



Comparison of Microwave-Assisted Thermal Pasteurization and High Pressure Processing as Pasteurization Methods for Green Beans



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OBJECTIVE

What is the effect of two novel processing technologies **high pressure processing (HPP)** and the **microwave-assisted pasteurization system (MAPS)** in inactivation of *Listeria innocua* (for mild pasteurization) and some quality attributes of green beans (for both mild and severe pasteurization)?

BACKGROUND

Consumers increasingly demand for minimally processed ready-to-eat (RTE) meals.

Most RTE meals are produced by conventional methods such as canning, which may introduce undesirable changes.

Canned beans



RTE beans

METHODS

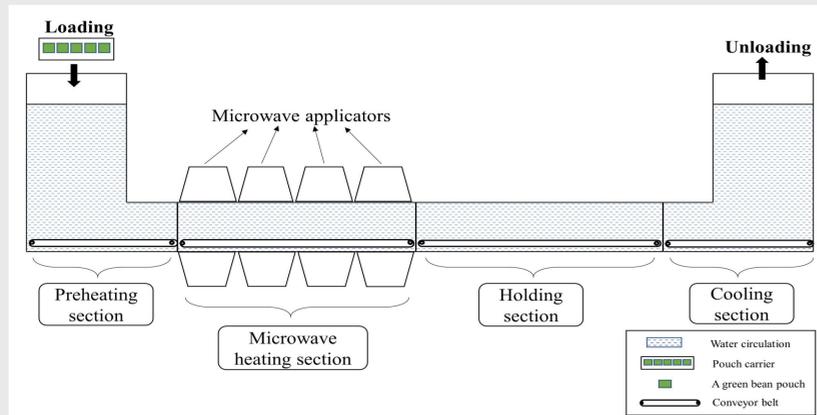


Fig.1. Schematic diagram of MAPS developed at Washington State University.

Intensity Level	Processing Conditions		Target Pathogen
	Thermal	High Pressure	
Mild pasteurization	P _{70°C} = 2 min	600 MPa, 10 min, 25°C	<i>Listeria monocytogenes</i>
Severe pasteurization	P _{90°C} = 10 min	600 MPa, 20 min, 45°C	Nonproteolytic <i>Clostridium botulinum</i> type E spores

Table 1. Equivalent process conditions (regarding microbial safety) for thermal and HPP, and target microorganism for each intensity level.



Green beans were inoculated with *L. innocua* to 9 –log CFU/g then processed by MAPS and HPP.



The quality attributes: color, chlorophyll content, texture of green beans were determined during storage.

RESULTS

Mild pasteurization

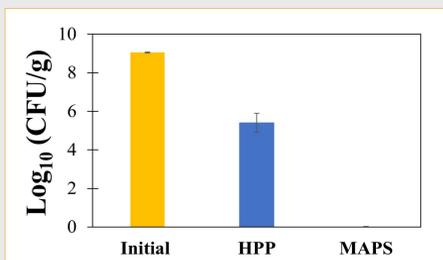


Fig. 2. The effect of HPP and MAPS treatments on the survival of *L. innocua* in green beans (1.3 g) and brine (0.9 ml) (n=9).

Treatment	Storage period at 2 °C										
	Frozen	Day 0	Day 4	Day 8	Day 12	Day 16	Day 20	Day 24	Day 30	Day 36	
MAPS											
HPP											

Treatment	Storage period at 10 °C									
	Frozen	Day 0	Day 2	Day 4	Day 6	Day 8	Day 10	Day 12	Day 16	Day 20
MAPS										
HPP										

Table 2. Effect of storage on the color of MAPS- and HPP-treated green beans.

Severe pasteurization

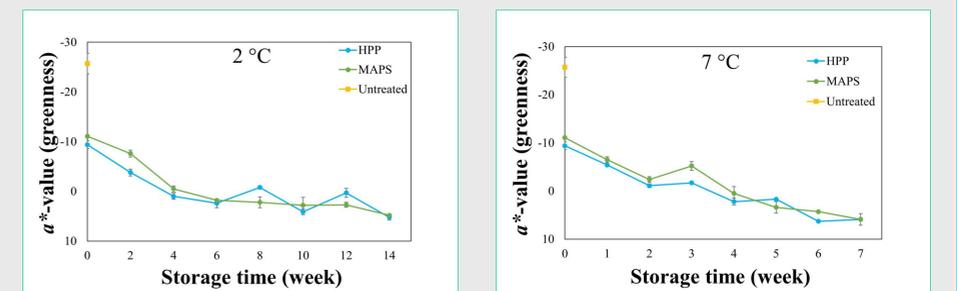


Fig. 3. Effect of MAPS and HPP on the greenness of beans treated by MAPS and HPP. Data are the means ± SD (n=3).

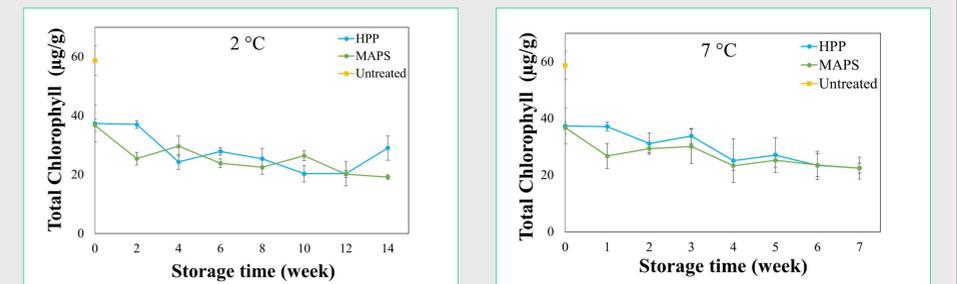


Fig. 4. Effect of HPP and MAPS on the total chlorophyll of green beans during storage. Data are the means ± SD (n=3).

CONCLUSION



MAPS treatment at the mild processing conditions used in this study is more effective than HPP in inactivation of *L. innocua* in green beans.



Although the processing temperature of MAPS is higher than HPP, better color retention and chlorophyll degradation as a result of mild pasteurization and similar color retention and chlorophyll degradation as a result of severe pasteurization was obtained in green beans.

REFERENCES

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- Vervoort, L., Van der Plancken, I., Grauwet, T., Verlinde, P., Matser, A., Hendrickx, M., & Van Loey, A. (2012). *Innovative Food Science & Emerging Technologies*, 15, 1-13.