



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

Mottled browning



Stilar-end russet spots browning



Net-like browning



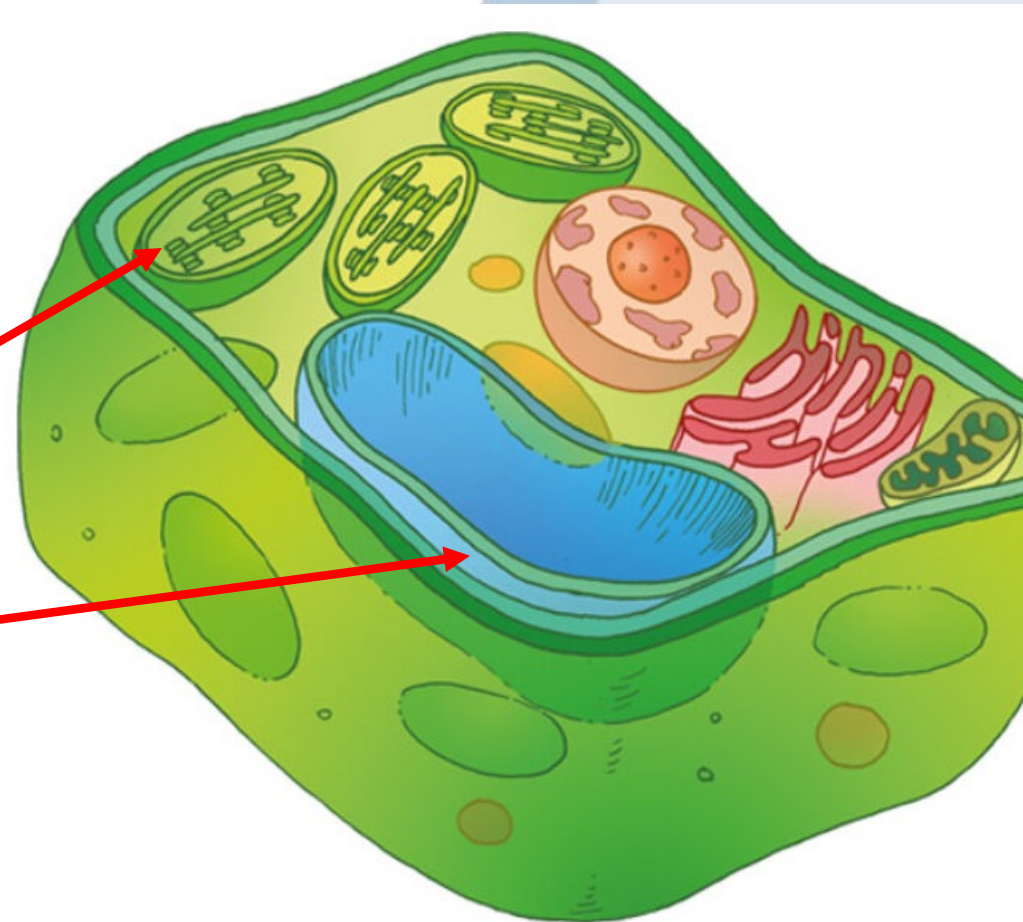
Sun burn



Quinones

Polyphenoloxidase

Phenolic
compounds



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 not subjected to treatments were used as control

15

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



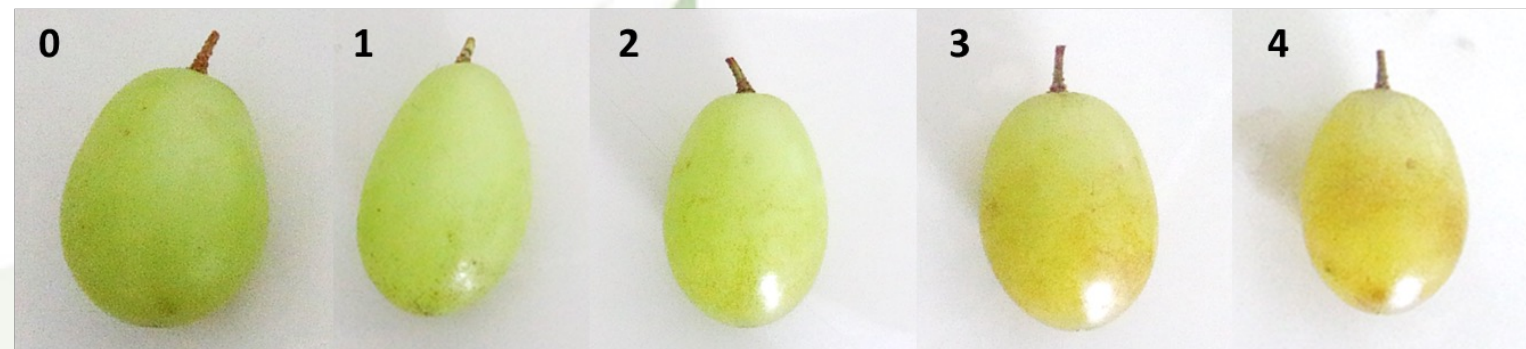
- 3 time points of postharvest:
- ✓ T1: 15 days of cold storage
 - ✓ T2: 30 days of cold storage
 - ✓ SL: 1 week at room temperature

5

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



EXPERIMENTAL PROCEDURES



Number of affected berries whit a specific class of severity

Value of the class of severity

Number of affected berries

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

Browning severity:

$$\frac{\sum_{i=1}^i (n_i \times v_i)}{N \times V} * 100$$

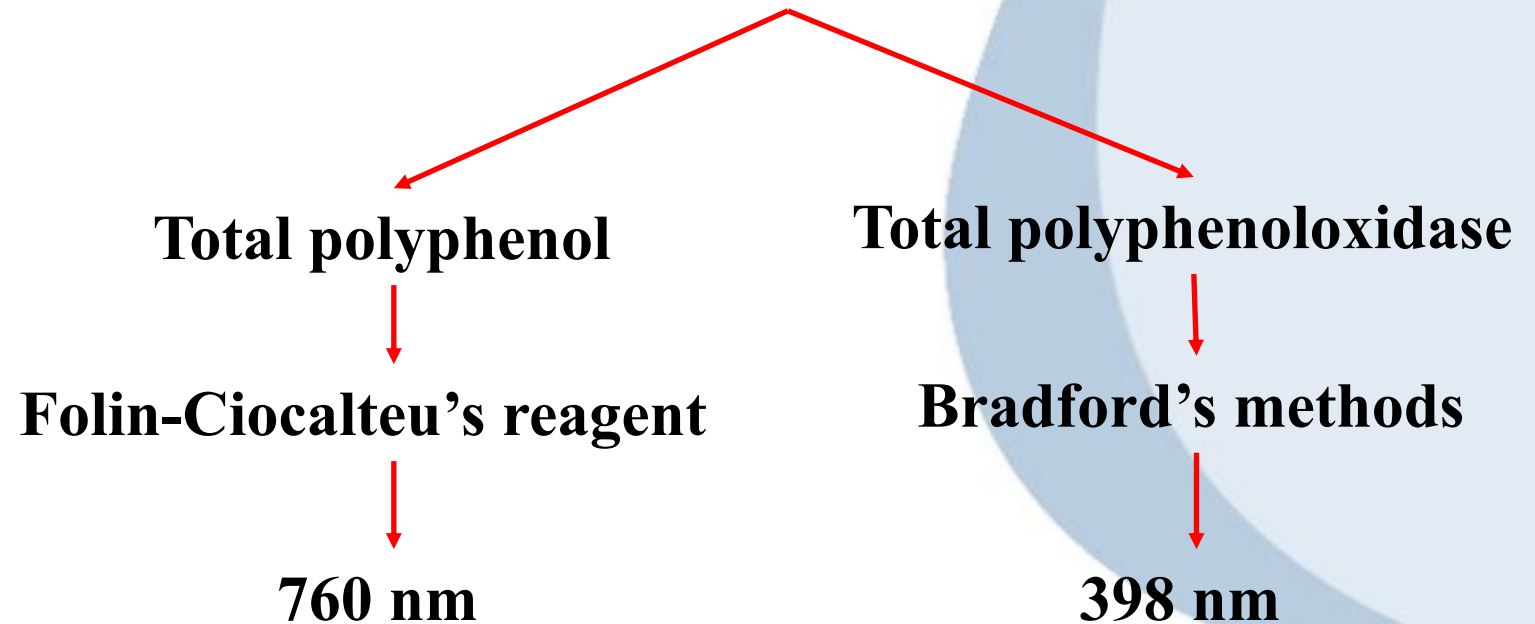
Total number of berries

Maximum value of the considered severity class

Total number of berries



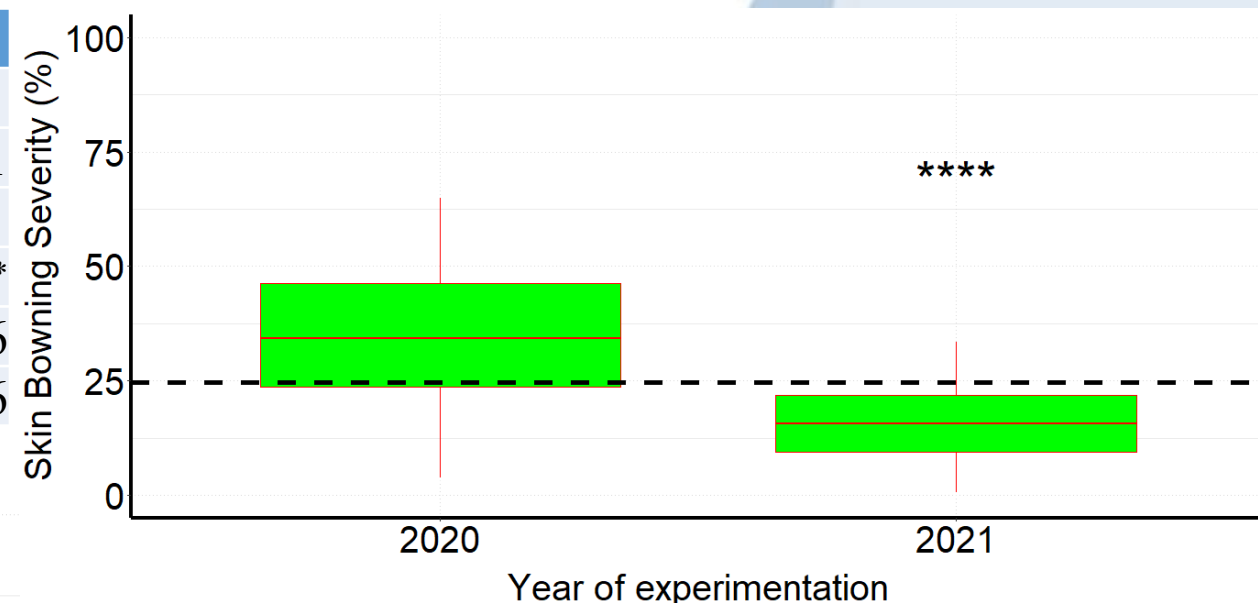
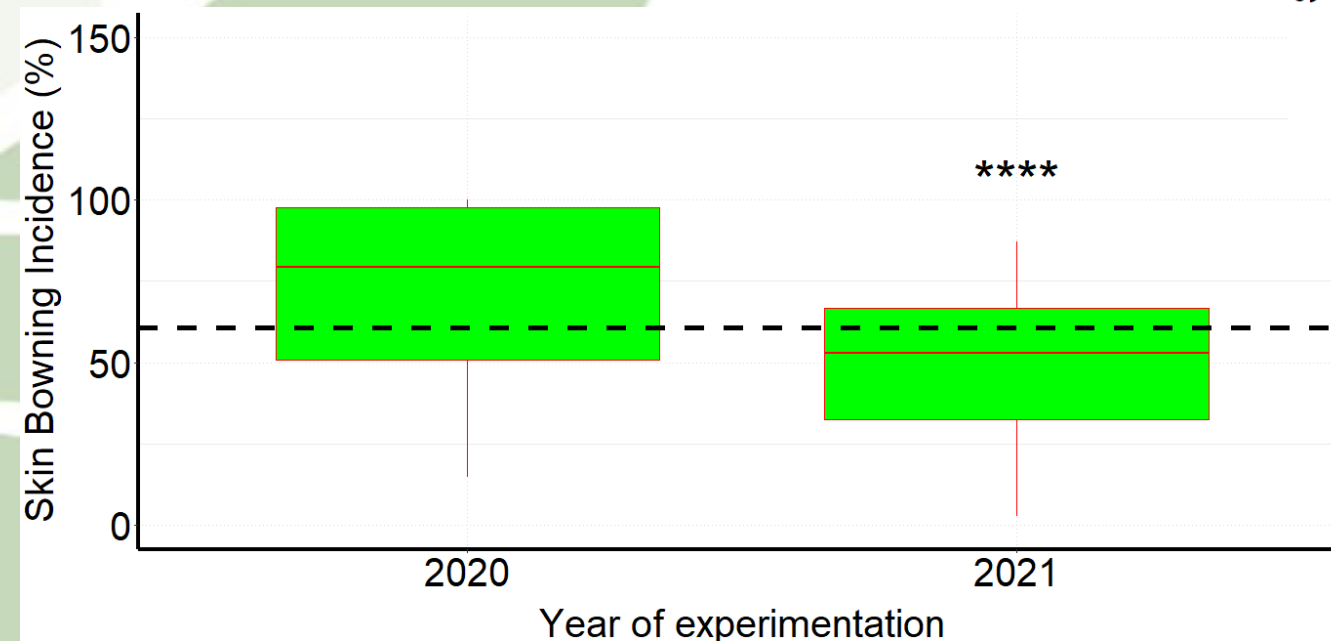
Spectrophotometric evaluation of:



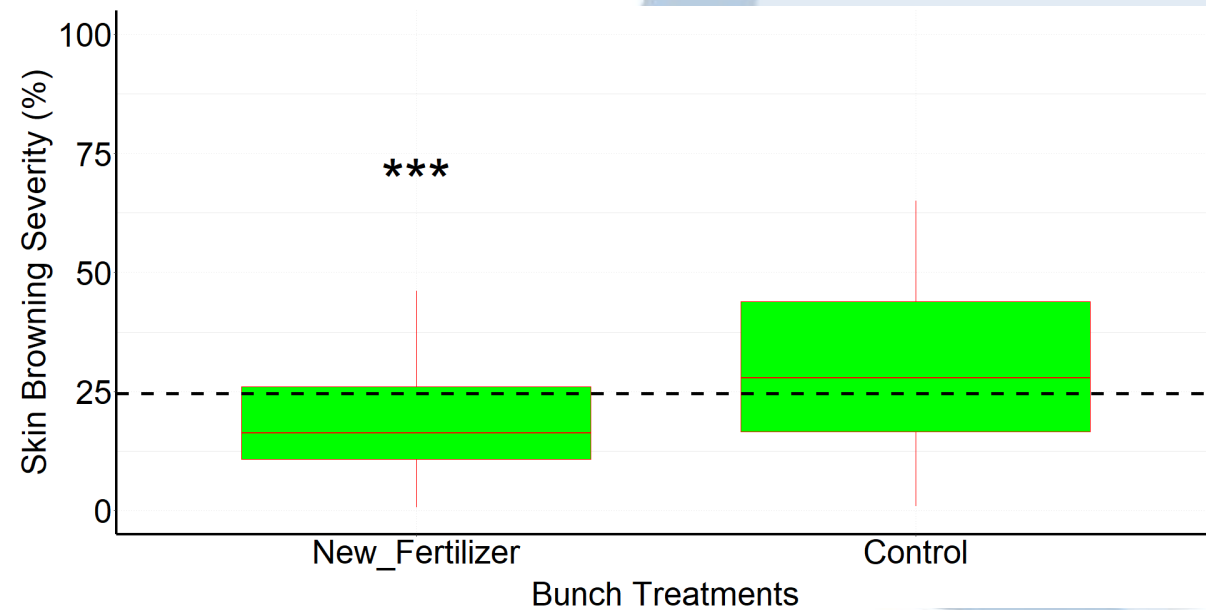
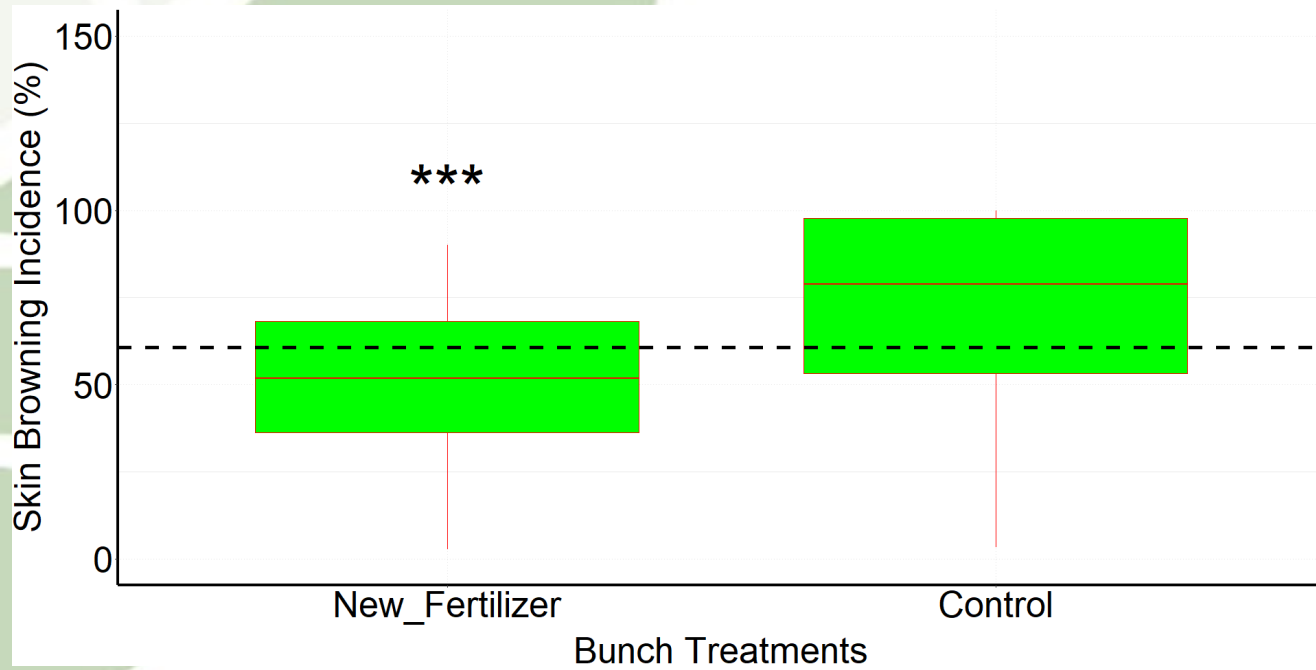
Statistical analysis:

- **Collected data were analyzed using the Kruskal-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.**

	SkBI			SkBS		
	Df	χ^2	<i>p-value</i>	Df	χ^2	<i>p-value</i>
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

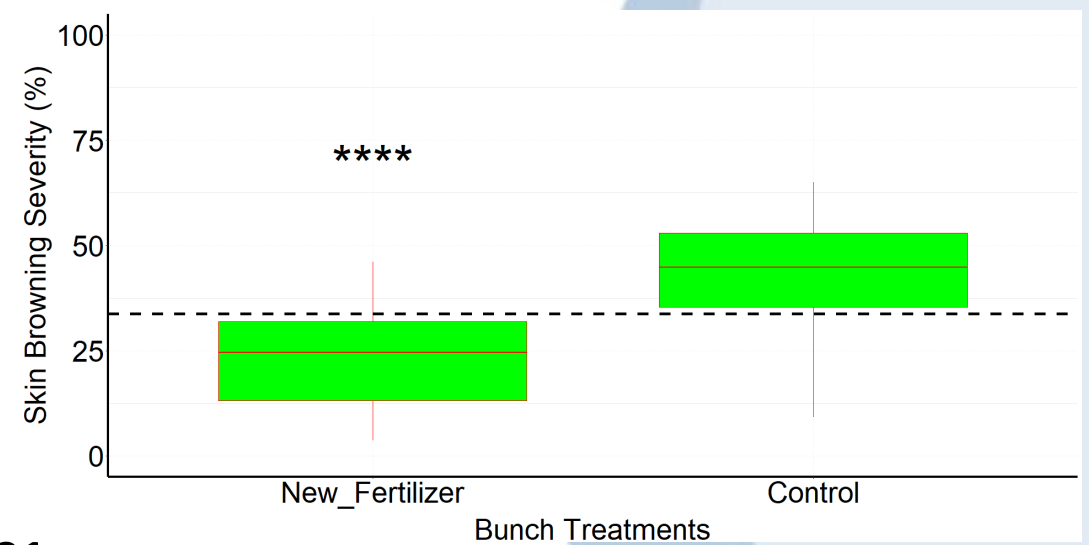
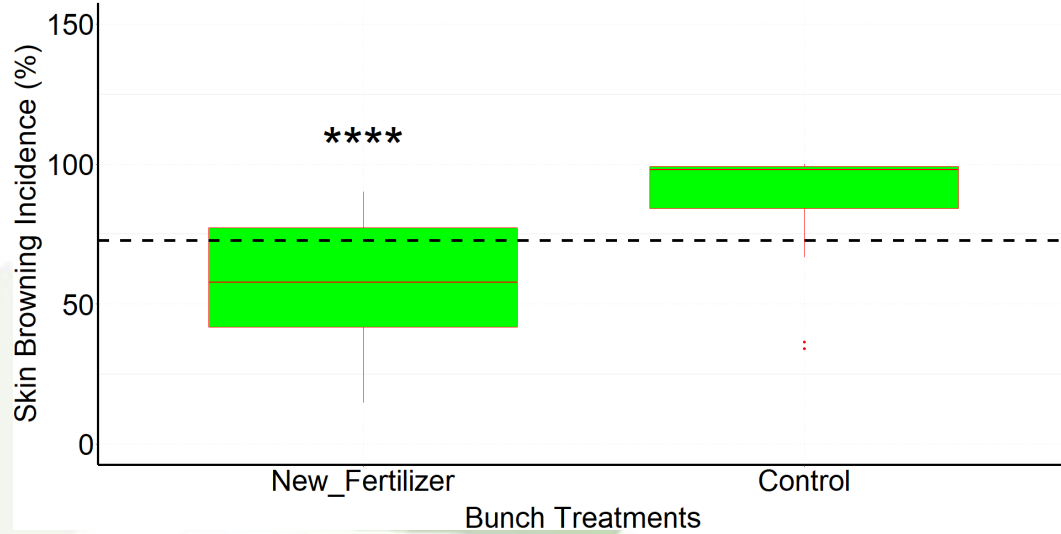


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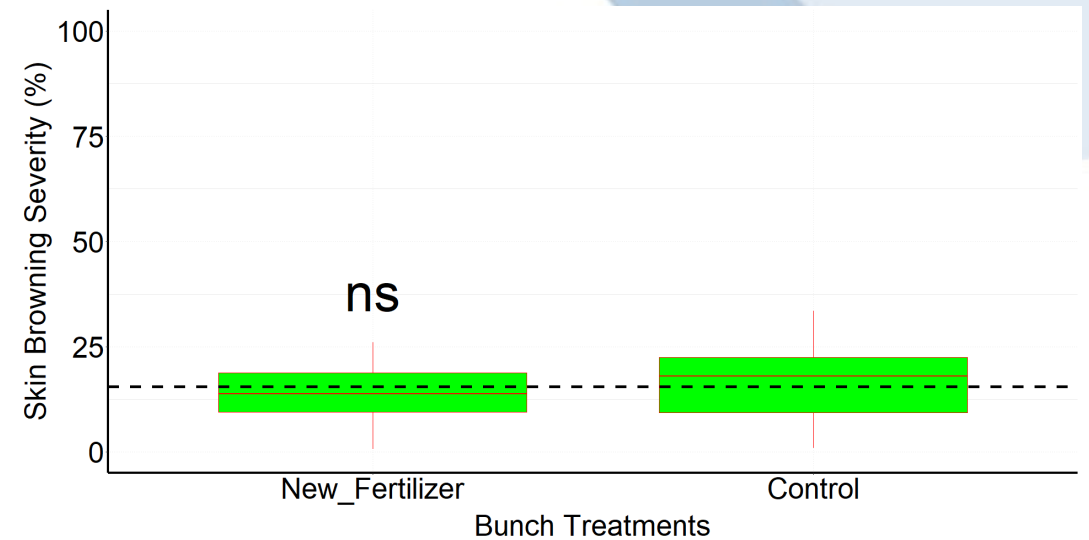
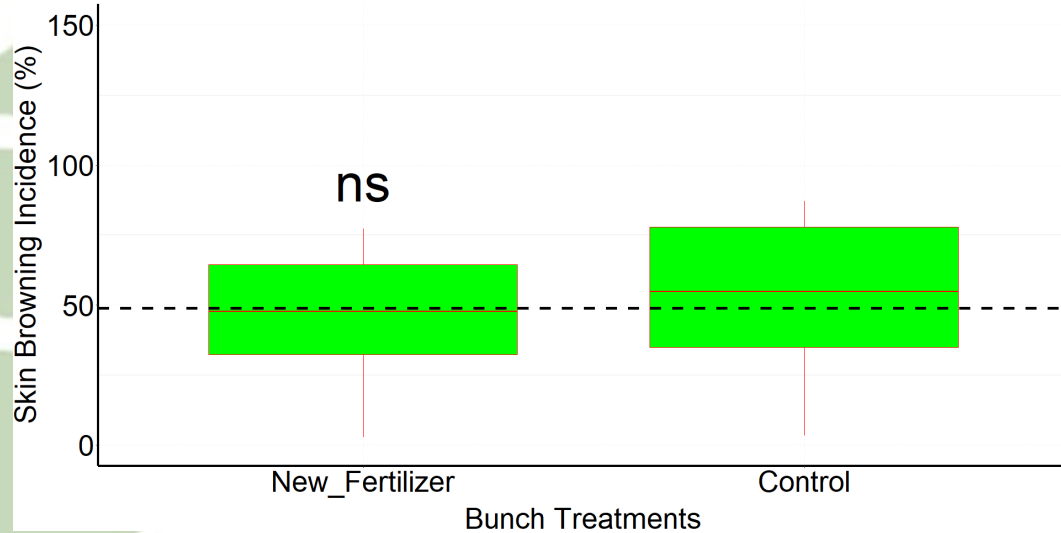


RESULTS

Field Trial_2020

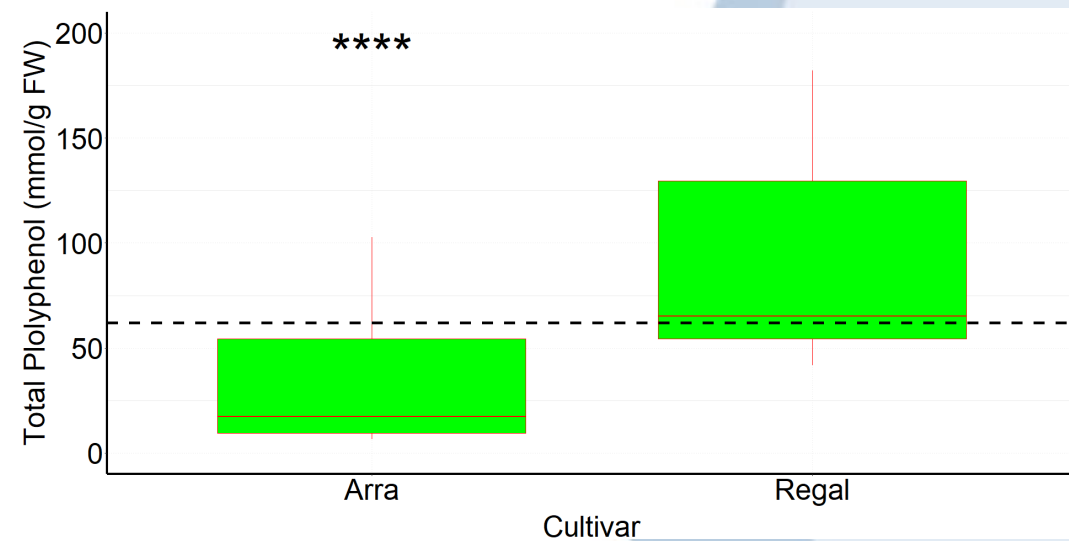


Field Trial_2021



RESULTS

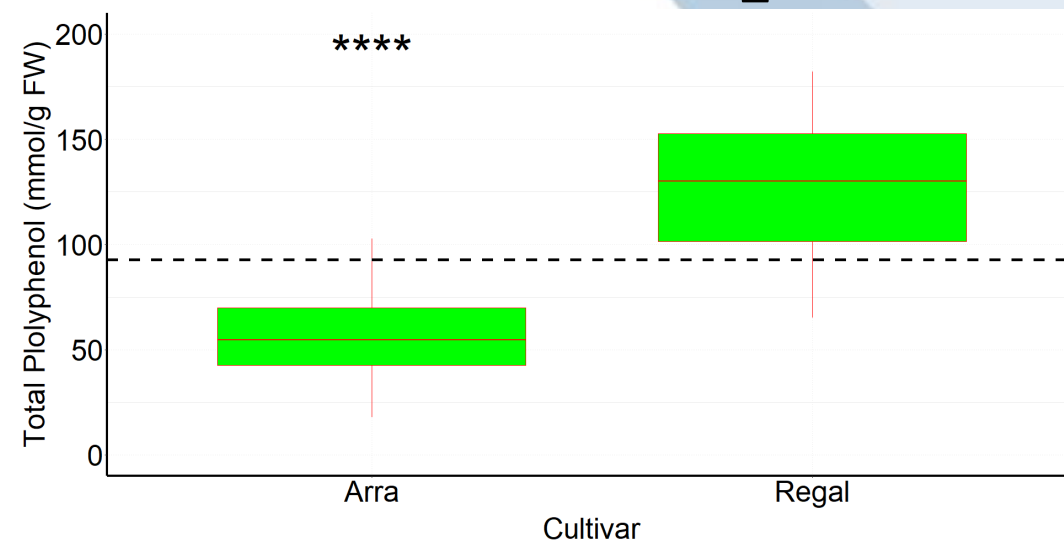
	PFT			PPO		
	Df	χ^2	<i>p-value</i>	Df	χ^2	<i>p-value</i>
Cultivar	1	3,5403	< 0,0001***	1	2,4822	0,1151
Year	1	4,2627	< 0,0001***	1	1,0981	0,2947
Treatment	1	0,009074	0,9241	1	10,64	0,001111**
Block	2	0,049372	0,9756	2	0,003319	0,9835
Time	3	5,61	0,1322	3	50.854	<0,0001***



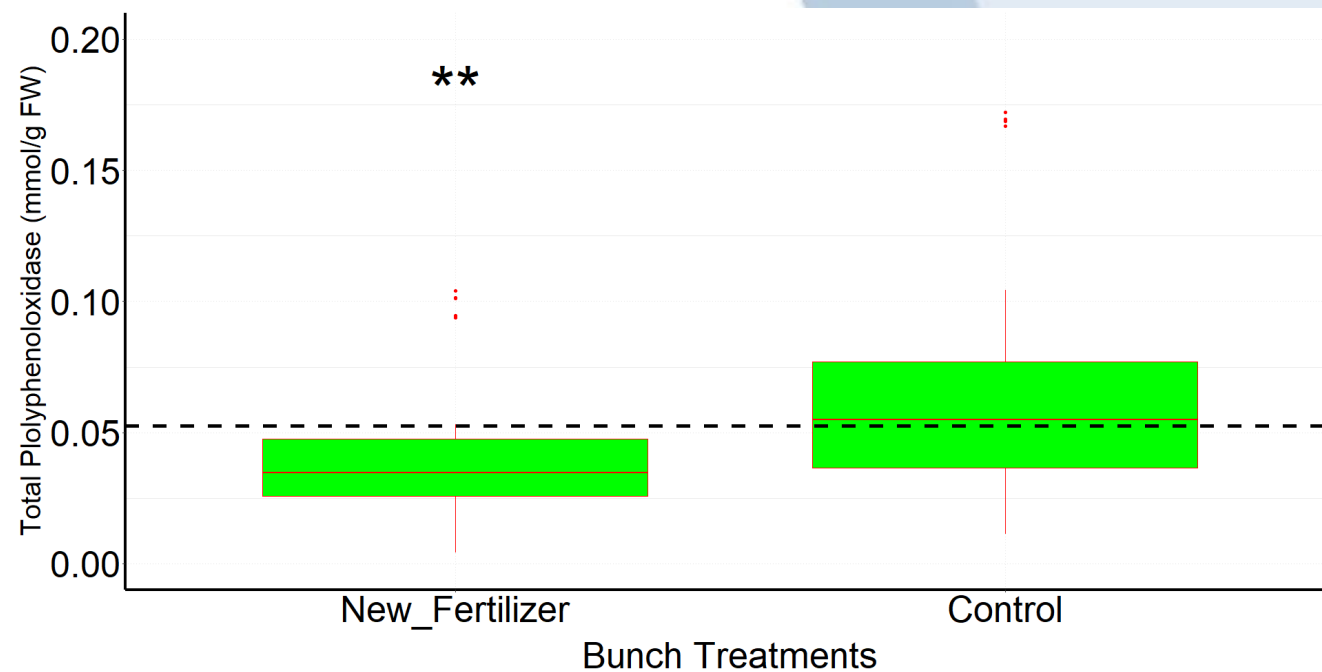
Field Trials 2020



Field Trials_2021

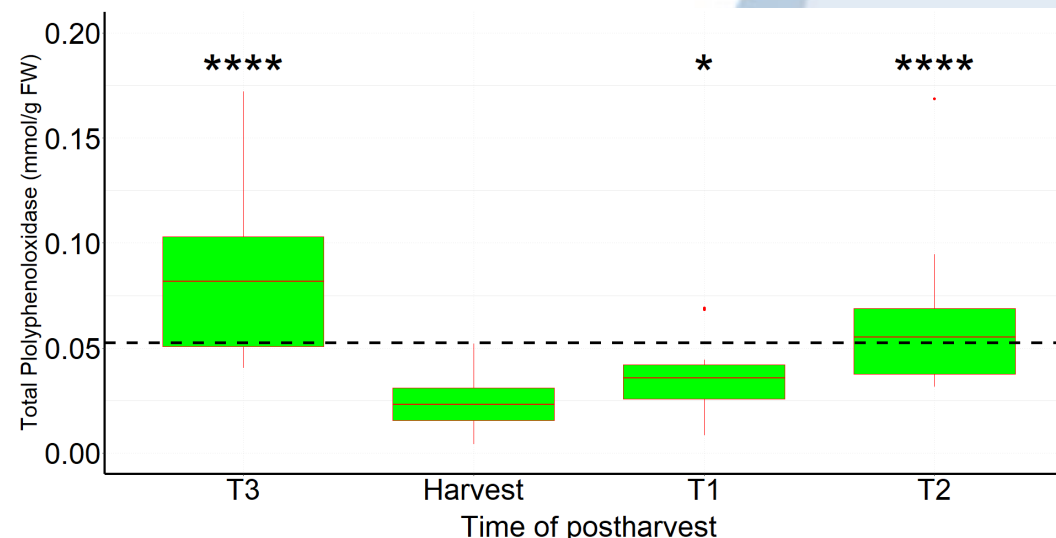


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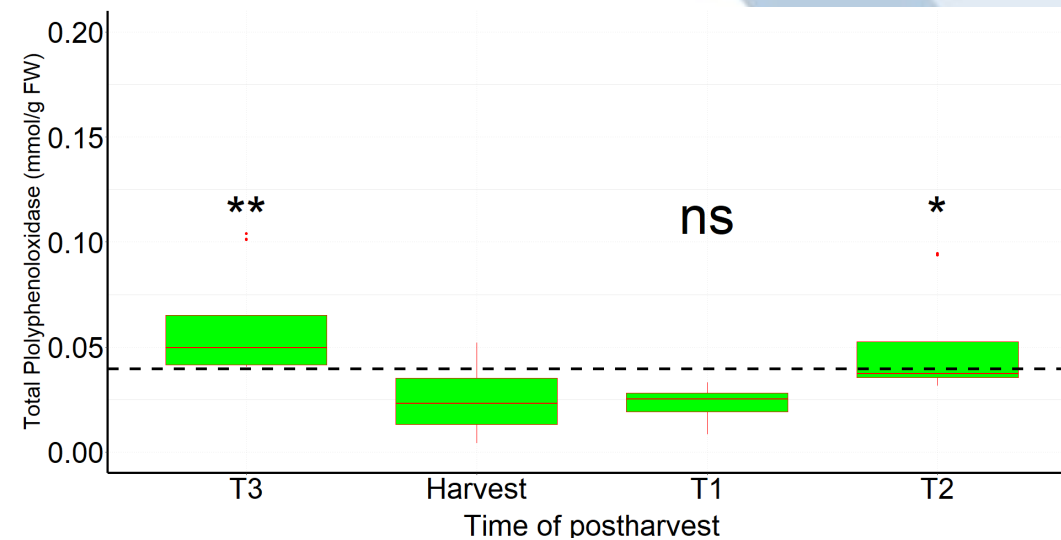
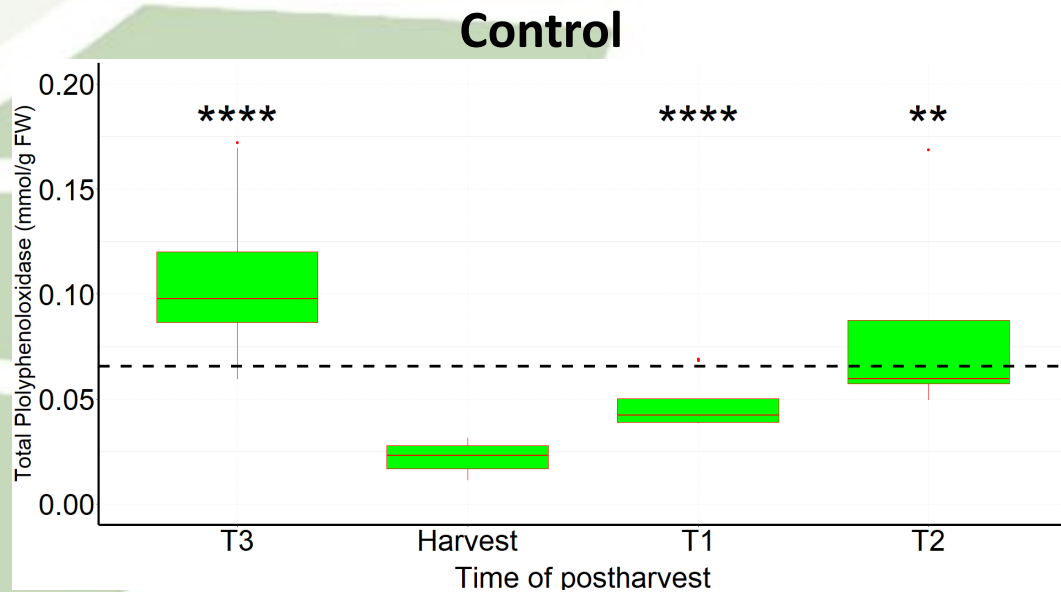


RESULTS

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Block	20,049372		0,9756	2	0,003319	0,9835
Time	3	5,61	0,1322	3	50.854	<0,0001***



New fertilizer



CONCLUSIONS

This fertilizer can represent a valid solution to mitigate the skin browning, both in terms of incidence and severity, in particular when the environmental conditions were favourable for their manifestation.

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

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



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**Thank you for
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