crea
Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria

10TH INTERNATIONAL TABLE GRAPE SYMPOSIUM
26 NOV TO 1 DEC 2023
SOMERSET WEST SOUTH AFRICA

Effect of field treatments with a new biopolymer-based fertilizer on table grape browning at harvesting and during storage

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INTRODUCTION

Motted browning

Stilar-end russet spots browning

Net-like browning

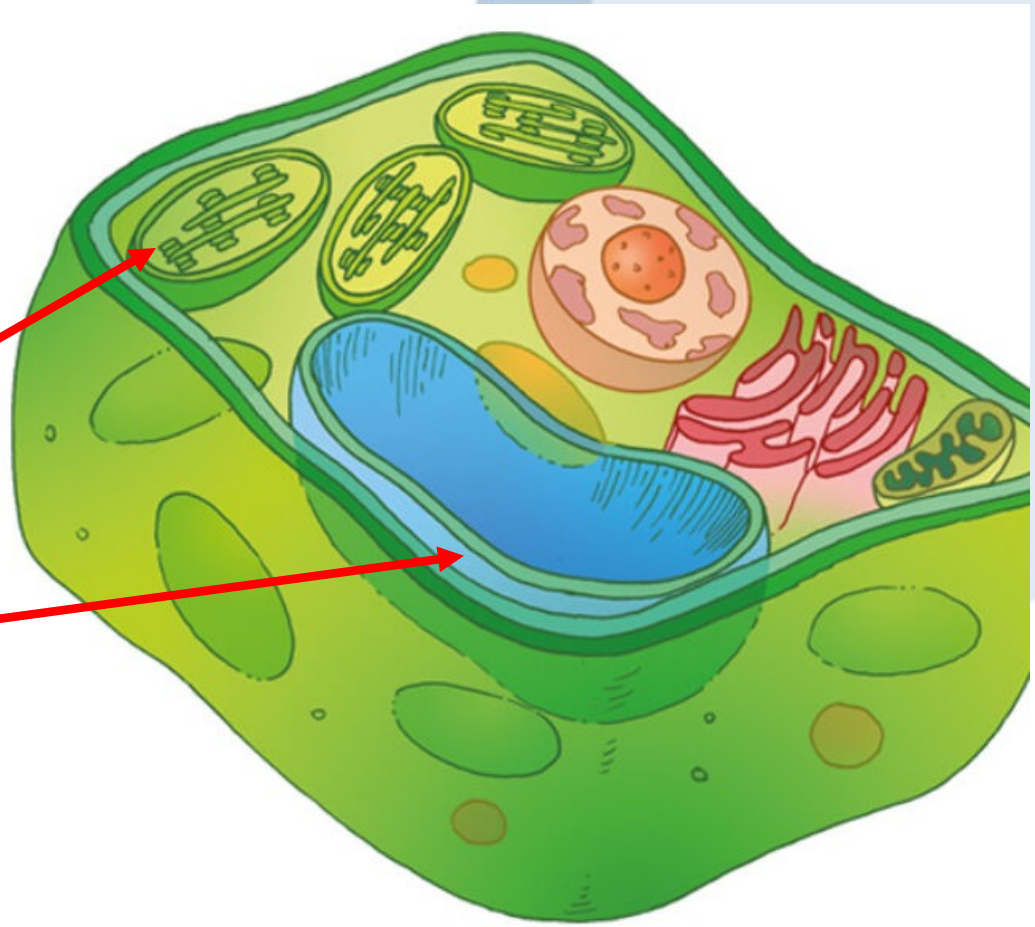
Sun burn

INTRODUCTION

Quinones

Polyphenoloxidase

Phenolic compounds



INTRODUCTION

Factors contributing browning:

1) Sugar levels of harvested grapes

2) Varietal susceptibility

→ It is unclear whether maturity level is the main contributing factors

Italia

Regal seedless

Arra 15

Thompson seedless

The main goal of our research activity is to evaluate the utility of a biopolymer-based fertilizer as a pre-harvest tool to improve the quality of table grape at harvest and during storage.

The phenotypic severity of skin browning on treated berries compared to untreated berries

The relationship between the effects of treatments on skin browning and the composition of the berries.

Phenolic compounds

Polyphenol oxidase

EXPERIMENTAL PROCEDURES

- Cultivars: 'Arra 15' and 'Regal seedless'
- Experimental design: completely randomized with 3 repetitions/treatment
- Planting distances: 2.5 x 2.5 m
- Wine growing system: 'tunnels' covered with plastic film

- Dose: 6.0 kg ha^{-1}, with a volume of water of 500 L ha^{-1}
- Time of applications: post – veraison and 10-15 days before harvesting
- Treatments were performed by using a knapsack sprayer
- Plants no sujected to treatments were used as control

EXPERIMENTAL PROCEDURES

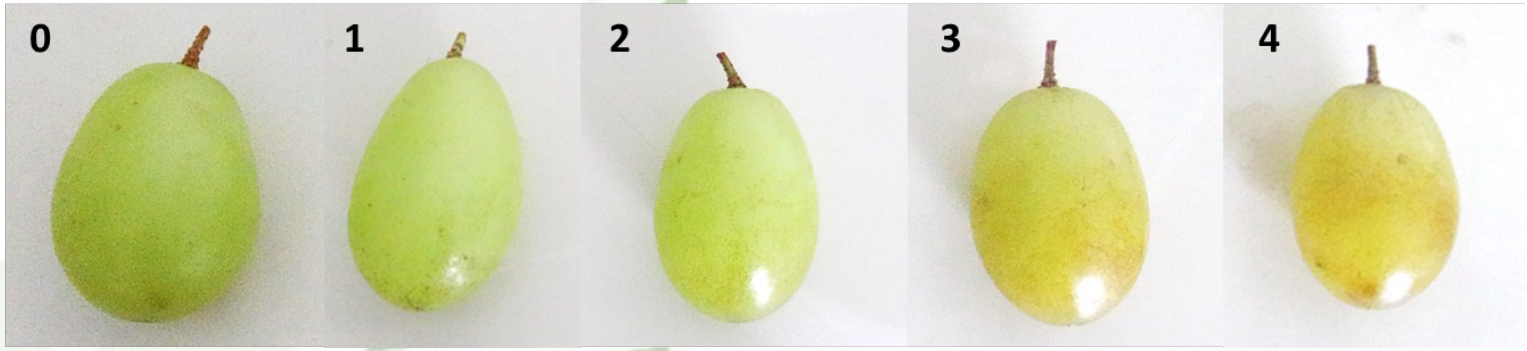
15 bunches/cultivars/treatments/repetitions were harvested at their commercial maturity

5 bunches/cultivars/treatments/repetitions were collected for laboratory analysis

3 time points of postharvest:

- ✓ **T1: 15 days of cold storage**
- ✓ **T2: 30 days of cold storage**
- ✓ **SL: 1 week at room temperature**

EXPERIMENTAL PROCEDURES



Number of affected berries whit a specific class of severity

Value of the class of severity

Browning severity:

$$\frac{\sum_1^i (n_i x v_i)}{N x V} * 100$$

Total number of berries

Maximum value of the considered severity class

Number of affected berries

Browning incidence: $\frac{n}{N} * 100$

Total number of berries

EXPERIMENTAL PROCEDURES

Spectrophotometric evaluation of:

Total polyphenol

Folin-Ciocalteu's reagent

760 nm

Total polyphenoloxidase

Bradford's methods

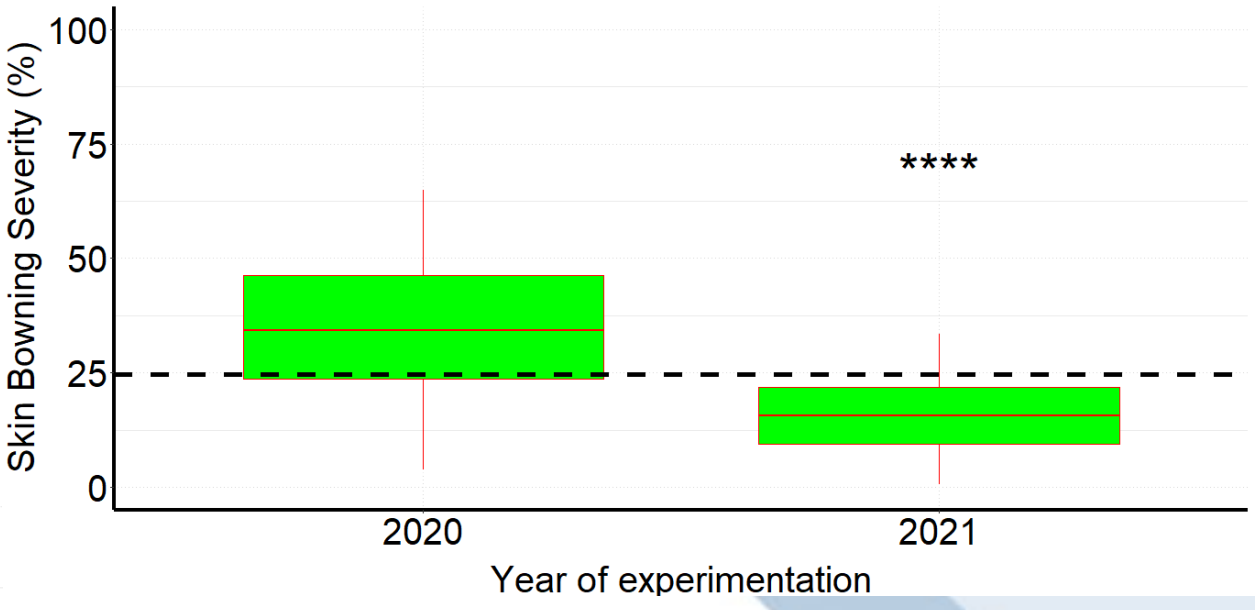
398 nm

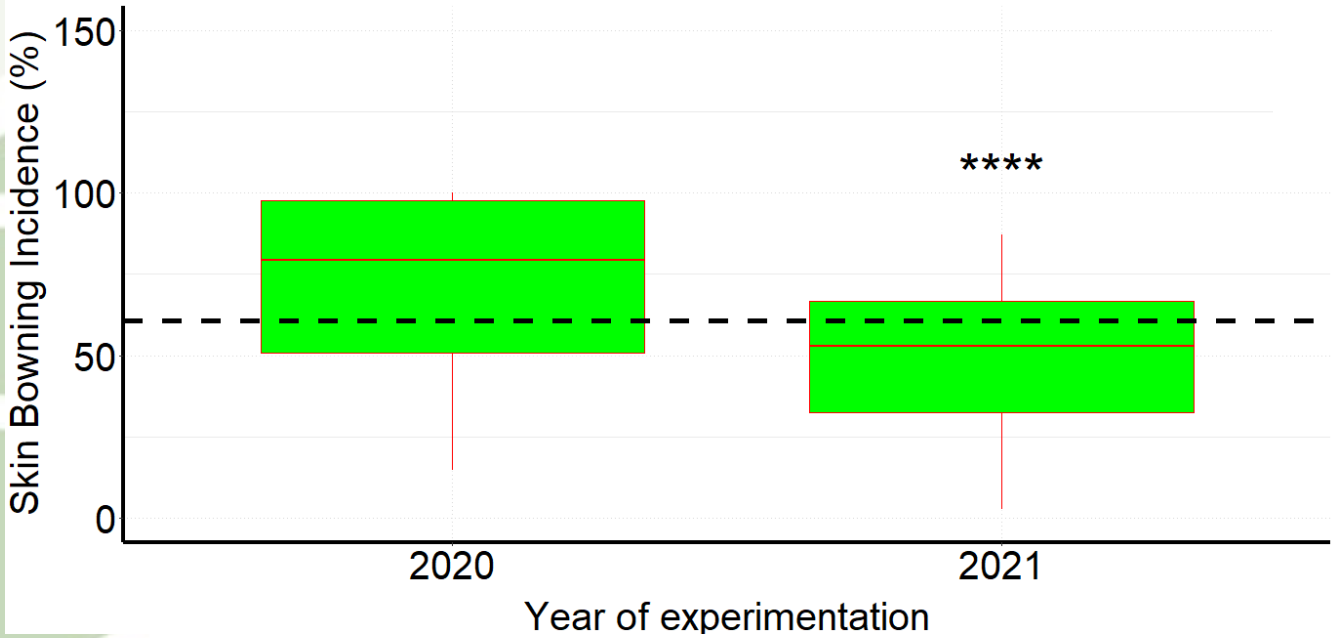
Statistical analysis:

- **Collected data were analyzed using the Kruskall-Wallis test ($p<0.05$)**
- **As post-hoc, the non-parametric Wilcoxon signed-rank test was performed, in order to evaluate differences between treatments and control.**

RESULTS

	SkBI			SkBS		
	Df	χ^2	*p-value*	Df	χ^2	*p-value*
Cultivar	1	3,1446	0,07618	1	2,391	0,1221
Year	1	1,8251	< 0,0001***	1	2,901	< 0,0001***
Treatment	1	1,3157	0,0002865*	1	8,548	0,0003459**
Block	2	0,17905	0,9144	2	0,39054	0,8226
Time	3	7,4591	0,05862	3	7,1569	0,06706





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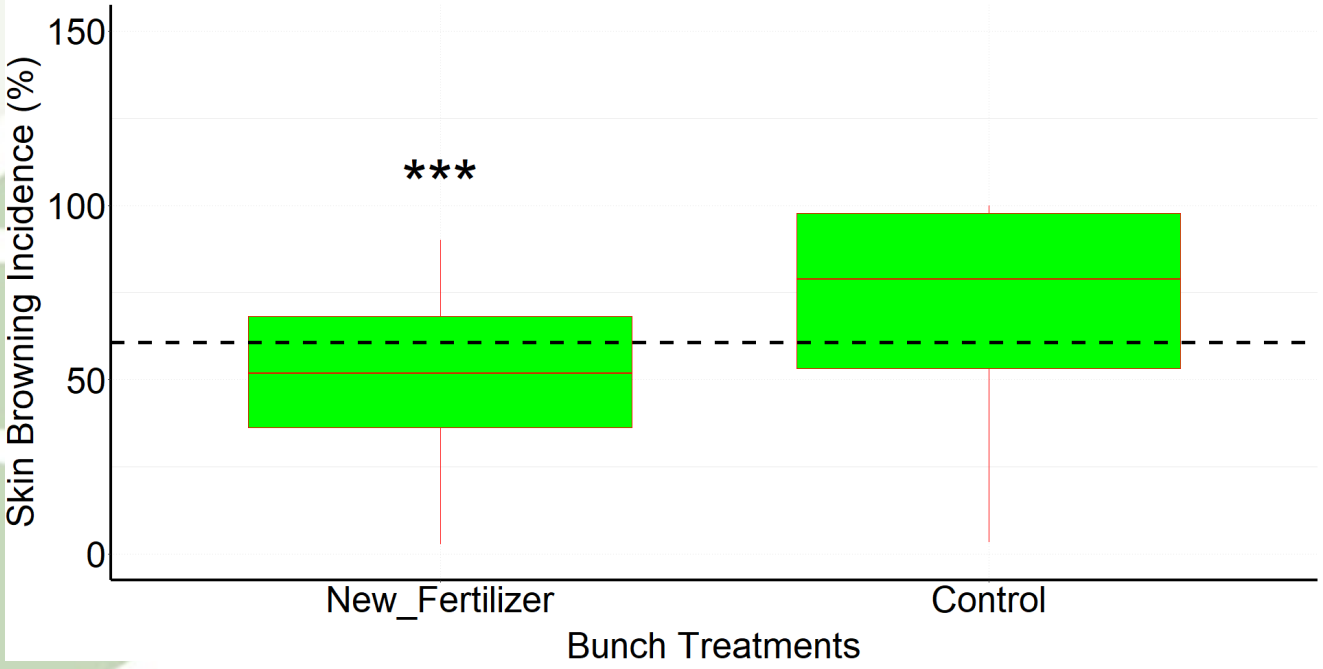
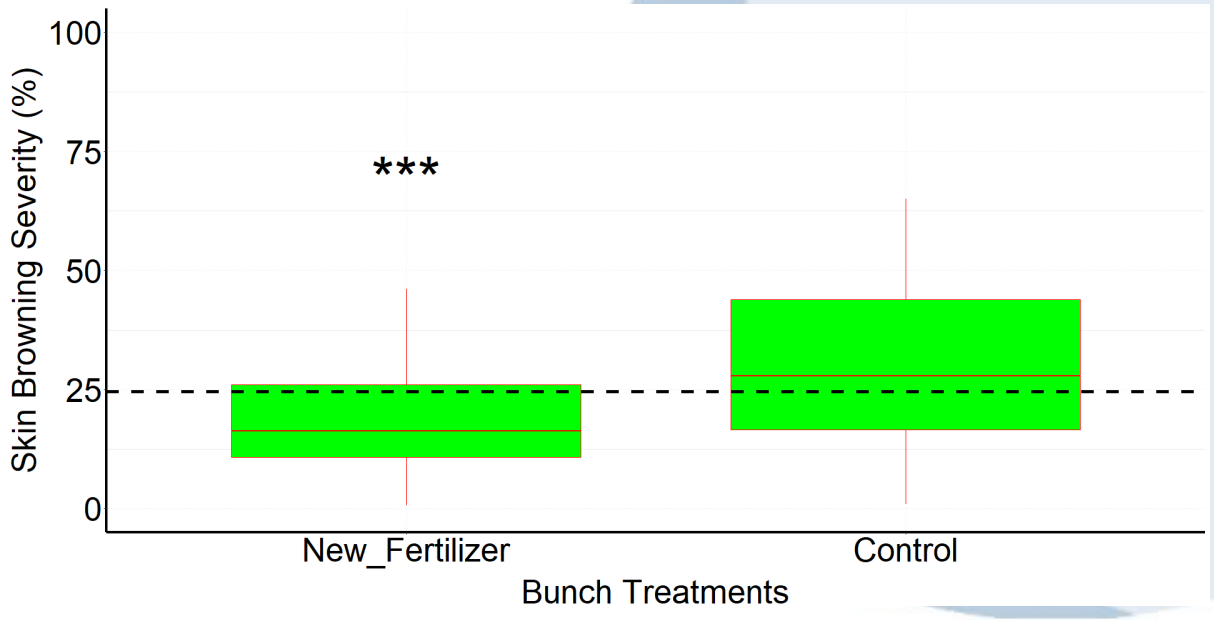
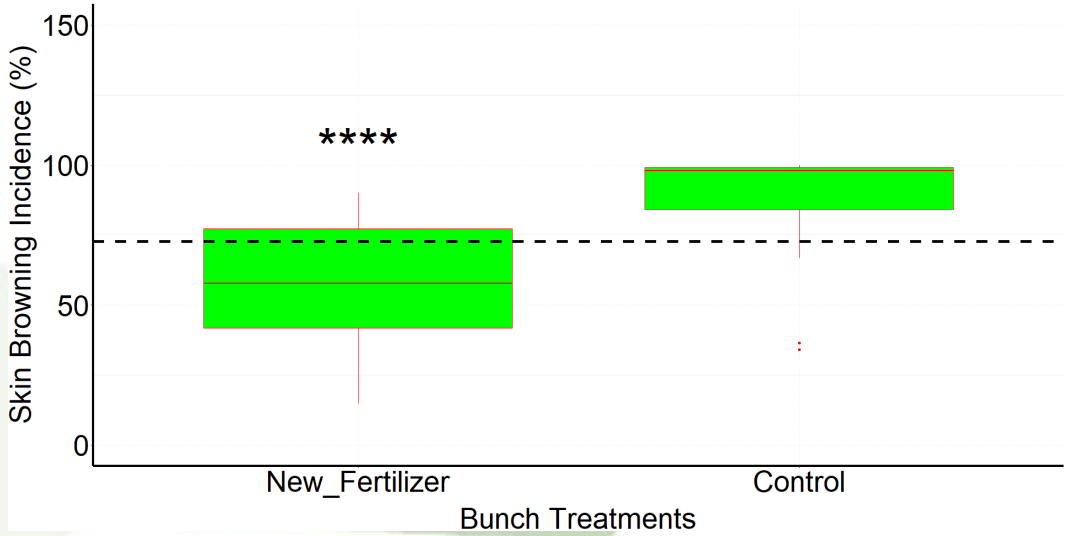


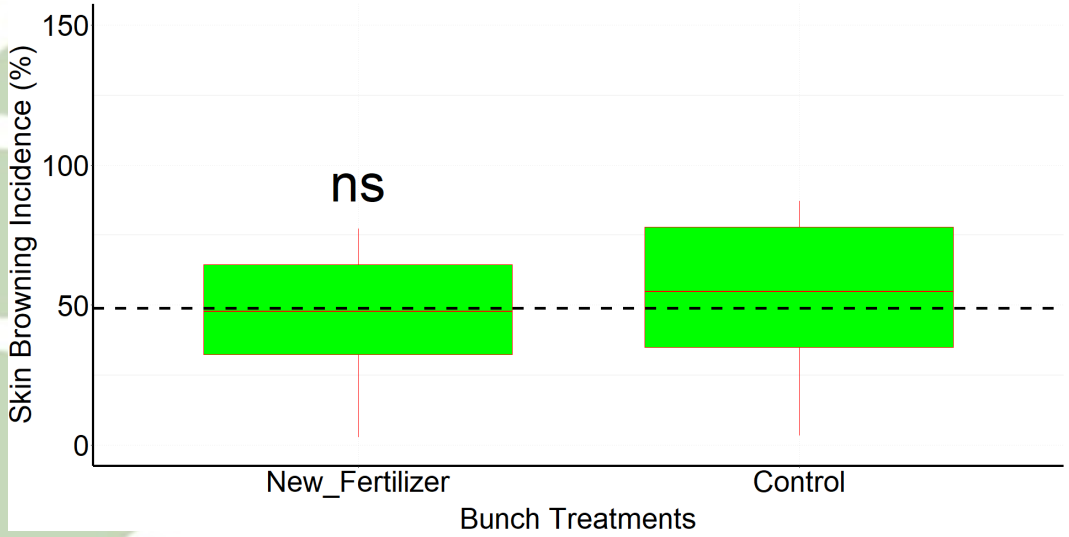


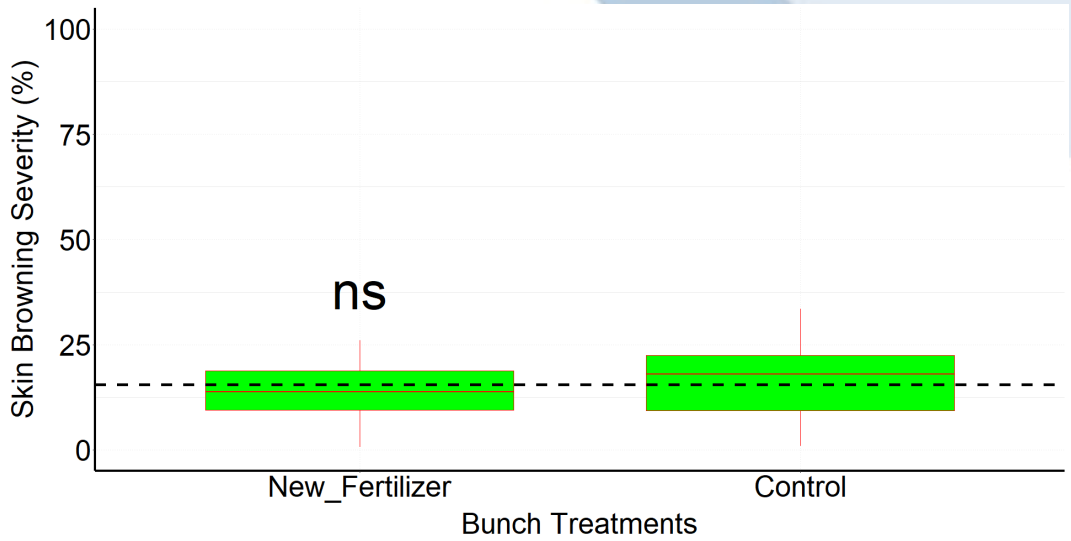
RESULTS

Field Trial_2020



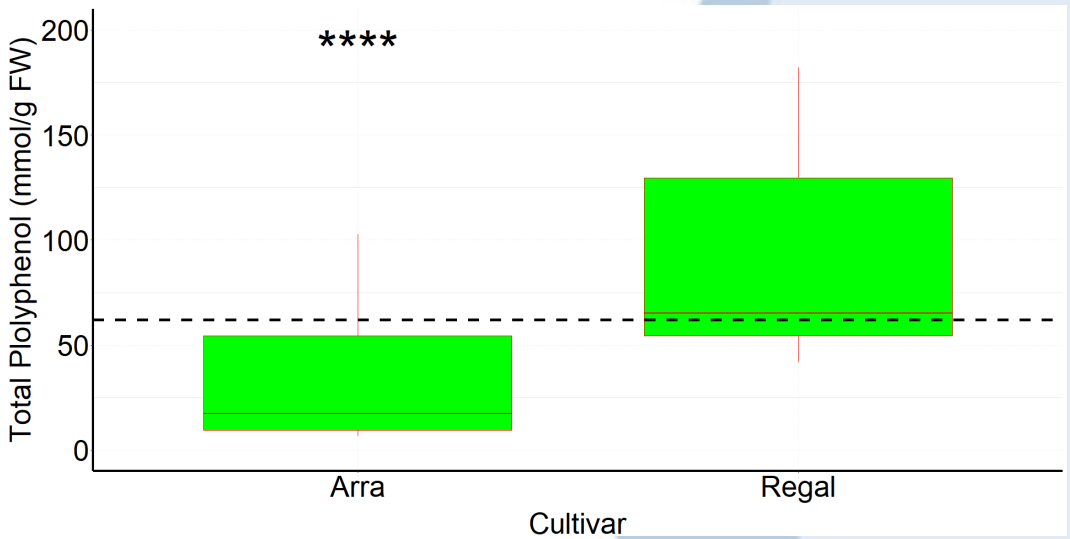
Field Trial_2021





RESULTS

	PFT			PPO		
	Df	χ^2	*p-value*	Df	χ^2	*p-value*
Cultivar	1	3,5403	< 0,0001***	1	2,4822	0,1151
Year	1	4,2627	< 0,0001***	1	1,0981	0,2947
Treatment	1	0,009074	0,9241	1	10,64	0,001111**
Block	2	0,049372	0,9756	2	0,003319	0,9835
Time	3	5,61	0,1322	3	50.854	<0,0001***



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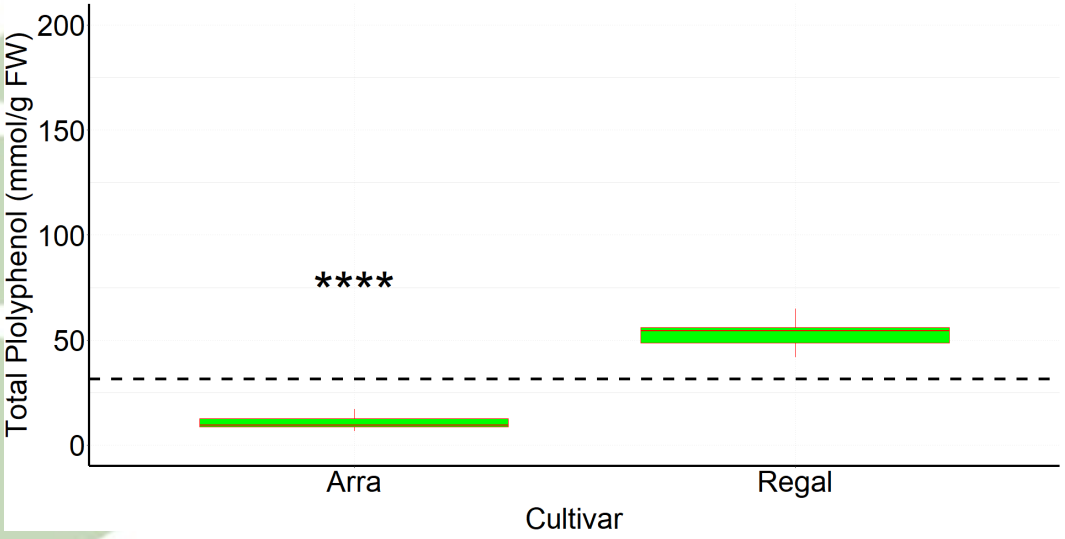
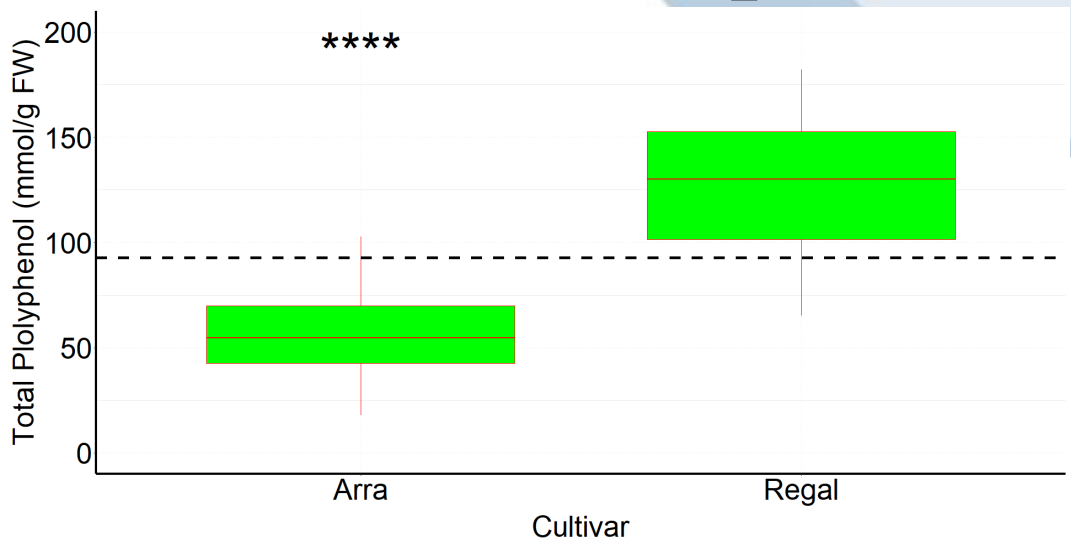


Field Trials_2021



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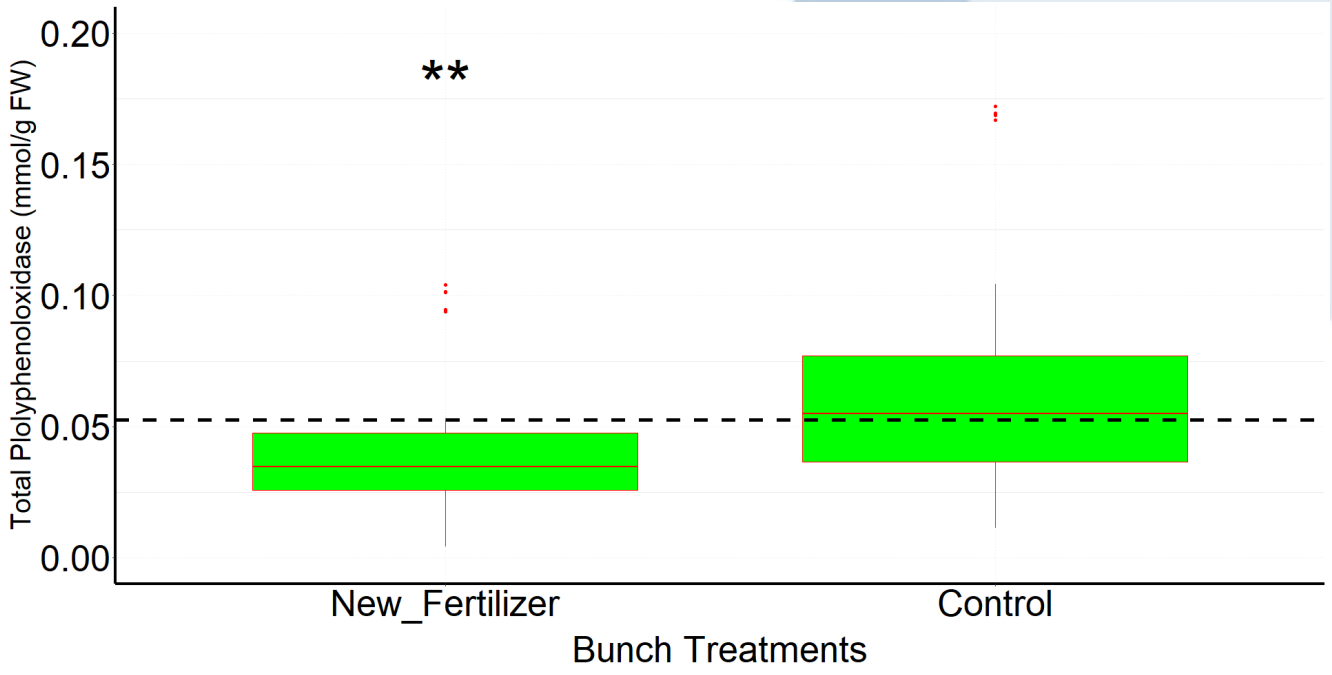

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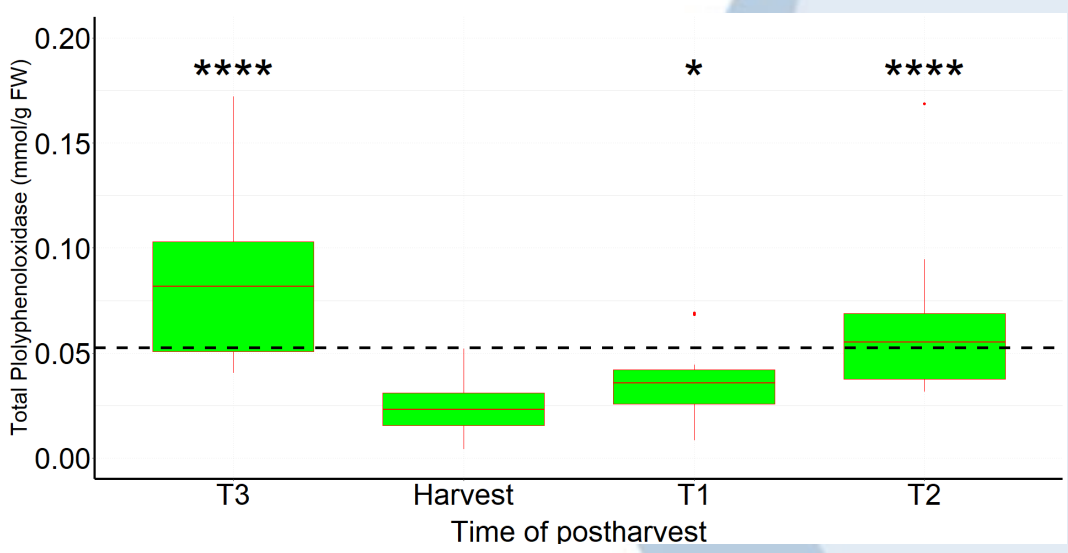
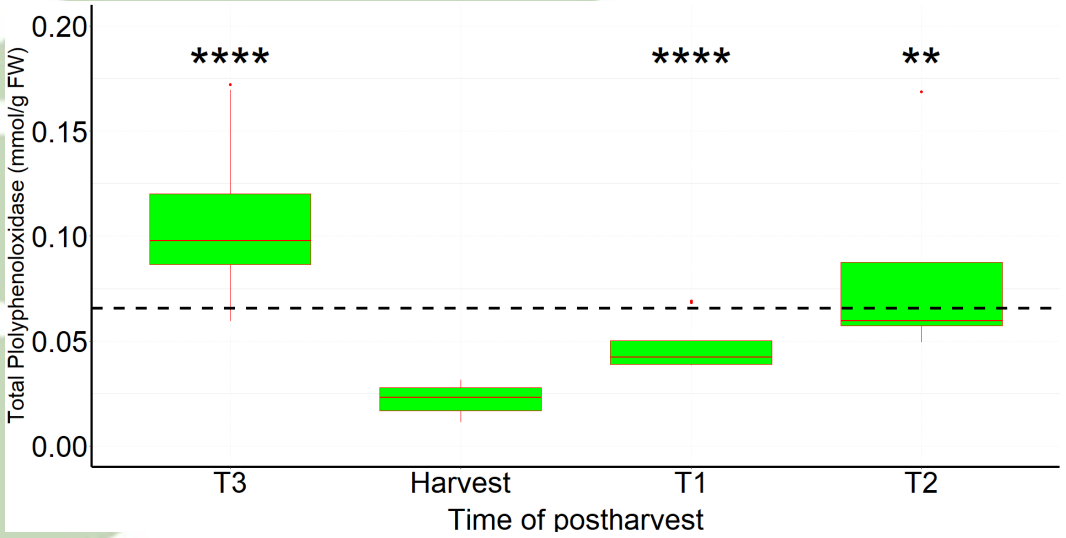
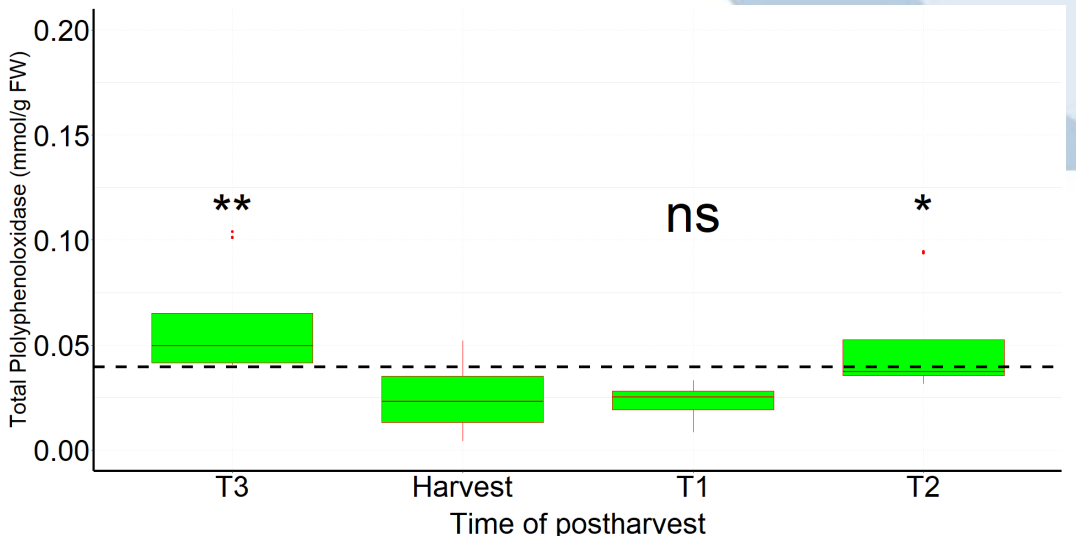


Control



New fertilizer



CONCLUSIONS

This fertilezer can represents a valid solution to mitigate the skin browning, both in term of incidence and severity, in particular when the enviromental conditions were favourable for their manifestation.

	SkBI	SkBS	PFT	PPO
SkBI		Spearman's index: 0.38 *p-value*: 0.007591**	Spearman's index: - 0.37 *p-value*: 0.009544**	Spearman's index: 0.45 *p-value*: 0.00125**
SkBS	Spearman's index: 0.38 *p-value*: 0.007591**		Spearman's index: - 0.53 *p-value*: 0.0001271**	Spearman's index: 0.39 *p-value*: 0.006174**
PFT	Spearman's index: - 0.37 *p-value*: 0.009544**	Spearman's index: - 0.53 *p-value*: 0.0001271**		Spearman's index: - 0.32 *p-value*: 0.02506**
PPO	Spearman's index: 0.45 *p-value*: 0.00125**	Spearman's index: 0.39 *p-value*: 0.006174**	Spearman's index: - 0.32 *p-value*: 0.02506**	

Field treatments with the new fertilizer can prevent the activity of polyphenoloxidase also during the first 15 days of cold storage.

Thank you for your attention