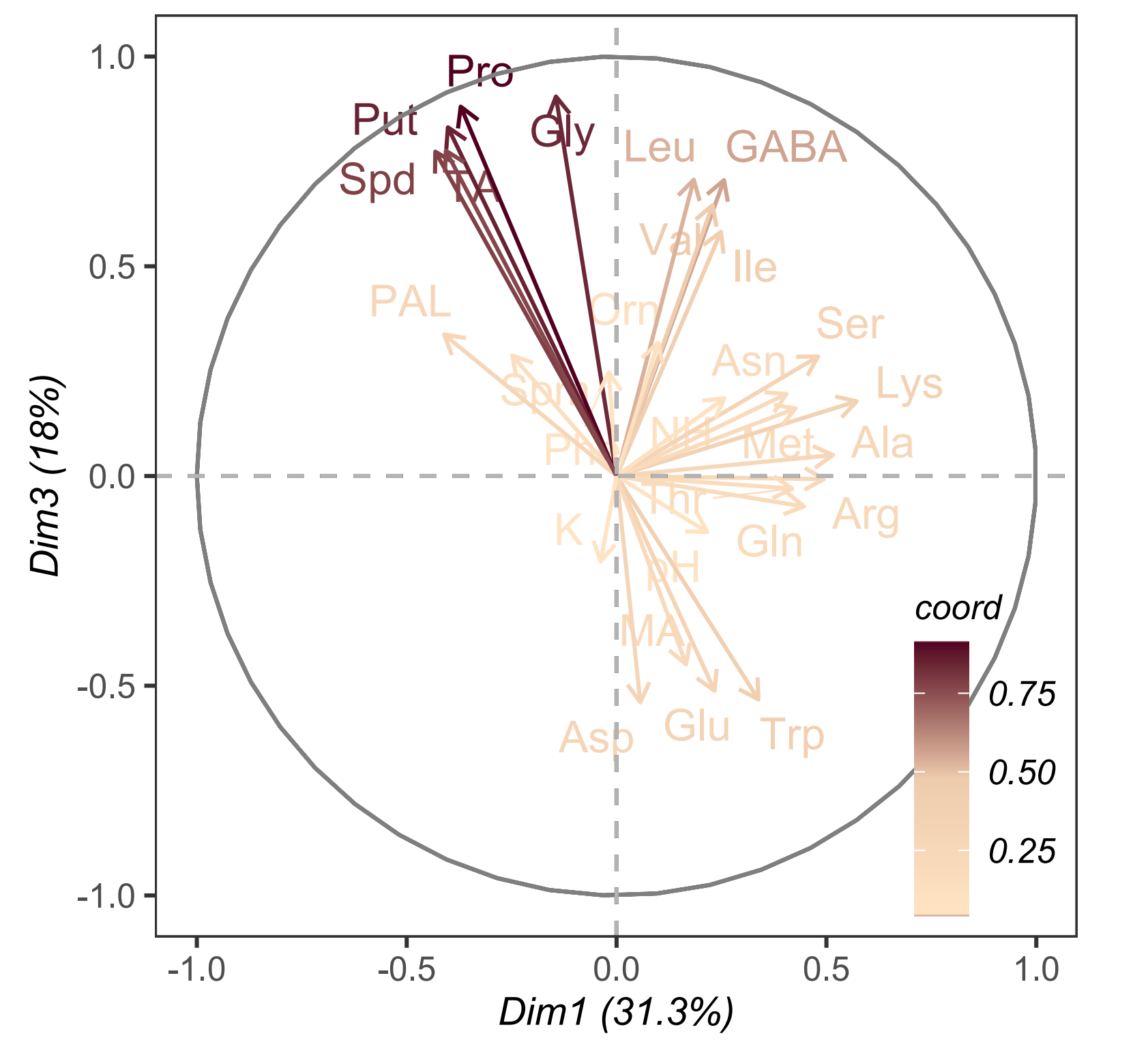
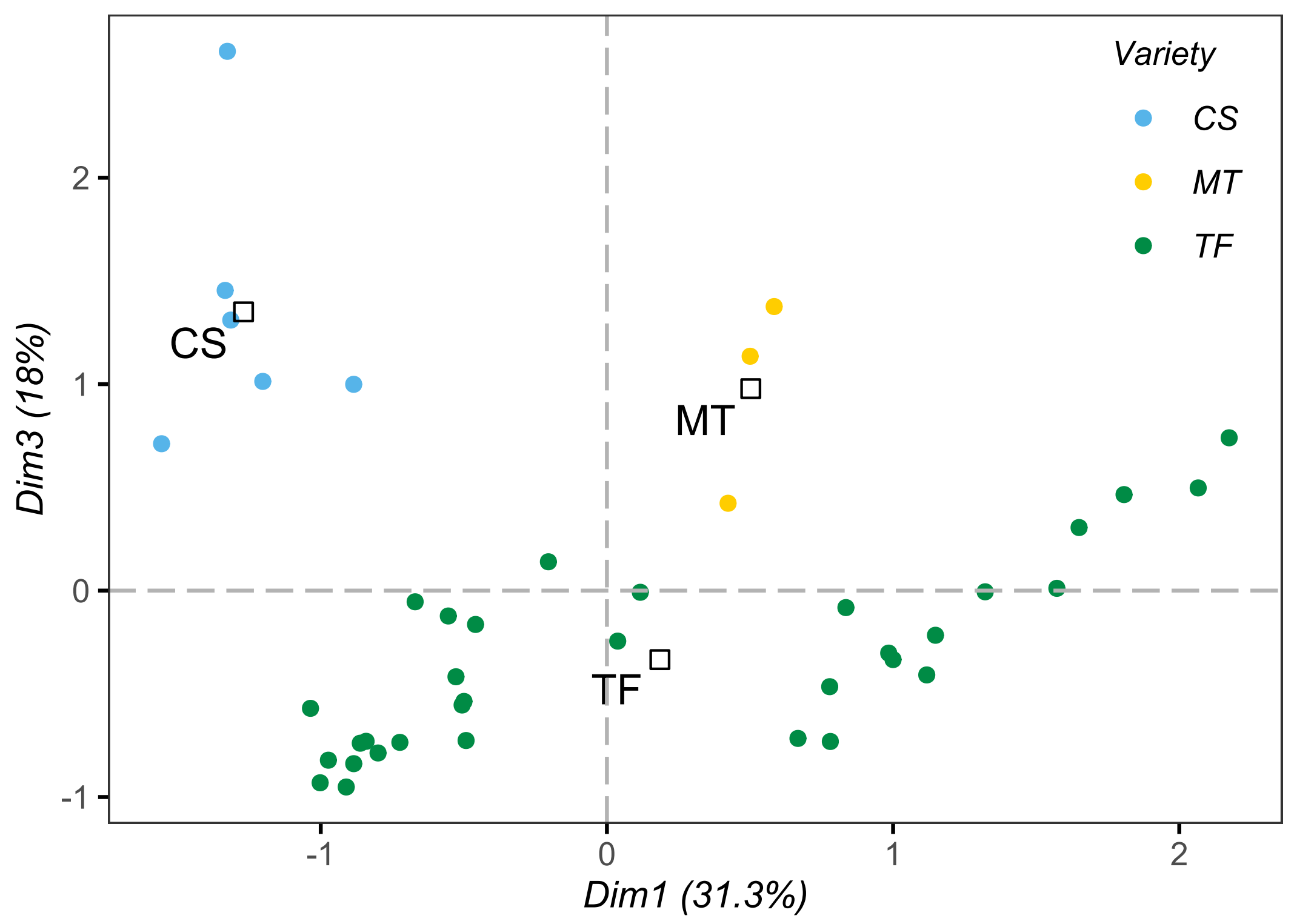


## RESULTS

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

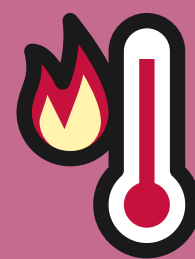


Asp: Aspartic acid; Glu: Glutamic acid; GABA: Gamma-aminobutyric acid; Arg: Arginine; Lys: Lysine; Asn: Asparagine; Ser: Serine; Gln: Glutamine; Gly: Glycine; Thr: Threonine; Ala: Alanine; Pro: Proline; Val: Valine; Met: Methionine; Trp: Tryptophan; Ile: Isoleucine; Leu: Leucine; Phe: Phenylalanine; Orn: Ornithine; NH: NH<sub>4</sub> Cl; Spd: Spermidine; Put: Putrescine; Spm: Spermine; PAL: Probable alcohol level; TA: Total acidity; MA: Malic acid; K: Potassium.  
CS: Cabernet Sauvignon; MT: Merlot; TF: Tempranillo.



## 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	2110	10.8	6.36
MT	1559	5.48	3.49
TF	480	0.82	2.99

## 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.

## REFERENCES

Torres et al. J. Food Comp. Anal. 62: 51-62 (2017); Moukarzel et al. Front. Plant. Sci. 14: 1162062. (2023)

## 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

