# Heat Treatment Effects on Physical-chemical and Microbiological Quality of Whole Tomato (*Lycopersicum esculentum* L.) Fruit during Storage

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## OBJECTIVE

Heat treatment (HT – 42 ºC/30 min) effects on quality attributes of whole tomatoes (untreated and heat treated), at two ripening stages (turning and pink), during storage at 7 ºC, 85% RH for 14 days.

## INTRODUCTION

Tomato is a typical climacteric fruit characterized by a rapid softening, change in colour and fungal development, once the ripening process is initiated. These quality changes can be a limitation for the product shelf-life and commercialization.

Recently, studies on postharvest treatments, namely HT, applied on different whole fruits and vegetables demonstrated a decay control and a positive effect on the ripening process[1,2,3].

## MATERIALS & METHODS

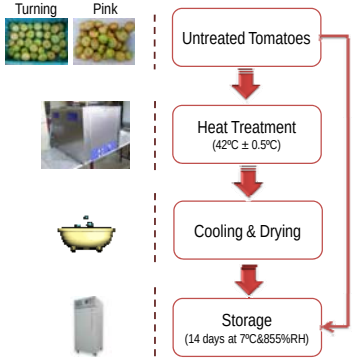



Fig. 1 – Flow diagram of untreated and heat treated tomatoes

Quality Attributes (analysis at 0, 7 and 14 days)

- ❑ CIELab parameters (L*,a*, b*, 12 replicates)

Fig. 2 – Minolta CR -300

- ❑ Texture (Maximum force – MF, N, 24 replicates)

Fig. 3 – TA-HDi Texture Analyser

- ❑ pH & soluble solids content (SSC, 6 replicates)
- ❑ Peroxidase[4] & pectinmethylesterase activity[5] (POD & PME, Abs.min.ml$^{-1}$, 6 replicates)
- ❑ Moulds and yeasts[6] ($Log_{10}$ CFU.g$^{-1}$, 3 replicates).

Data Analysis:

✓ Analysis of variance (Statistic v.7.0) – significant differences after HT and during storage between turning and pink tomatoes were detected with Scheffé test (significant at $p < 0.05$).

Table 1 – Initials values of quality attributes of untreated turning and pink tomatoes (mean ± standard deviation).

| Ripening Stage | L* | a* | b* | MF (N) | SSC (ºBrix) | pH | POD (Abs.min.ml$^{-1}$) | PME (Abs.min.ml$^{-1}$) | Moulds & Yeasts ($Lo_{10}$ CFU.g$^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|
| Turning | 48.07 ± 2.25 | -9.57 ± 1.18 | 22.90 ± 3.34 | 10.15 ± 1.77 | 3.98 ± 0.53 | 4.29 ± 0.04 | 5.45 ± 0.95 | 1.87 ± 0.19 | 3.02 ± 0.69 |
| Pink | 48.64 ± 2.95 | 1.81 ± 0.36 | 21.99 ± 3.31 | 8.38 ± 1.84 | 4.05 ± 0.14 | 4.29 ± 0.03 | 2.56 ± 0.15 | 2.53 ± 0.34 | 3.02 ± 0.69 |

## RESULTS

### Colour & Texture

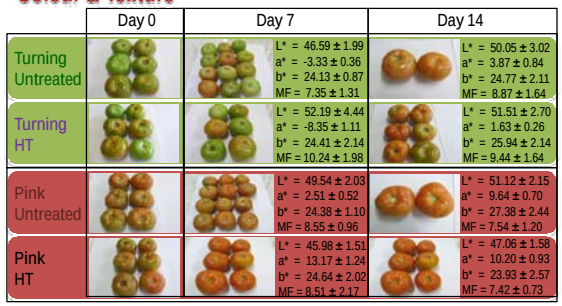



Fig. 4 – Photographs of untreated and HT tomatoes at ripening stage, turning and pink (values CIELab parameters & maximum force).

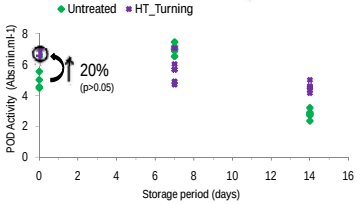
**After HT:**

- ❖ No significant differences ($p>0.05$) were found on colour parameters.
- ❖ HT did not affect the firmness of tomatoes ($p>0.05$).

**After storage**

- ❖ Tomato colour developed from green (chlorophylls) to red (lycopene).
- ❖ Both treated samples denoted maintenance of maximum force during storage ($p>0.05$).

### POD Activity



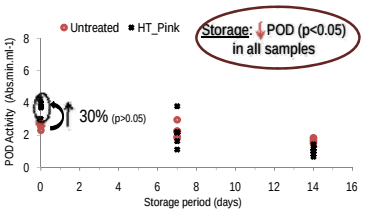
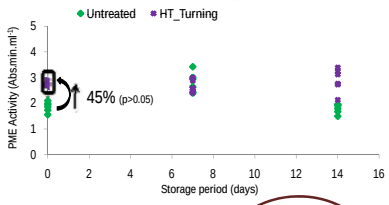




Fig. 5 – Evaluation of POD activity (Abs.min/ml) of unheated and heat treated turning tomatoes (HT_Turning) and heat treated pink tomatoes (HT_Pink) stored at 7ºC for 14 days.

### PME Activity



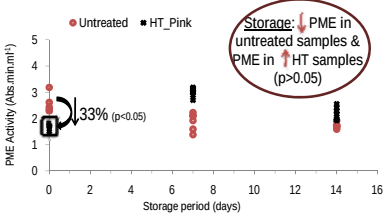
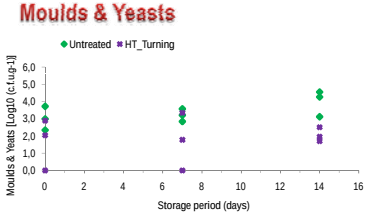




Fig. 6 – Evaluation of PME activity (Abs.min/ml) of unheated and heat treated turning tomatoes (HT_Turning) and heat treated pink tomatoes (HT_Pink) stored at 7ºC for 14 days.

### Moulds & Yeasts



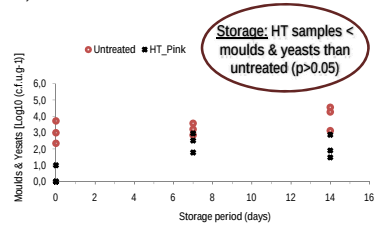




Fig. 7 – Evaluation of moulds and yeasts of unheated and heat treated turning tomatoes (HT_Turning) and heat treated pink tomatoes (HT_Pink) stored at 7ºC for 14 days.

**pH & SSC** After HT and during storage: pH did not differ and SSC increased on HT tomatoes (0.3 units and 0.9 on turning and pink) .

## CONCLUSIONS

HT (42ºC/30min) seems to be more effective on quality maintenance and decrease of fungal development compared with untreated tomatoes, during cold storage of whole fresh tomatoes.

References:

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