

## GRAPE COMPOSITION AND WINE QUALITY OF MUSCAT HAMBURG CULTIVAR AFTER A SPECIFIC INACTIVATED DRY YEAST APPLICATION AS ADAPTATION STRATEGY TO CLIMATE CHANGE

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### Abstract:

**Context and purpose of the study** - In a climate change context, the management of Mediterranean vineyards should be adapted to the new environmental conditions. Predictive models underline that in the future the most of the Mediterranean vineyard regions is expected to experience further warming events producing challenges in ripening balanced fruit. It is already registered that in warm and dry summers, the ripening process is faster and the balance between phenolic and technological (sugar) maturity may not be the desirable. This study investigates the use of specific inactivated yeast derivatives sprayed on the entire canopies of field grown cv Muscat Hamburg vines.

**Material and methods** - The trial was carried out in a vineyard located in Nea Agchialos, Central Greece. Muscat Hamburg vines were tagged and randomly assigned in pairs to a spray treatment with a specific inactivated yeast derivatives (IYT, LalVigne™ MATURE, with the patent pending application technology of Lallemand, 100% natural formulation) or unsprayed (C = control vines). The entire canopy of all IYT vines were sprayed at veraison with IYT solution. The treatment was repeated at the same concentration 10 days later. At harvest, yield parameters, bunch morphology, grape composition and wine analysis were recorded.

**Results** - There was no effect of inactivated yeast treatment on yield, bunch weight, berry weight and bunch compactness, whereas relative skin mass was increased on IYT vines. At harvest, TSS, TA and pH were similar in both treatments while treated vines showed higher total anthocyanin and phenolics content, improving phenolic maturity of the berries. Finally, wine color quality was improved on IYT vines. Our results indicate that in the Mediterranean vineyard regions, often characterized by dry and hot vintages, specific inactivated yeast derivatives applications can be an easier alternative to other traditional management techniques (e.g. cluster thinning, early defoliation, girdling) for improving phenolic maturity in grapes.

**Keywords:** Inactivated dry yeast, Muscat Hamburg, Berry composition, Phenolic maturity, Wine quality

### 1. Introduction.

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INTRODUCTION

In a climate change context, the management of Mediterranean vineyards should be adapted to the new environmental conditions in a sustainable way. It is already registered that in warm and dry summers, the ripening process is faster and the balance between phenolic and technological (sugar) maturity may not be the desirable. In this study, the entire canopies of field grown or Muscat Hamburg vines were treated twice at veraison with a specific inactivated yeast derivatives (IYT, LaVigne™ MATURE, with the patent pending application technology of Lallemand, 100% natural formulation) and compared with an unsprayed control.

MATERIAL AND METHODS

- ❖ 2016
- ❖ cv Muscat Hamburg rootstock 110R
- ❖ Vineyard near N. Aghialos (Volos, central Greece, elevation 200m a.s.l., sandy clay soil type)
- ❖ 5-year-old planting



- ❖ Vertically shoot-positioned (VSP), trained to a bilateral spur-pruned cordon with a bud-load of about 10 nodes per meter of row length
- ❖ The vines were spaced 1.0m within rows and 2.80m between rows.
- ❖ Drip irrigated, while pest management and canopy management (basal leaf removal, shoot thinning and hedging) were run according to local standard practices. The bunch number per vine was adjusted at about 38-40 bunches

Six adjacent rows were selected to build a complete randomized-block design with each row as a block. Within each row, five uniform vines were tagged and randomly assigned in pairs to a spray treatment with a specific inactivated yeast derivatives (IYT, LaVigne™ MATURE, with the patent pending application technology of Lallemand, 100% natural formulation) or unsprayed (C = control vines). The entire canopy of all IYT vines were sprayed at veraison with IYT solution. The treatment was repeated at the same concentration 10 days later.

RESULTS AND DISCUSSION

- ❖ No effect of inactivated yeast treatment on yield, bunch weight, berry weight and bunch compactness were registered
- ❖ Skin mass was increased on IYT vines
- ❖ At harvest, TSS, TA and pH were similar in both treatments while treated vines showed higher total anthocyanin and phenolics content, improving phenolic maturity of the berries.

- ❖ Wine color quality was improved on IYT vines
- ❖ Our results indicate that in the Mediterranean vineyard regions, often characterized by dry and hot vintages, specific inactivated yeast derivatives applications can be an easier alternative to other traditional management techniques (e.g. cluster thinning, early defoliation, girdling) for improving phenolic maturity in grapes

Table 1. Yield components and bunch morphology recorded in 2016 in field-grown Muscat Hamburg vines treated with specific inactivated dry yeast (Yeast treated) or left untreated (Control).

Parameter <sup>1</sup>	Control	Yeast treated	Significance
Bunches/vine	39.6	37.5	ns
Yield/vine (kg)	12.5	12.2	ns
Bunch weight (g)	322	326	ns
Berries (number/bunch)	142	139	ns
Bunch compactness			
Yield/rachis length (g/cm)	19.7	18.7	ns
OIV rating	7.0	6.7	ns
Berry mass (g)	3.55	3.67	ns
Relative skin mass (%)	16.7 <sup>a</sup>	19.5 <sup>b</sup>	**
Seed number/berry	1.95	2.02	ns
Seed weight/berry (g)	0.134	0.178	ns

<sup>1</sup> Different letters indicate mean separation within rows by t test. \*\*, \* ns: Significant at P < 0.01, 0.05 or not significant, respectively.  
<sup>2</sup> Relative skin mass = 100 (skin mass/total fresh berry mass).

Table 2. Grape composition recorded in 2016 in field-grown Muscat Hamburg vines treated with specific inactivated dry yeast (Yeast treated) or left untreated (Control).

Parameter <sup>1</sup>	Control	Yeast treated	Significance
Total soluble solids (°Brix)	20.5	20.5	ns
Total acidity (g/l)	4.60	3.80	ns
pH	3.70	3.70	ns
Total anthocyanins (mg/kg)	231 <sup>a</sup>	580 <sup>b</sup>	**
Total phenolics (mg/kg)	2450 <sup>a</sup>	3874 <sup>b</sup>	**
Total anthocyanins (mg/berry)	0.82 <sup>a</sup>	2.13 <sup>b</sup>	**
Total phenolics (mg/berry)	8.58 <sup>a</sup>	14.22 <sup>b</sup>	**

Table 3. Wine composition parameters recorded in 2016 in field-grown Muscat Hamburg vines treated with specific inactivated dry yeast (Yeast treated) or left untreated (Control).

Parameter <sup>1</sup>	Control	Yeast treated	Significance
Alcohol (°v/v)	11.05	11.40	ns
Titrateable acidity (g/l)	6.62	6.95	ns
pH	3.69	3.60	ns
Color intensity (A <sub>420</sub> + A <sub>520</sub> + A <sub>620</sub> )	0.18 <sup>a</sup>	0.25 <sup>b</sup>	*
Color hue (A <sub>420</sub> /A <sub>520</sub> )	2.34 <sup>a</sup>	2.07 <sup>b</sup>	**

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