



SHELF LIFE ESTIMATION OF LIME JUICE TREATED WITH HIGH PRESSURE PROCESSING



Laksika Chavakitkosol, Siriwan Thaipakdee and Sirichat Chanadang

Division of Food Science and Nutrition, Faculty of Agricultural Product Innovation and Technology
Srinakharinwirot University

Abstract

The quality and shelf-life of high pressure processed (HPP) lime juices were compared to fresh and frozen lime juices. The juice was pressure at 600 MPa, 60°C for 2 minutes and 5 minutes and stored at 25°C and 35°C for up to 6 weeks. All juices were evaluated every 2 weeks for microbiological, physical, chemical and sensory properties. Immediately after processing, HPP lime juices had marginal differences in physical and chemical properties when compared to fresh lime juice. However, HPP showed significant negative impacts on sensory properties and consumer acceptance of the juice. During storage, key quality properties (Ascorbic acid content, non-enzymatic browning and cloud stability) of lime juices were significantly changed throughout storage for HPP samples. Ascorbic acid loss was more than 20% after storage for 2 weeks. Brown color was also developed during 2 weeks of storage time. However, cloud stability of HPP lime juices were significantly decreased after storage for 4 weeks.

Introduction

How to extend shelf life of lime juice?

General

- Freezing Transportation
- Using additives Taste
- Pasteurization Nutrition
- UV-C irradiation Taste

This work

To study the quality and shelf life of High Pressure Processed lime juices

Methods



- pH
- Color
- Cloud loss
- Ascorbic acid
- Non-enzymatic browning
- Pectinmethylesterase activity
- Sensory Evaluation

Results and Discussion

Fresh lime juice VS HPP lime juice

Table 1. Evaluation of chemical, physical and microbial analysis of HPP (2 min and 5 min) and fresh lime juice.

Sample	Chemical analysis					Physical analysis			Microbial analysis		
	pH	Ascorbic acid (mg/sample)	Cloud loss (%)	Non-enzymatic browning	Pectinmethylesterase activity (mM)	L	a	b	Total viable count	Yeasts & Molds	E.coli
Fresh	2.24 ± 0.02 ^a	11.633 ± 0.82 ^a	4.67 ± 0.12 ^a	0.08 ± 0.002 ^a	0.028 ± 0.001 ^a	20.78 ± 0.50 ^a	-3.71 ± 0.08 ^a	1.206 ± 0.03 ^a	<10 cfu/g	<10 cfu/g	<10 cfu/g
HPP 2 min	2.26 ± 0.02 ^a	11.785 ± 0.29 ^a	5.4 ± 3 ^a	0.12 ± 0.003 ^a	0.056 ± 0.001 ^a	31.86 ± 0.39 ^b	-5.64 ± 0.15 ^b	2.587 ± 1.42 ^b	<10 cfu/g	<10 cfu/g	<10 cfu/g
HPP 5 min	2.27 ± 0.01 ^a	12.085 ± 0.14 ^a	1.77 ± 1.06 ^a	0.15 ± 0.001 ^a	0.026 ± 0.001 ^a	37.31 ± 0.93 ^b	-6 ± 0.0 ^b	3.84 ± 1.38 ^b	<10 cfu/g	<10 cfu/g	<10 cfu/g

^{a,b} Mean ± SD. Different letters with different superscripts differ (P < 0.05).



Fig. 1. Sensory evaluation (Descriptive analysis) of HPP (2 min and 5 min) and fresh lime juice. The evaluation was carried out for 10 consumers (5 trained and 5 untrained) with 30-point scale (0 = none, 7.5 = medium intensity, 15 = highest intensity).

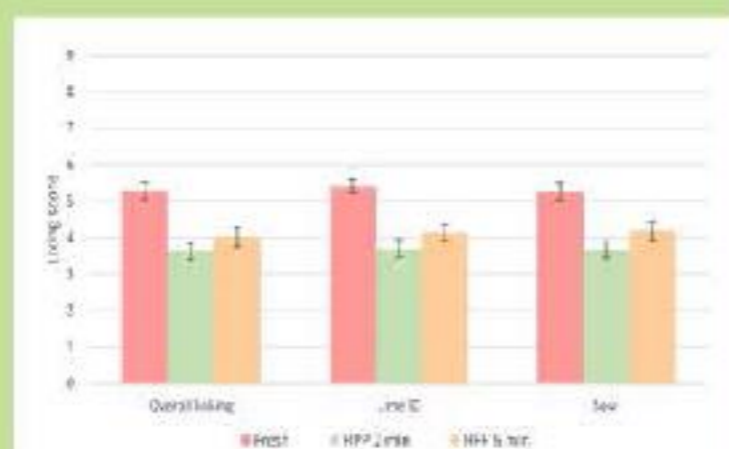


Fig. 2. Consumer acceptance of HPP (2 min and 5 min) and fresh lime juice evaluation was carried out for 10 consumers (5 untrained and 5 trained) using 9-point hedonic scale (1 = Dislike extremely, 5 = Neither like nor dislike, 9 = Like extremely).

During storage



Fig. 3. pH of fresh, HPP (2 min and 5 min) and frozen lime juice stored at 25°C and 35°C and frozen lime juice during storage time.

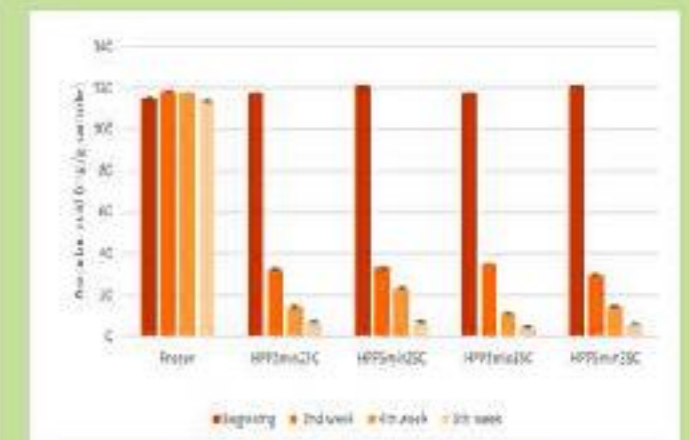


Fig. 4. Ascorbic acid content of high pressure processed lime juice (2 min and 5 min) stored at 25°C and 35°C and frozen lime juice during storage time.



Fig. 5. Cloud loss of high pressure processed lime juice (2 min and 5 min) stored at 25°C and 35°C and frozen lime juice during storage time.

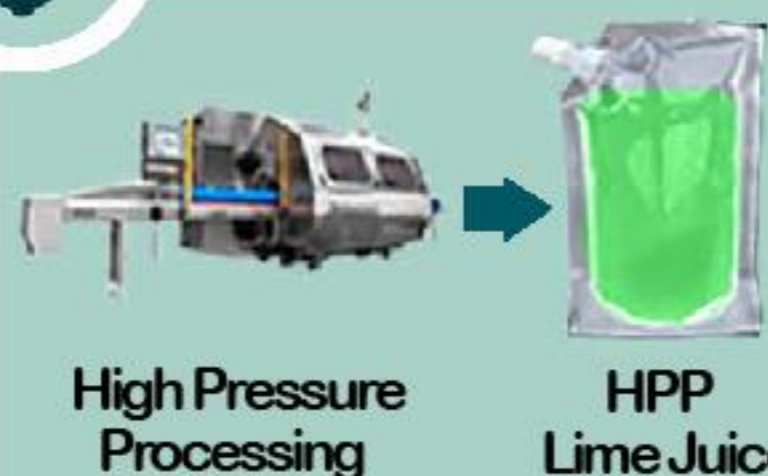


Fig. 6. Non-enzymatic browning of high pressure processed lime juice (2 min and 5 min) stored at 25°C and 35°C and frozen lime juice during storage time.

Conclusion

High pressure processing (HPP) is an alternative technology for prolonging shelf life of many food products, however, may not appropriate technique for extending shelf life of lime juice. HPP lime juice had inferior sensory qualities compared to fresh lime juice and shorter shelf life compared to frozen lime juice.

Innovation



References

Fustier, P., St-Germain, F., Lamarche, F., & Mondor, M. (2011). Non-enzymatic browning and ascorbic acid degradation of orange juice subjected to electroreduction and electro-oxidation treatments. *Innovative Food Science & Emerging Technologies*, 12(4), 491-498. doi:10.1016/j.ifset.2011.07.014

Nienaber, U., & Shellhammer, T. (2001). High-pressure processing of orange juice: combination treatments and a shelf life study. *Journal of Food Science*, 66(2), 332-336.