

# Berries preservation with curcumin and b-cyclodextrin: the use of blue light for a 'green' approach

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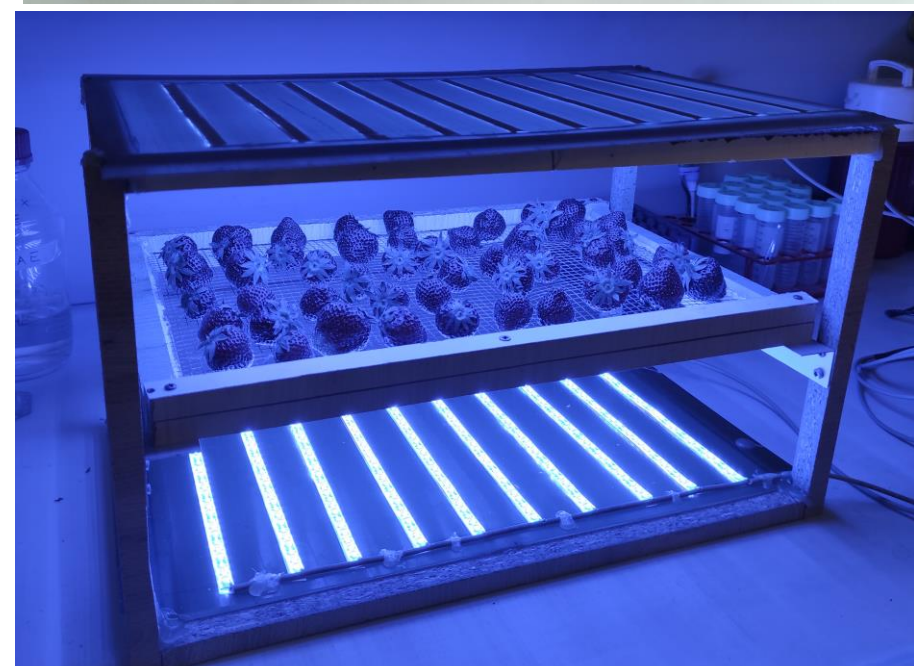
## INTRODUCTION

Berries are very delicate and produce a lot of waste due to a presence of foodborne pathogens. In order to extend shelf-life, different approaches are explored, as treatment before harvest and new container types. Here a treatment just after harvest with organic substances is investigated. In particular, curcumin dissolved in  $\beta$ -cyclodextrin is considered. Curcumin is a widely used antioxidant and has anti-bacterial activity, especially combined with blue light.

## METHODOLOGY



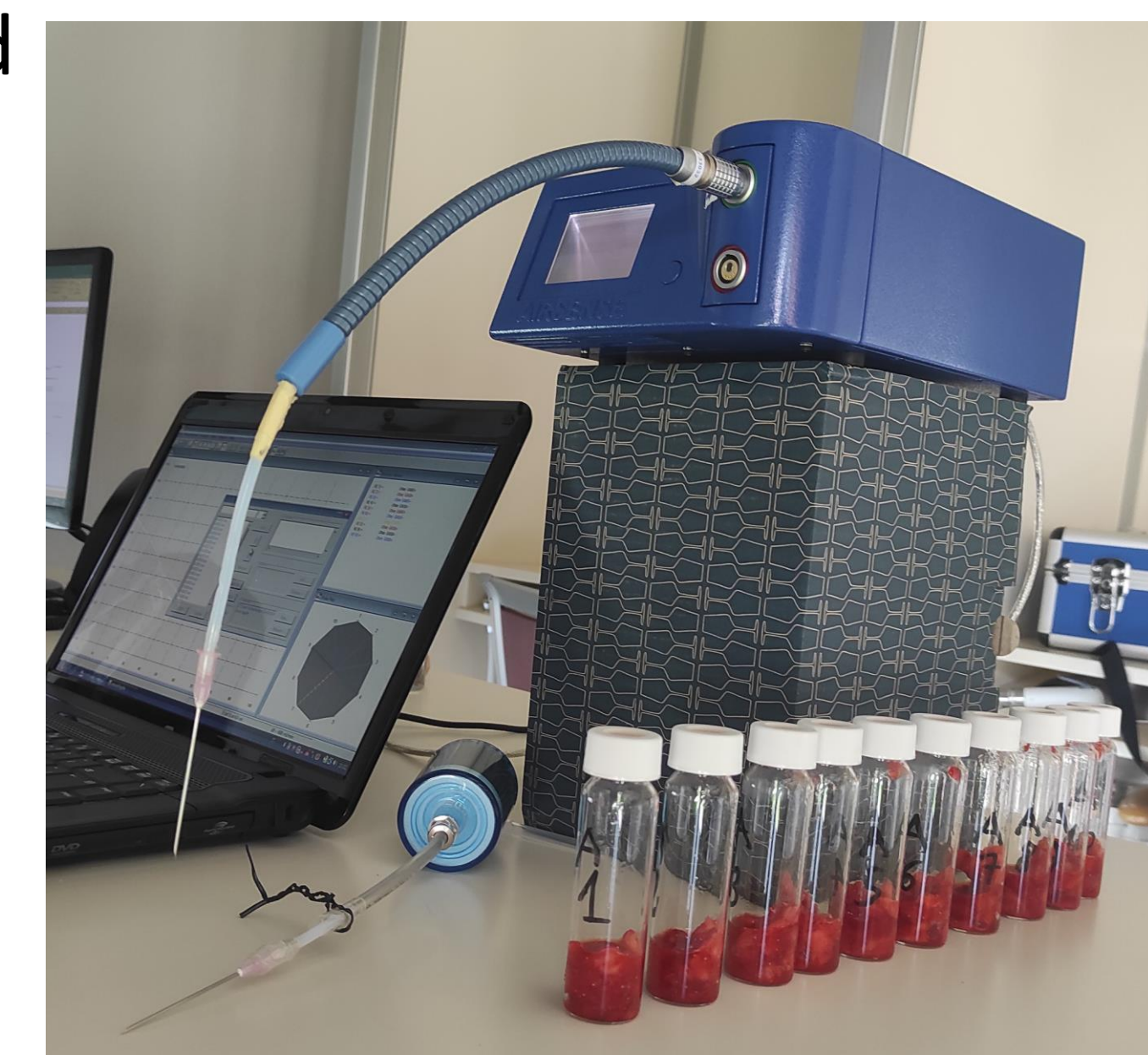
**Four groups** for each berry are created: the control one (CTR) without treatment, berries sprayed with  $\beta$ -cyclodextrin solution (CI), berries sprayed with a solution of 1 mg/ml curcumin in  $\beta$ -cyclodextrin (CICU) and another one sprayed as CICU and exposed to blue light for 3h (CICUB) after 1 h of incubation.



At T0, at 24, 48 and 72h the microbiological efficacy of curcumin is evaluated by plating of serial dilutions and counting of colony forming units (CFU/mL) after homogenization in sterile water of the berries, dilution and filtration of washing water. Moreover, a visual control at 24, 48 and 72 h is done in order to remove waste.



An odour test on berries at day 4 is finally conducted by e-nose techniques in order to perform a Principal Component Analysis (PCA) of the volatile compounds in the four groups.

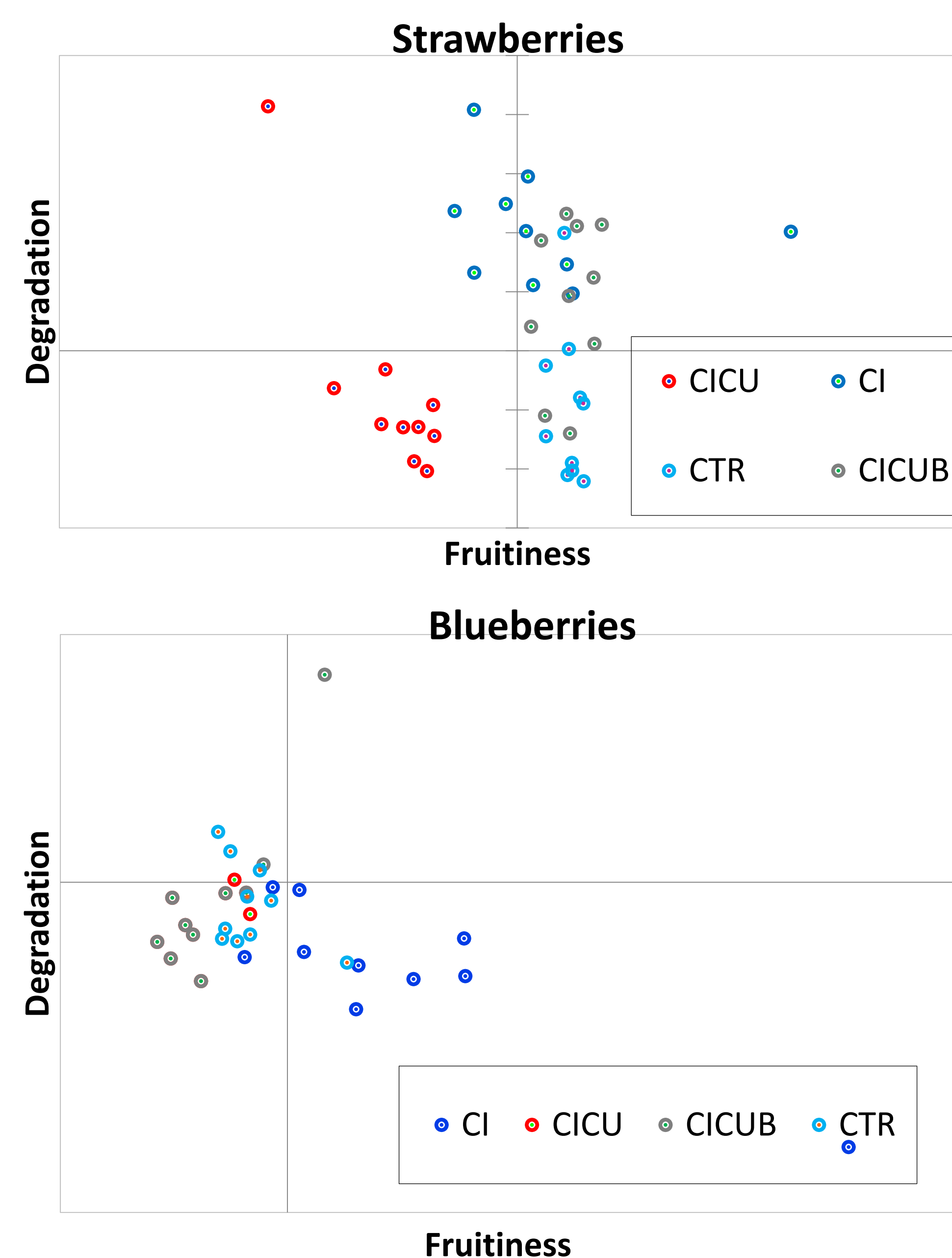
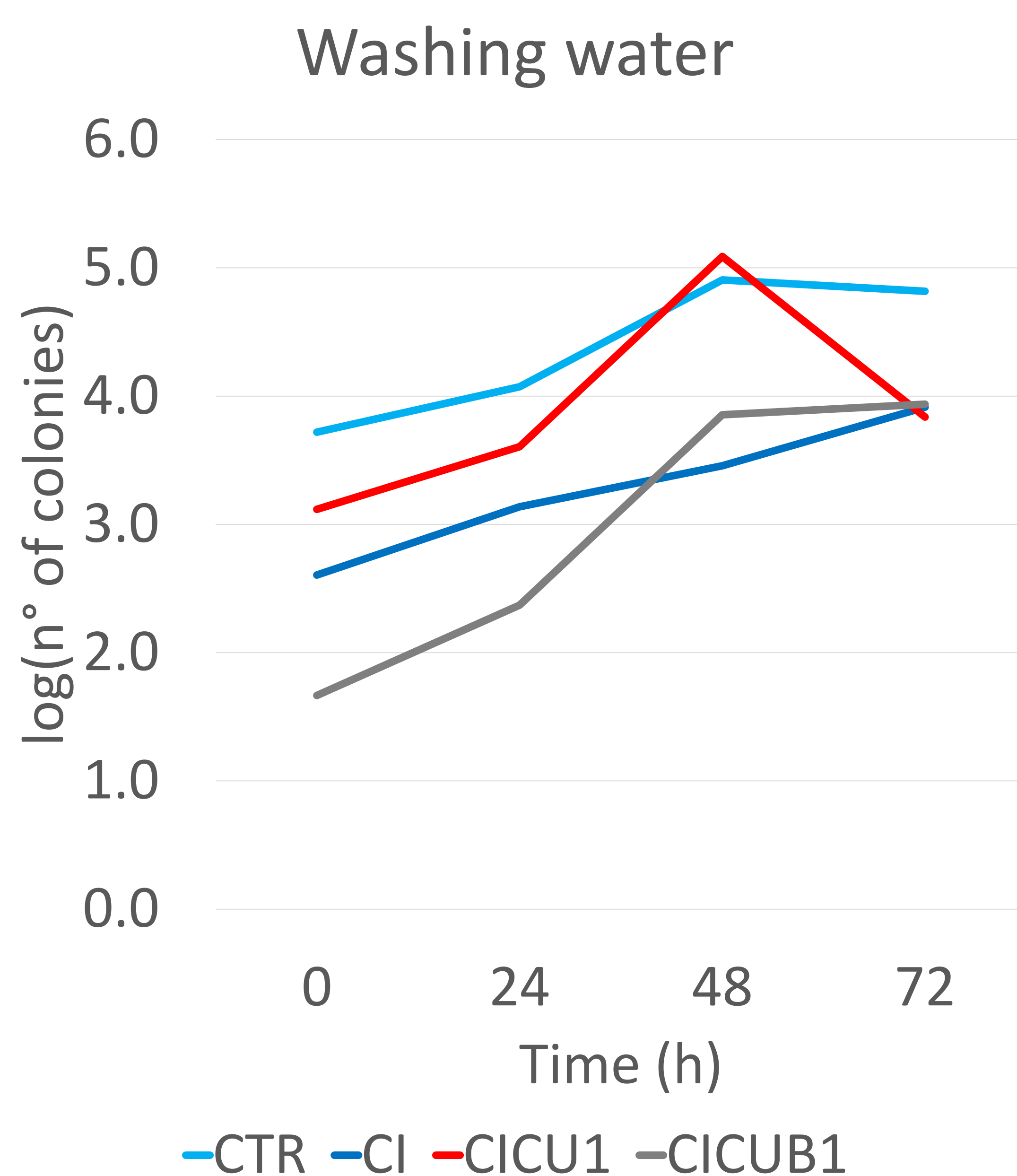


*On the left: preparation, illumination and storage of strawberries.  
On top: volatile compound analysis with PEN e-nose*

## RESULTS

In these preliminary tests, a more effective mean control of bacterial colonies and a lower average of rotten berries are seen in CICUB (grey line) vs CTR (light blue line) at 48h.

Moreover, PCA shows similarity between CTR and CICUB samples while a difference between CTR and CI groups is detected because of the odor masking effect of  $\beta$ -cyclodextrin.



## CONCLUSIONS

**Major finding:**  $\beta$ -cyclodextrin with curcumin (1 mg/ml) sprayed on strawberries followed by 3h of blue light irradiation **may be effective in extending berries shelf-life without altering their organoleptic properties.**

**Limitations** of the study: short observation time, small number of samples, high inter-fruit variability.

**Further investigations:** changing curcumin concentration (e.g. 2 or 3 mg/ml), trying multiple illumination steps (1 per day).