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Effects of the addition of bio-activators on wine alcoholic fermentation in challenging conditions

ENRICO VIOLA – enrico.viola01@you.unipa.it
Department of Agricultural, Food and Forest Sciences (SAAF), University of Palermo, Viale delle Scienze, Bldg. 5, 90128, Palermo, Italy
Tutor: Prof. Nicola Francesca

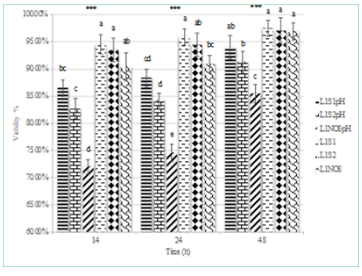
INTRODUCTION

The alcoholic fermentation process is usually driven by yeast cells, which could face several issues due to numerous ecological and technological factors that could affect the final quality of the product. The metabolic activity and cell development of yeasts can be severely affected by a wide variety of stress factors. In order to protect themselves from environmental stress, cells often develop adaptive responses. These require temporary reprogramming of cellular activities to protect cell membranes from stress-induced damage, enabling cells to withstand and recover from these stresses. Among these environmental challenges, low pH can have a significant impact on yeast metabolism and viability. This factor directly affects several metabolic pathways and cellular functions in yeast. As the extracellular environment becomes more acidic, the proton gradient across the cell membrane can be severely disrupted. As a result, the rate of glucose metabolism can be reduced, reducing overall energy production and yeast cell development.
With the final aim to improve the intrinsic resistance of yeast cells, this study investigated the addition of yeast-based bio-activators and their effect on fermentation performance.

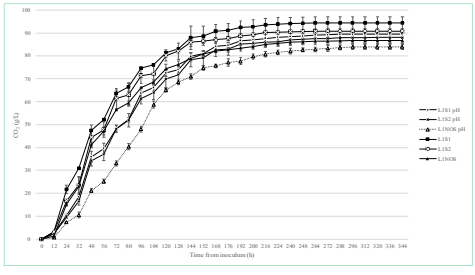
METHODOLOGY

The strain was first rehydrated and viability assessed by plate count. The yeast levels were then monitored during the first hours of alcoholic fermentation. The grape must used was cv Catarratto and the inoculum was performed in the presence of two bio-activators. Two different conditions were established, the first representing a standard must and the second simulating a challenging environment (pH 2.9). Weight loss, plate counts, and flow cytometry were used to monitor the results. The samples were collected 14, 24, and 48 hours after the inoculum to determine microbial content and yeast viability

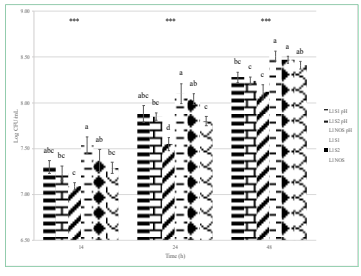
RESULTS



- Viability > 80 % in all treatments except for L1NOS_pH within the first 24 h from the inoculum



- Standard treatments showed the highest fermentation rates
- Within low pH trials, bio-activators added ones exhibited significantly higher FR than control treatment



- Yeast levels increased along 48 h of alcoholic fermentation, showing the greatest differences within the first 24 h

CONCLUSIONS

The presence of bio-activators enhanced cell viability, which could represents a fair explanation for the improved fermentation rate observed in presence of both bio-activators. Further researches are ongoing to study the effects on the volatile organic composition and to explore how gene expressions and fatty acids profile are modulated in several challenges conditions