

Postharvest quality of fresh-cut baby leaf lettuce as affected by packaging type and LED light treatment

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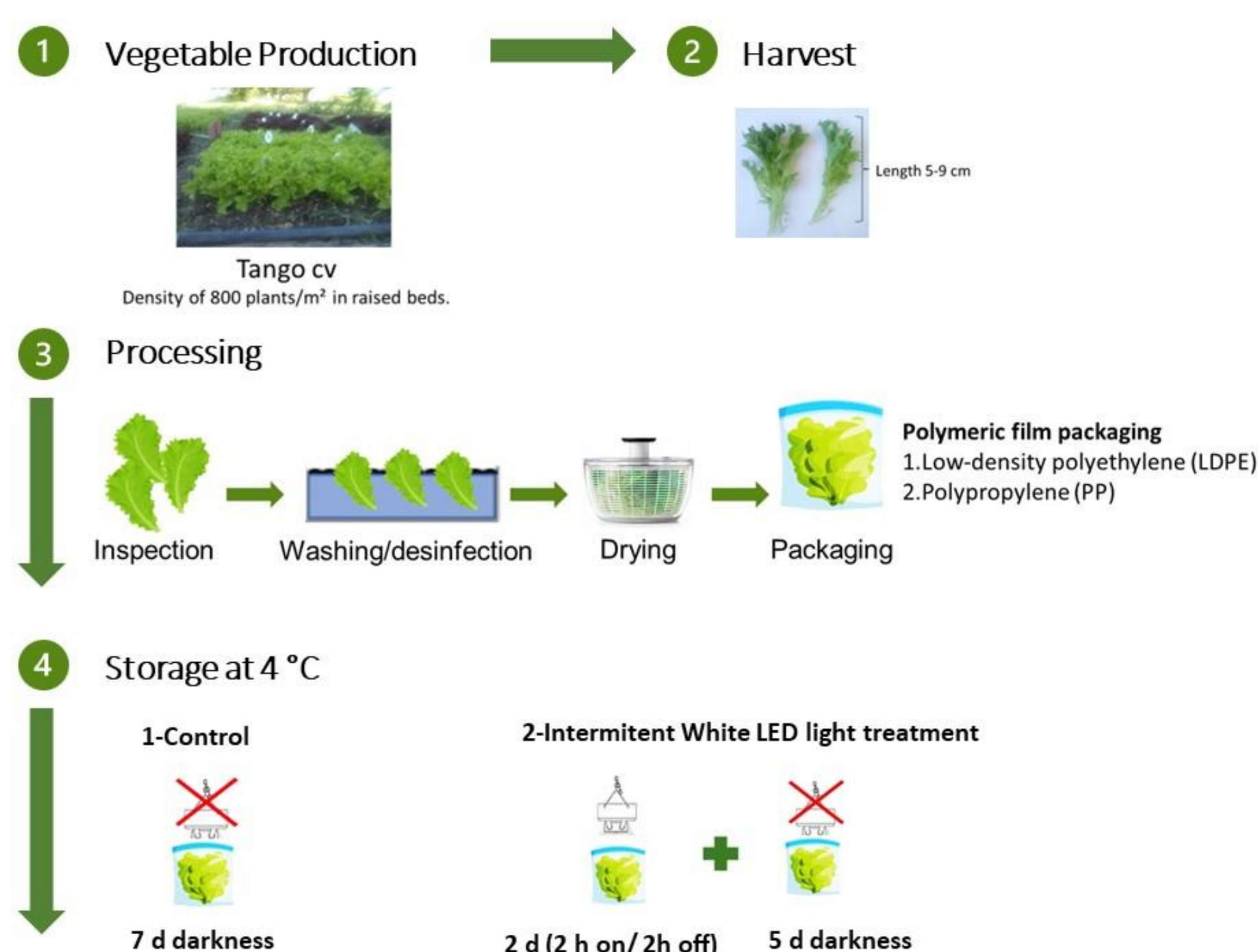
INTRODUCTION & AIM

The fresh-cut processing industry has provided a means for enhancing the consumption of vegetables, preserving their freshness for considerable periods, and making their distribution easier through convenient packaging and storage conditions. Nowadays, light-emitting diodes (LEDs) are emerging as a promising tool for food preservation due to their low heat irradiance and greater efficacy. The aim of this study was to evaluate the effect of packaging type combined with white LED treatment on the quality of fresh-cut baby leaf lettuce during postharvest preservation.

Keywords: *Lactuca sativa* L., minimally processed vegetables, polyethylene, polypropylene, shelf life.

METHOD

Plant material, ready-to-eat preparation and storage conditions



Analytical measurements

- Weight loss determination:** The fresh weight loss was measured according to Kasim and Kasim (2016).
- Chlorophylls and total carotenoids content:** The method proposed by Lichtenthaler and Buschmann (2001) was used for the determination and quantification of the chlorophyll a (Chl a), chlorophyll b (Chl b), and total carotenoid content (TCC).
- Total phenolic content (TPC)** was performed using the Folin-Ciocalteu method following the methodology proposed by Nikzad and Parastar (2021).
- Antioxidant activity (AOX):** The antioxidant activity in the lettuce extracts was determined by the 2, 2-diphenyl-1-picrylhydrazyl method (DPPH), according to Lanza Volpe et al. (2021).
- Microbiological analyses:** The microbiological quality of the samples was assessed by the growth of aerobic mesophilic bacteria, enterobacteria, yeasts, moulds, and total psychrophiles (Giménez et al., 2021).

RESULTS & DISCUSSION

- Weight loss gradually increased during storage time and significant changes were observed for each treatment and packaging. The lowest weight loss was recorded in the LDPE packaging under LED treatment (Figure 1).

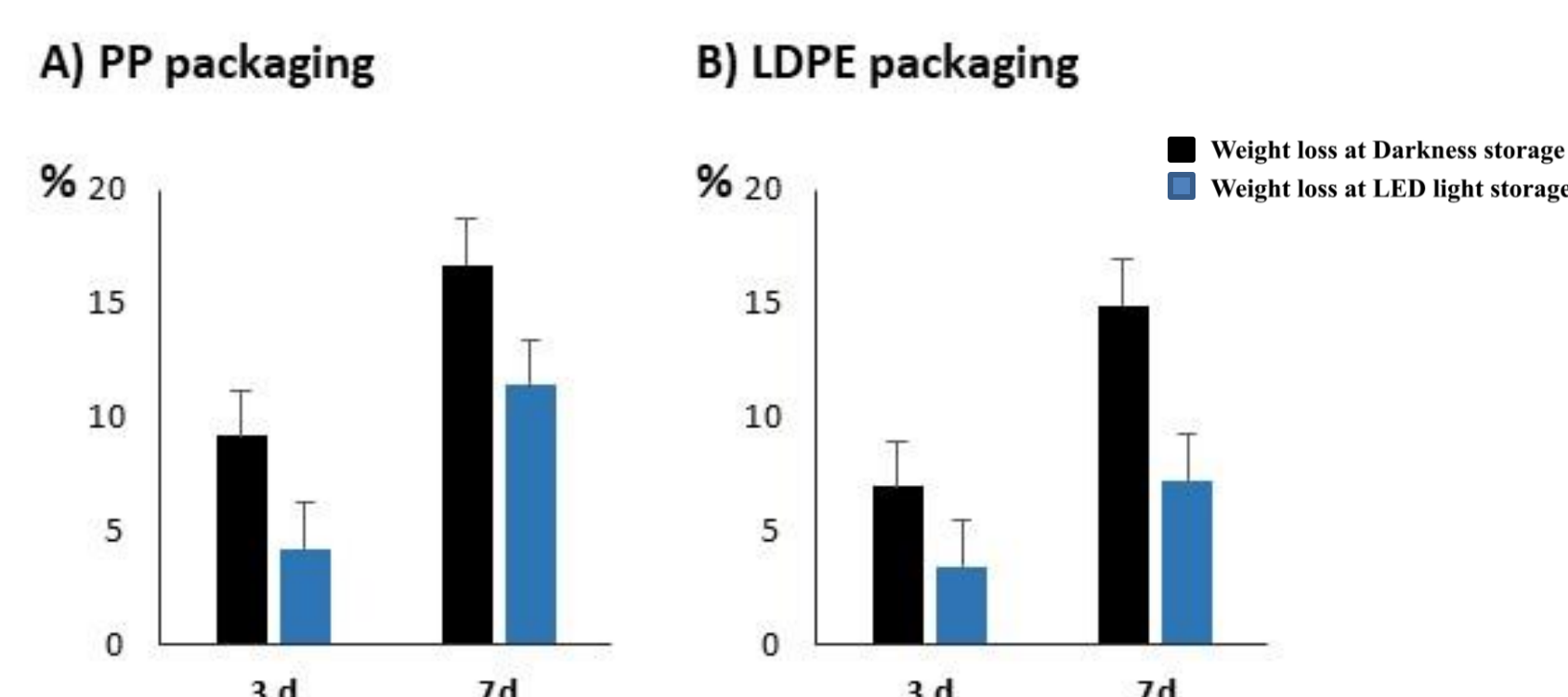


Fig. 1. Changes in weight loss (%) in fresh-cut baby leaf lettuce during postharvest under darkness and LED treatment at 4 °C for 7 days. Error bars represent standard deviations of the mean.

- Microbial counts (aerobic mesophilic bacteria, enterobacteriaceae, yeasts, and moulds) increased significantly by the end of the storage period in LDPE packaging with LED treatment. Psychrophilic aerobic growth was not detected during the evaluation period.
- Total chlorophyll content, total phenolic compounds, and antioxidant activity did not change during storage. However, the carotenoid content was significantly higher in samples packaged in LDPE (Table 1).

Table 1. Changes in chlorophylls, carotenoids, total phenol content and antioxidant activity in fresh-cut baby leaf lettuce during postharvest under darkness and LED treatment at 4 °C for 7 days.

	Storage conditions	Storage time	Packaging
Chlorophylls (mg g ⁻¹)	Control	6.9 a ¹	0 d
	LED light	7.15 b	3 d
			7 d
Total carotenoids content (mg g ⁻¹)	Control	0.8 a	0 d
	LED light	0.9 a	3 d
			7 d
Total phenol content (mg EGA g ⁻¹)	Control	21.4 a	0 d
	LED light	22.1 a	3 d
			7 d
Antioxidant activity (%)	Control	97.5 a	0 d
	LED light	99.0 b	3 d
			7 d

¹Means not sharing a common letter are significantly different at $p \leq 0.05$, Tukey test.

CONCLUSION

Overall, the packaging in PP combined with LED treatment showed the most favorable results for maintaining postharvest quality in fresh-cut lettuce. This was deduced because the leaves showed the longest shelf life and the highest antioxidant activities. Moreover, this film can provide a safer and fresher baby leaf lettuce to growers and/or exporters in order to fulfil consumer demand.

Acknowledgments

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