Effects of hot air treatment and storage temperature on ´Camarinha` (*Corema album* L.D. Don) postharvest quality

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Introduction

The *Corema album* L. D. Don, 'Camarinha` or the 'white crowberry' is white-berried perennial adapted to sandy soils along the Atlantic coast in the Iberian Peninsula [a].

The main challenges related to this crop are the short-term production period, low production volume capacity, uneven fruit ripening and quality loss (e.g colour) during storage and transportation to the final market.

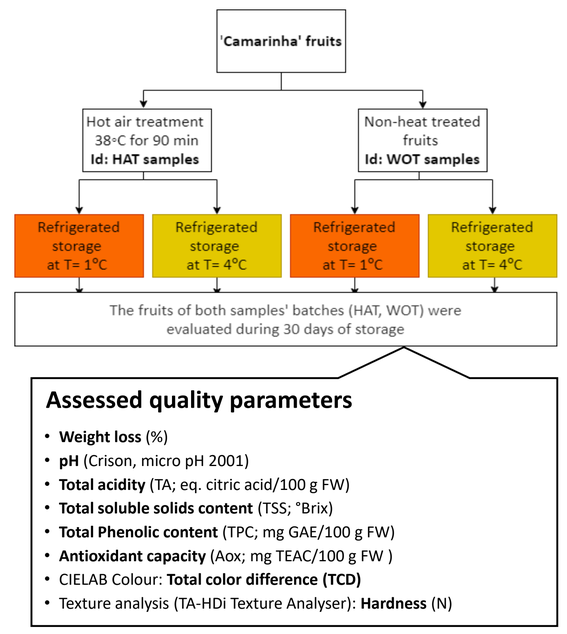
The perishability of the round, white, berry-like drupes is very high. The leading causes of the decrease in the quality of these fruits are rot, shriveling due to loss of water, discoloration and over-ripening, compromising their shelf life [b].

The postharvest treatments of fresh produce aim to delay the physiological processes of senescence, reduce the development of physiological disorders and minimize the risk of microbial growth. Among the existing postharvest treatments, hot air heat treatment have successfully been applied to prevent quality losses of other small fruits[c].

This preliminery study aimed to evaluate the effects of hot air treatment (HAT - 38°C during 90 min) and storage temperature (1° and 4°C) on the postharvest storage quality of "Camarinha" fruit, to improve shelf-life and allowing its commercialization.

Material & Methods

- The fruits were placed in Petri dishes (n=25).
- The biometric parameters (longitudinal and transversal Ø - expressed in mm) were measured with a digital caliper



Conclusions

- ✓ The decay of Camarinha fruits during storage can be attributed to colour and texture parameters, as well as, fruits weight loss, since all other quality parameters evaluated did not show great differences;
- ✓ Still, regarding fruit´s weight loss, storage temperature of 1°C proved to be the best temperature condition to maintain fruit´s quality;
- ✓ The hot heat treatment evaluated (38°C - 90 min) appears to not have any effect on the maintenance Camarinha fruit´s quality during storage.

Results & Discussion

✓ Visual appearance and CIE colour parameters

The visual appearance of Camarinha's fruits, fresh samples (CTrol samples; t=0), heat-treated (HAT samples) and nontreated (WOT samples) stored under 1°C and 4°C for 30 days is show in Figure 1.

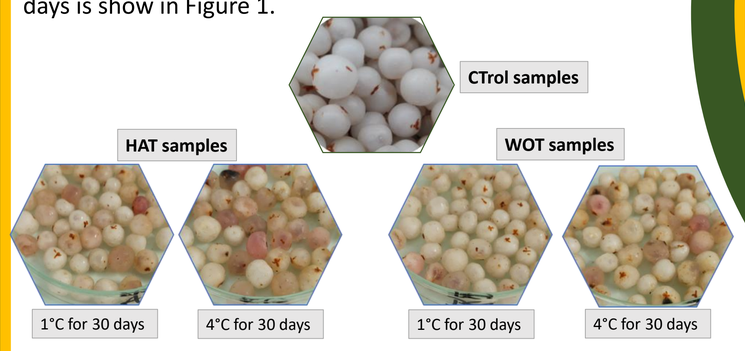


Figure 1. Visual appearance of Camarinha´s fruit

During storage, **TCD colour parameter** (average values) (Fig. 2) for treated and not treated samples increased slightly until the end of storage. This increase was more accentuate in treated samples storage at 4 °C. A better colour retention was observed at samples storage at 1°C.

However, a great dispersion of the measure's values was observed, revealing a non uniform colour development in the samples

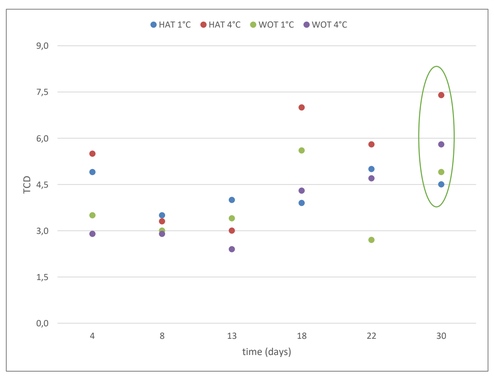


Figure 2. TCD colour parameter

✓ Texture evaluation

Hardness values (N) of Camarinha's fruits heat-treated (HAT samples) and nontreated (WOT samples) at the initial time and after 30 days of storage are presented in Table 1.

Hot air heat treatment of fruits caused a considerable decrease of hardness, compared to fresh (untreated) fruits (≈ 15%). Samples storage at 4 °C showing hardness higher values than samples storage at 1°C.

Table 1. Camarinha's fruits texture evaluation (hardness average values)

Time	Storage temperature	WOT samples	HAT samples
0 days		3.4±1.0	2.9±0.3
30 days	1°C	2.6±0.9	2.1±0.8
	4°C	2.7±1.0	2.7±1.6

✓ Fruit weight loss

Camarinha's fruits weight loss during storage was presented in Fig. 3 a and b, for HAT and WOT samples, respectively. Differences in this parameter increases were observed during storage for all the samples. Samples at 4 °C showing highest loss, corroborating with the results found for the texture evaluation.

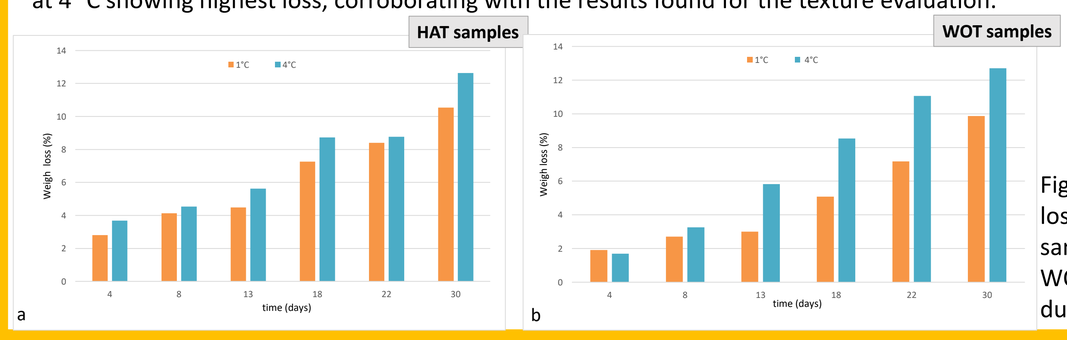


Figure 3. Weight loss for HAT samples (a) and WOT samples (b) during storage.

✓ Biometric Parameters

Biometric measurements were obtained from three independent samples, as shown, as an example, in Figure 4. Fruits had an average diameter between 9.5-10 mm, and no changes were observed during the storage period (30 d) at all the different conditions evaluated.

Figure 4. Samples of fresh Camarinha fruit

✓ Physic-chemical evaluation

pH, total acidity and total soluble solids content of Camarinha's fruits heat-treated (HAT samples) and nontreated (WOT samples) at the initial time and after 30 days of storage values, are presented in Table 3.

As can be noticed, the parameter evaluated did not show great variations between fresh samples, after treatment or after the 30 days of storage at different storage temperatures.

Table 3. Camarinha's fruits pH, Total acidity (TA) and Total soluble solids content (TSS) (average values)

	Fresh samples	HAT samples		WOTsamples	
	(0 day)	1°C (30 days)	4°C (30 days)	1°C (30 days)	4°C (30 days)
pH	2.8±0.0	2.8±0.0	2.5±0.0	2.8±0.0	2.6±0.0
TA (eq. citric acid/100 g FW)	1.3±0.1	1.3±0.0	1.8±0.0	1.7±0.0	1.4±0.0
TSS (°Brix)	7.9±0.7	7.6±0.4	7.8±0.3	6.7±0.4	7.2±0.2

✓ Total Phenolic content and Antioxidant capacity

The total phenolic content and antioxidant capacity of fresh and after 30 days of storage, for the different samples, are presented in Table 4. Samples storaged at 1°C revealed less total phenolic content at the end of storage. However, the antioxidant capacity didn´t decrease. Therefore, all the samples presented a slight increase at the end of the storage (30d), being higher for WOT samples_ 1°C.

Table 4. Camarinha's fruits total phenolic content and antioxidant capacity (average values)

Determination	T0	HAT samples (30 days - 1°C)	HAT samples (30 days - 4°C)	WOT samples (30 days - 1°C)	WOT samples (30 days - 4°C)
TPC (mg GAE/100 g FW)	54.6±1.7	48.5±0.2	56.2±1.2	51.1±3.3	54.3±5.2
Aox (mg TEAC/100 g FW)	3452.9±153.6	3548.7±93.5	3603.2±39.6	3607.9±388.7	3463.3±146.9

✓ References

[a] Oliveira, P.B. and Dale, A. (2012). *Corema album* (L.) D. Don, the white crowberry – a new crop. Journal of Berry Research , 2:123-133.

[b] Léon-Gonzalez, A.J., Truchado. P., Tomás-Barberán, F.A., LópezLázaro, M., Barradas, MC., Martín-Cordero, C. (2013). Phenolic acids, flavonols and anthocyanins in *Corema album* (L.) D. Don berries. Journal of Food Composition and Analysis 29: 58–63.

[c] Lu, J., Vigneault, C., Charles, M., Raghavan, V. (2007). Heat treatment application to increase fruit and vegetable quality. Stewart Postharvest Review. 3: 1-7.