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Quality traits and antioxidant activity of sweet cherries after biostimulants application

Sílvia Afonso*, Marta Serapicos, Ivo Oliveira, Carlos Ribeiro, Alice Vilela, Anne S. Meyer, Berta Gonçalves

*safonso@utad.pt

Introduction

SWEET CHERRY

APPEARANCE

Bright colour, Sweetness, Taste, Flavour, Firmness

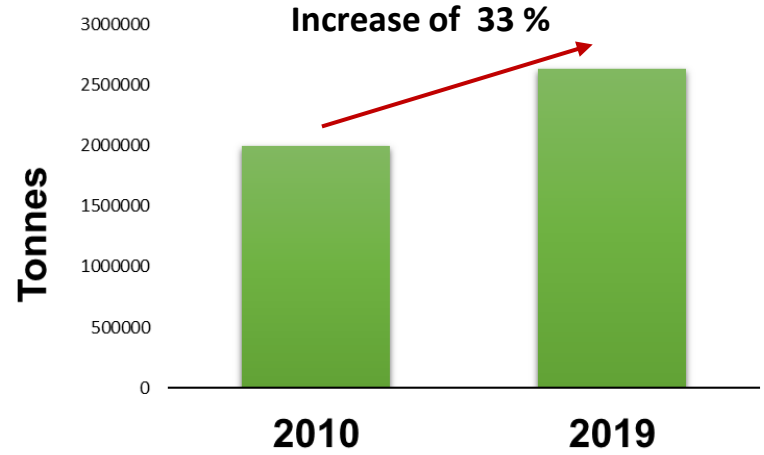
NUTRICIONAL VALUE

Minerals, Vitamins, Proteins, Water, Polyphenols

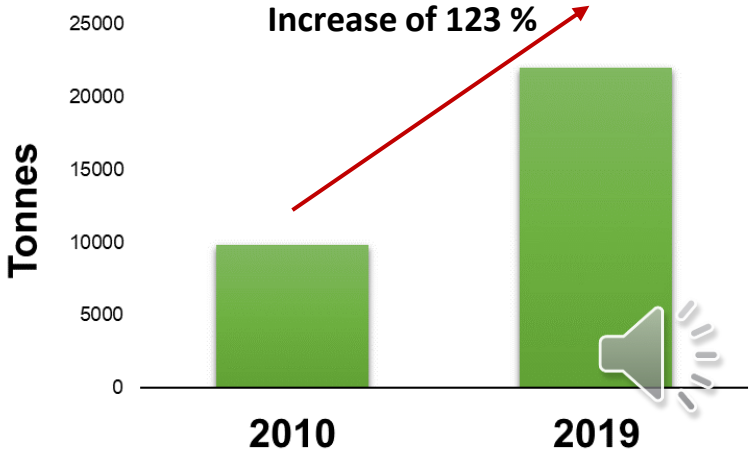
HEALTH BENEFITS

Anticancer, Antioxidant, Dietetic, Anti-inflammatory, Heart health

WORLDWIDE



PORTUGAL



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Introduction

BIOSTIMULANTS

Introduction

BIOSTIMULANTS

Beneficial bacterial and fungi 

Humic and fulvic acids 

Inorganic compounds 

Protein hydrolysates 

Seaweed extracts 

FRUIT QUALITY

- ↑ Nutricional quality
- ↑ Antioxidant compounds
- ↑ Antioxidant enzyme activities
- ↑ Total soluble solids
- ↑ Energy and nutriente transportation

SHOOT GROWTH

- ↑ Leaf surface area
- ↑ Crop yield
- ↑ Shoot and root length

PLANT PHYSIOLOGY

- ↑ Chlorophyll content
- ↑ Photosynthetic activity
- ↑ Stomatal condutance
- ↑ Relative water content
- ↑ Tolerance to abiotic and biotic stresses

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Objectives

Application of two concentrations of seaweed-based and glycine betaine biostimulants and their combination

quality and antioxidant traits on sweet cherry fruits

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Material and methods

PLANT MATERIAL AND EXPERIMENTAL DESIGN

Commercial orchard located in Alufinha, Resende, Portugal

Age: 8 years old

Rootstock: *Santa Lucia* 64

Cultivars: *Lapins*

8 trees / treatment

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Material and methods

PLANT MATERIAL AND EXPERIMENTAL DESIGN

Glycine-betaine

0,25 % (GB <)
0,40 % (GB >)

Ecklonia maxima

0,15 % (SW <)
0,30 % (SW >)

Mix

0,25 % (GB <)
0,15 % (SW <)

Control

Distilled water

BBCH scale

Stage 77 | Stage 81 | Stage 89

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Material and methods

SWEET CHERRY QUALITY TRAITS

Length (mm)

Width (mm)

Diameter (mm)

Weight (g)

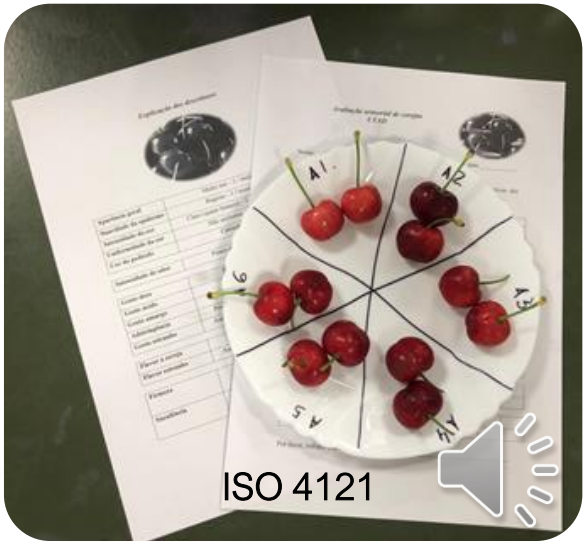
pH

Soluble solids content (SSC, °Brix)

Total acidity (TA, % citric acid)

Maturity Index (MI) = SSC / TA

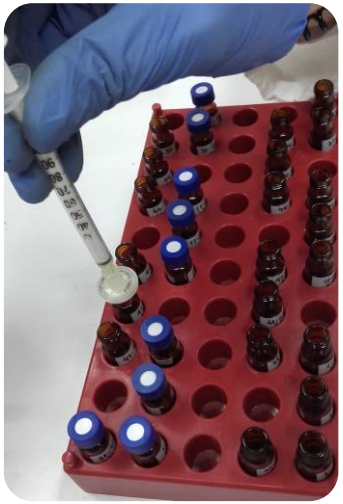
ISO 6658



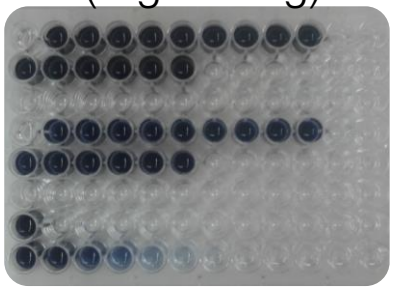
ISO 4121

Material and methods

SWEET CHERRY ANTIOXIDANT TRAITS

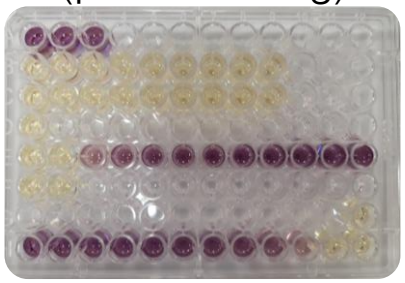


Total phenolic
(mg GAE/g)



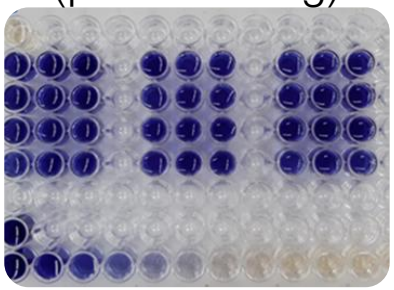
765 nm

DPPH
(µmolTrolox/g)



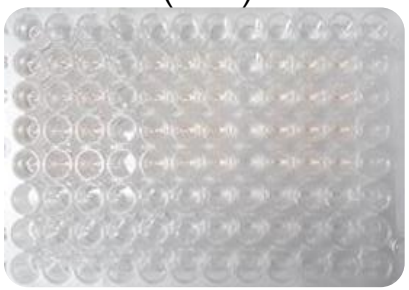
517 nm

FRAP
(µmolTrolox/g)



593 nm

β-carotene
(I %)



470 nm

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Results

QUALITY TRAITS

Lapins	Length (mm)	Width (mm)	Diameter (mm)	Weight (g)
C	23.09 ± 1.30 d	24.64 ± 1.72 c	21.42 ± 1.23 d	7.50 ± 1.30 d
GB<	25.36 ± 0.94 c	27.89 ± 0.89 a	23.74 ± 0.64 ab	10.35 ± 0.83 b
GB>	24.26 ± 0.61 a	26.63 ± 1.00 b	23.12 ± 0.75 bc	9.25 ± 0.82 c
SW<	25.01 ± 0.81 ab	27.61 ± 1.00 a	24.02 ± 1.06 a	10.37 ± 0.76 b
SW>	25.31 ± 0.89 a	28.25 ± 1.07 a	23.88 ± 0.86 a	11.04 ± 0.83 a
Mix	24.34 ± 0.89 bc	26.53 ± 0.87 b	22.58 ± 0.70 c	8.89 ± 0.58 c
p-value	< 0.001	< 0.001	< 0.001	< 0.001

Control fruits recorded **smaller dimensions**

Fruits sprayed with **SW> treatment** recorded **higher dimensions**

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Results

QUALITY TRAITS

Lapins	SSC (°Brix)	pH	TA (% citric acid)	MI (SSC/TA)
C	14.28 ± 0.19 c	3.72 ± 0.08	0.50 ± 0.01 a	28.59 ± 0.61 d
GB<	15.93 ± 0.42 ab	3.73 ± 0.07	0.50 ± 0.01 a	31.65 ± 0.31 c
GB>	15.23 ± 0.25 bc	3.69 ± 0.07	0.46 ± 0.00 b	33.43 ± 1.14 bc
SW<	16.13 ± 0.50 ab	3.73 ± 0.03	0.46 ± 0.02 b	34.91 ± 0.76 ab
SW>	16.30 ± 0.36 a	3.73 ± 0.03	0.45 ± 0.01 b	36.27 ± 1.18 a
Mix	16.33 ± 0.38 a	3.68 ± 0.05	0.45 ± 0.00 b	36.25 ± 0.93 a
p-value	< 0.001	0.807	< 0.001	< 0.001

SSC and **MI** values **increased** with the application of **SW>** and **Mix teatments**

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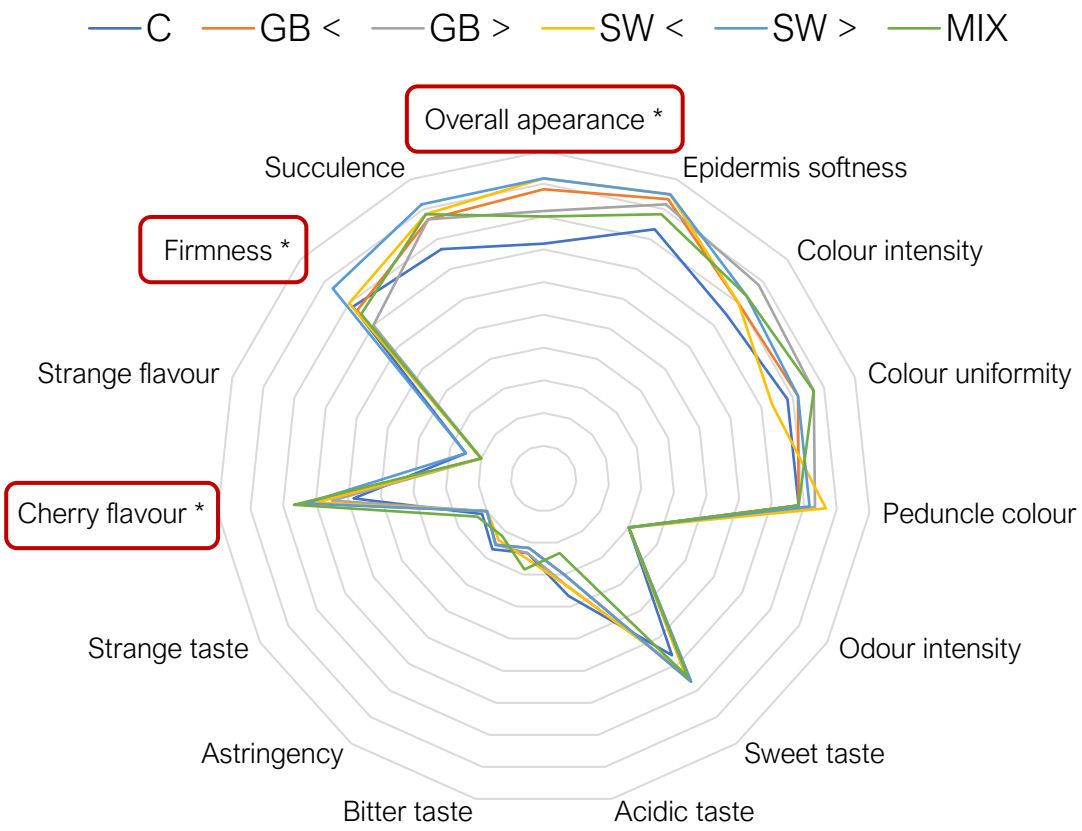
Results

SENSORY PROFILE



Overall appearance and **firmness enhanced** when fruits were sprayed with both **SW treatments**

Cherry flavour was **stronger** with **SW>** and **MIX treatments**

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Results

ANTIOXIDANT TRAITS

Lapins	Total phenolic (mg GAE/g)	DPPH (µmol Trolox/g)	FRAP (µmol Trolox/g)	*β*-carotene (I %)
C	12.52 ± 0.49 a	17.49 ± 0.08 a	55.36 ± 1.02 b	90.73 ± 4.85 a
GB<	11.20 ± 0.17 ab	17.11 ± 0.04 bc	49.20 ± 1.30 c	85.02 ± 2,80 ab
GB>	10.42 ± 0.40 b	16.88 ± 0.07 c	45.22 ± 1.53 c	79.14 ± 4,29 b
SW<	12.32 ± 0.53 a	17.45 ± 0.03 a	55.47 ± 2.16 b	92.40 ± 0,84 a
SW>	11.18 ± 0.94 ab	17.34 ± 0.25 a	49.39 ± 2.26 c	88.13 ± 1,51 a
Mix	11.94 ± 0.54 ab	17.56 ± 0.09 a	61.54 ± 3.24 a	92.82 ± 0,18 a
p-value	0.005	< 0.001	< 0.001	< 0.001
Correlations between total phenolic and antioxidante activity		0.647*	0.669*	0.724**

* *p-value* < 0.01
** *p-value* < 0.001

Cherries treated with **Mix** treatment had a **higher antioxidant capacity**

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Conclusions

Pre-harvest treatments:

Treatments resulted in improved sweet cherry characteristics:

- *Ecklonia maxima* seaweed extract at high concentration treatment can **increment quality traits** and **sensorial characteristics**
- The **Mix** treatment (Ecklonia maxima + Glycine-betaine) **increased antioxidant** capacity

safonso@utad.pt

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Thank you for your attention