Comparison of osmotic dehydration of Dixiland and Elegant Lady peach slices in glucose and sucrose solutions

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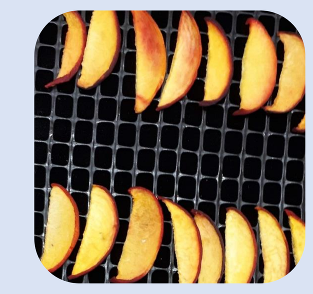
Introduction

Peach (*Prunus persica*) is a stone fruit with a fleshy pulp and a delicate aroma. Peach provides vitamins, fiver and antioxidant compounds, among others. Nevertheless, it is a perishable fruit. Dried fruit (D) is a strategy to maintain the provision of this healthy fruit during the whole year. Osmotic dehydration (OD) previous conventional drying is a pre-treatment applied to fresh fruit in order to prevent browning or sugar caramelization during prolonged hot air exposure. Here, the effects of sugar type and cultivar on the nutritional and nutraceutical properties were studied using slices of peach of two commercial cultivars Dixiland (DX) and Elegant Lady (EL) using OD with sucrose or glucose as a pre-treatment before conventional drying (D).

Materials and methods

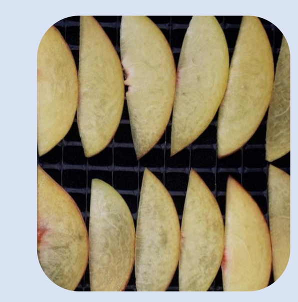
- Dixiland (DX) and Elegant Lady (EL) Fresh fruit. (Whole and mature)
- 2 min wash with chlorinated water, pH 6.8 (200ppm) + wash with tap water
- Slicing with ceramic knife (2 mm)
- 2 min Anti-browning treatment (1% (w/v) ascorbic acid and 0.5% (w/v) citric acid) + 30 min drain on absorbent paper
- 3 h incubation in 47°Brix sucrose/glucose + 2% (w/v) $CaCl_2$ at 40°C under stirring
- Drying in oven at 58°C until 12-15 water content

Osmotically dehydrated samples + hot-air drying (OD+D)



Osmotically dehydrated samples (OD)

Fresh samples (F)

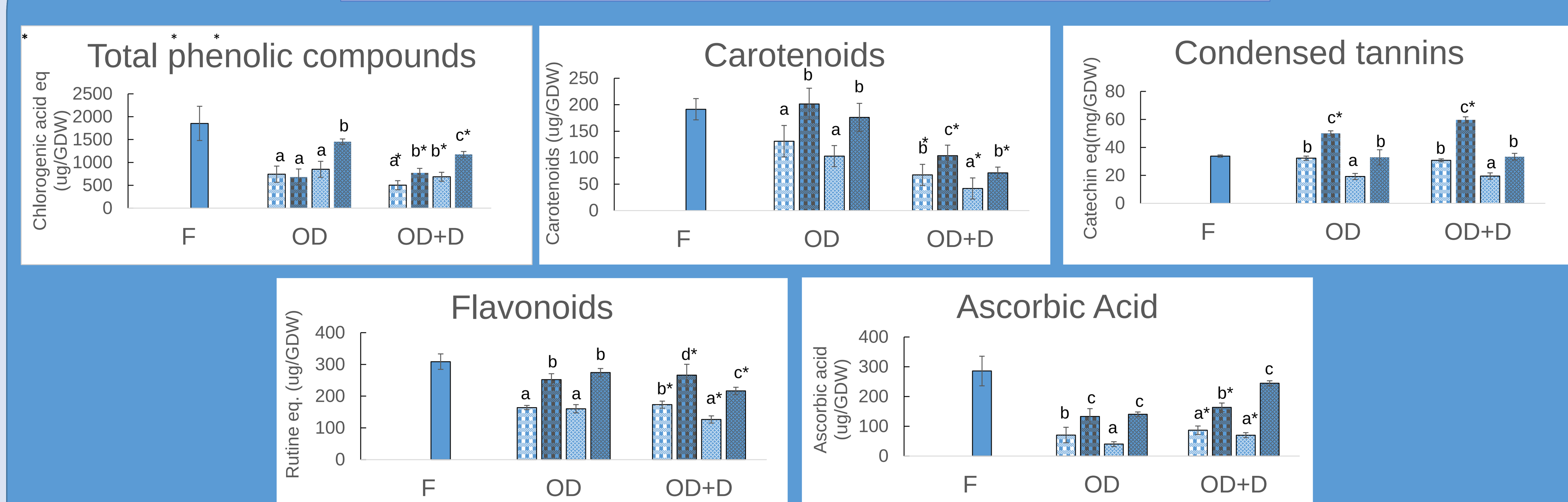


Flavonoids[1], carotenoids[2], phenolic compounds[3], ascorbic acid[4], total proteins[5], antioxidant capacity[6], sorbitol, sucrose[8] and glucose[7] quantification. Colour measurement[9].

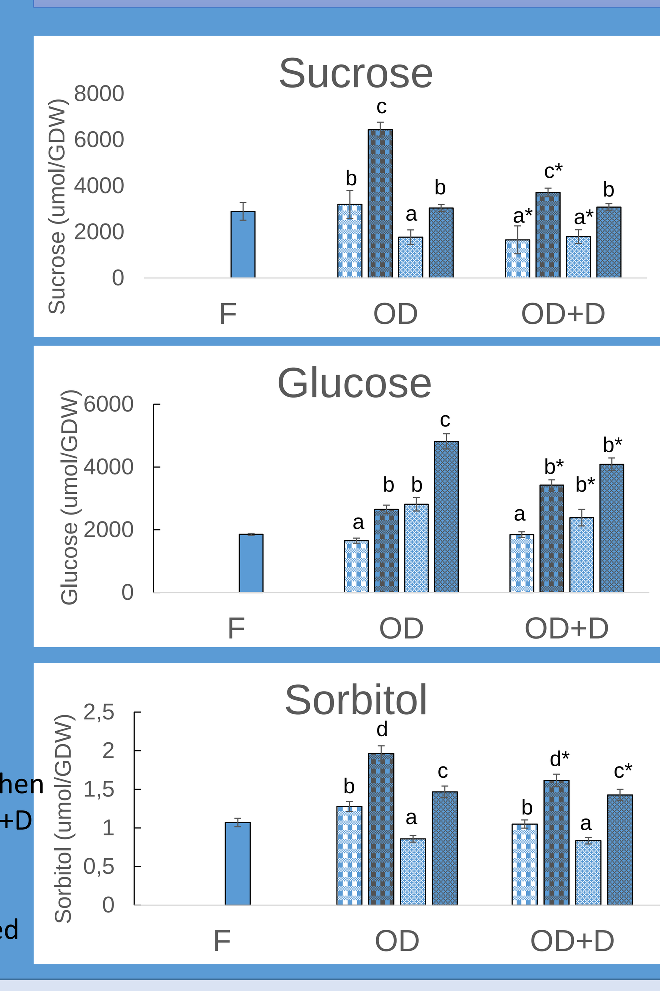
Statistics: Within OD or OD+D samples, values with different letters are statistically significantly different (p <0.05), according to ANOVA followed by Tukey tests. T-test was performed to compare F and OD+D samples, the presence of (*) indicates that the values are statistically different.

Elegant Lady

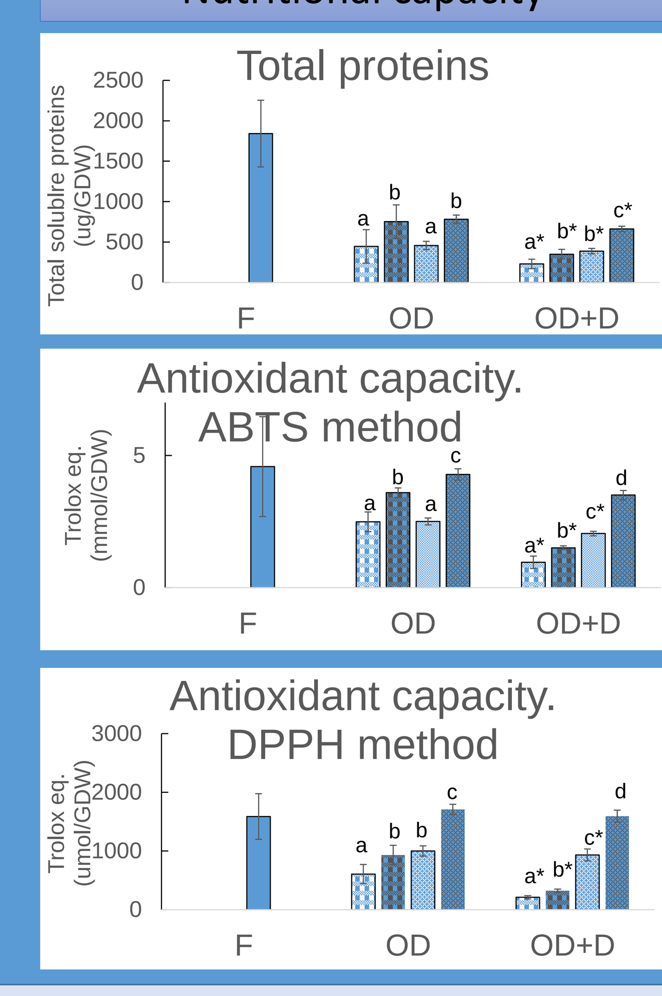
Total biactive compounds

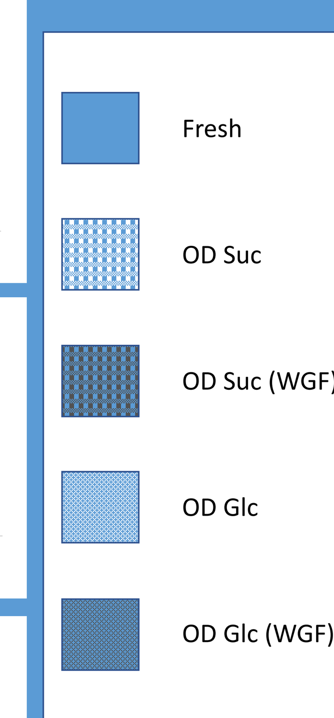


Sugars



Nutritional capacity

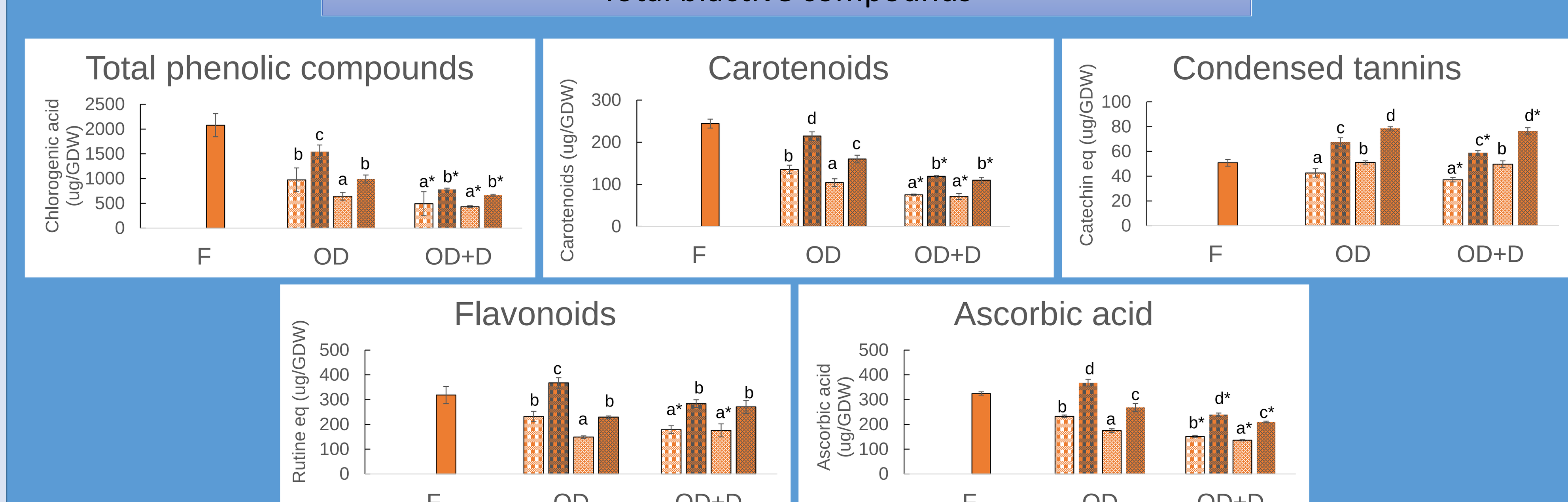




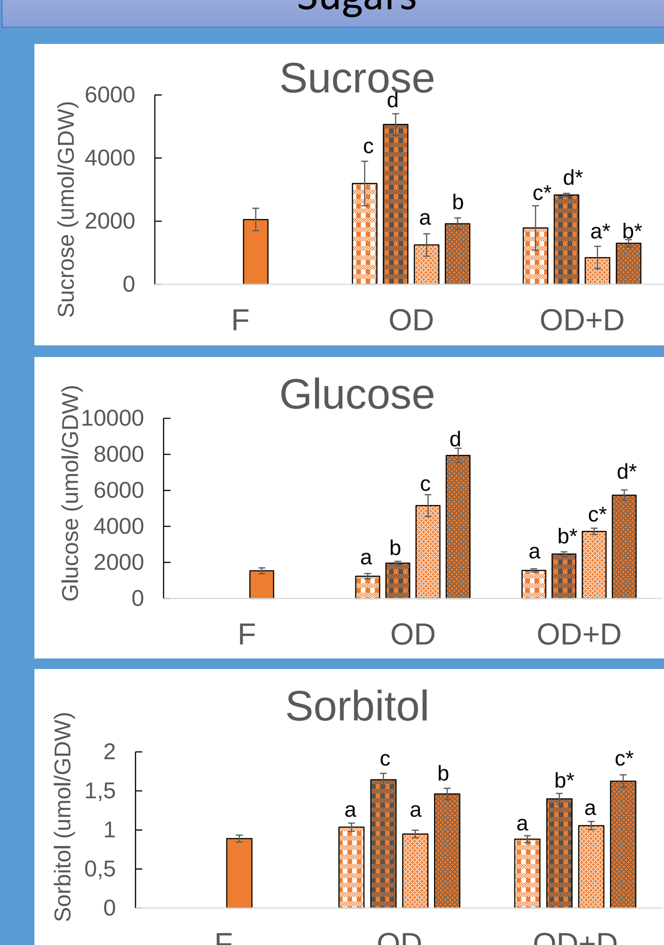
- As expected, samples that were incubated with sucrose or glucose exhibited a grater amount in these sugars.
- Phenolic compounds, flavonoids and carotenoids decreased in OD+D irrespectively of the sugar. Ascorbic acid decreased in OD+D slices; nevertheless, when considering the amount of weight gained by the fruit, ascorbic acid didn´t change in samples treated with glucose.Antioxidant capacity decreased in OD+D incubated with sucrose, while when using glucose the net capacity was not modified.
- Total soluble proteins decreased using either glucose or sucrose in OD+D slices with respect to F.
- While condensed tannins decreased with respect to F, in a DW basis, the use of a correction factor indicates that the net amount of tannins was increased upon treatment with sucrose.

Dixiland

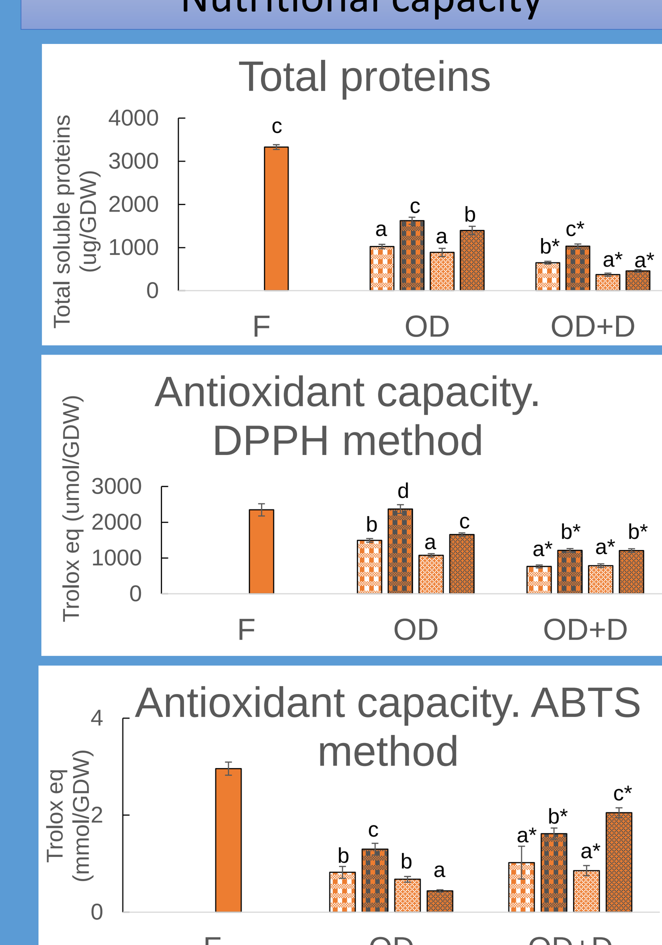
Total biactive compounds

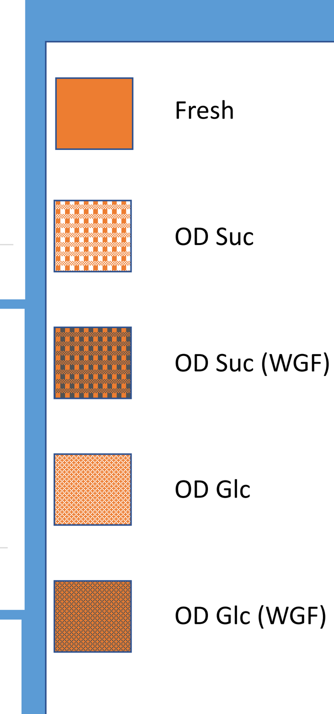


Sugars



Nutritional capacity





- As expected, samples that were incubated with sucrose or glucosa exhibit a grater value in this parameters.
- OD+D slices incubated with sucrose or glucose showed a decrease in total phenolics, total proteins, flavonoids, ascorbic acid, carotenoids, and antioxidant activity measured by DPPH and ABTS methods with respect to F in a DW basis.
- While condensed tannins decreased with respect to F, in a DW basis, the use of a correction factor indicates that the net amount of tannins was increased upon treatment with sucrose or glucose.

Colour (La*b* space)

Color	EL F	EL OD	EL OD+D	DX F	DX OD	FD OD+D
(L*)	66.3±5.8 b	72.6±3.1c	61.3±4.3 a	71.5±0.9 b	79.5±2.5 c	62.6±2.2a
(a*)	11.4±3.7 b	6.3±0.9a	9.4±3.8 b	2.5±1.9 a	9.5±1.4 b	4.1±1.3a
(b*)	43.5±3.9 a	41.3±2.2a	39.5±3.4 a	48.7±1.5 b	43.2±1.1 a	42.5±0.1a

- **L→ Brighteness. 0=black, 100= White.**
- **a* → red-green range. <0= Green, >0= red.**
- **b*→ yellow- blue range. <0=blue, >0= yellow.**

Weight gain factor (WGF)

Cultivar	Sucrose	Glucose
Dixiland	1,58±0,16 a	1,53±0,11 a
Elegant Lady	1,54±0,04 a	1,71±0,11 a

- The factor to consider the weight gain was calculated to take into consideration the fruit up-take of sucrose or glucose during the treatment.
- The WGF didn´t differ between cultivars or sugars used.

Conclusion

- **In general, there are no main differences in the results obtained when using glucose or sucrose as osmotic agent. In addition, EL and DX showed essentially the same behavior of response.**
- **OD+D slices were less luminous than F irrespectively of the genotype.**
- **Tannins were induced by the treatment.**

References

[1]Müller et al. Biol. Plant. 54: 403–414 (2010). [2]Sass-Kiss et al. Food Res. Int. 38: 1023-1029 (2005). [3]Cantin et al. J. Agric. Food Chem. 57: 4586–4592 (2009). [4]Okamura M. Clin. Chim. Acta 103: 259–268 (1980). [5]Bradford et al. Anal. Biochem. 72: 248-254 (1976). [6]BrandWilliams et al. LWT - Food Sci. Technol. 28: 25-30 (1995). Drogoudi et al. Postharvest Biol. Technol. 115: 142-150 (2016). [7]Kingsley et. Clin. Chem. 6: 466–475. (1960). [8] Gerlach, U., & Hiby, W. Sorbitol dehydrogenase. In *Methods of enzymatic analysis* (pp. 569-573). Academic Press. (1974). [9] Borsani, J., et al. (2009). J. *Exp.* Bot. 60: 1823-1837. *arXiv:1705.02999*. (2017).