

COMBINED EFFECT OF NATURAL LEMON ESSENTIAL OIL AND LEMON JUICE PRESERVATIVES ON PEAR AND RASPBERRY MILKSHAKES



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INTRODUCTION

As the importance of reducing food waste and sustainability in the food systems grows, natural food preservatives have gained more popularity to use in food preservation method. Essential oils (EOs) have a great potential to be a safe and environmentally friendly preservative due to their beneficial properties such as antimicrobial, antifungal and antioxidant. **This study aims to examine the antimicrobial efficacy of combined pasteurized lemon juice and lemon essential oil as natural preservative on pear and raspberry milkshake.**

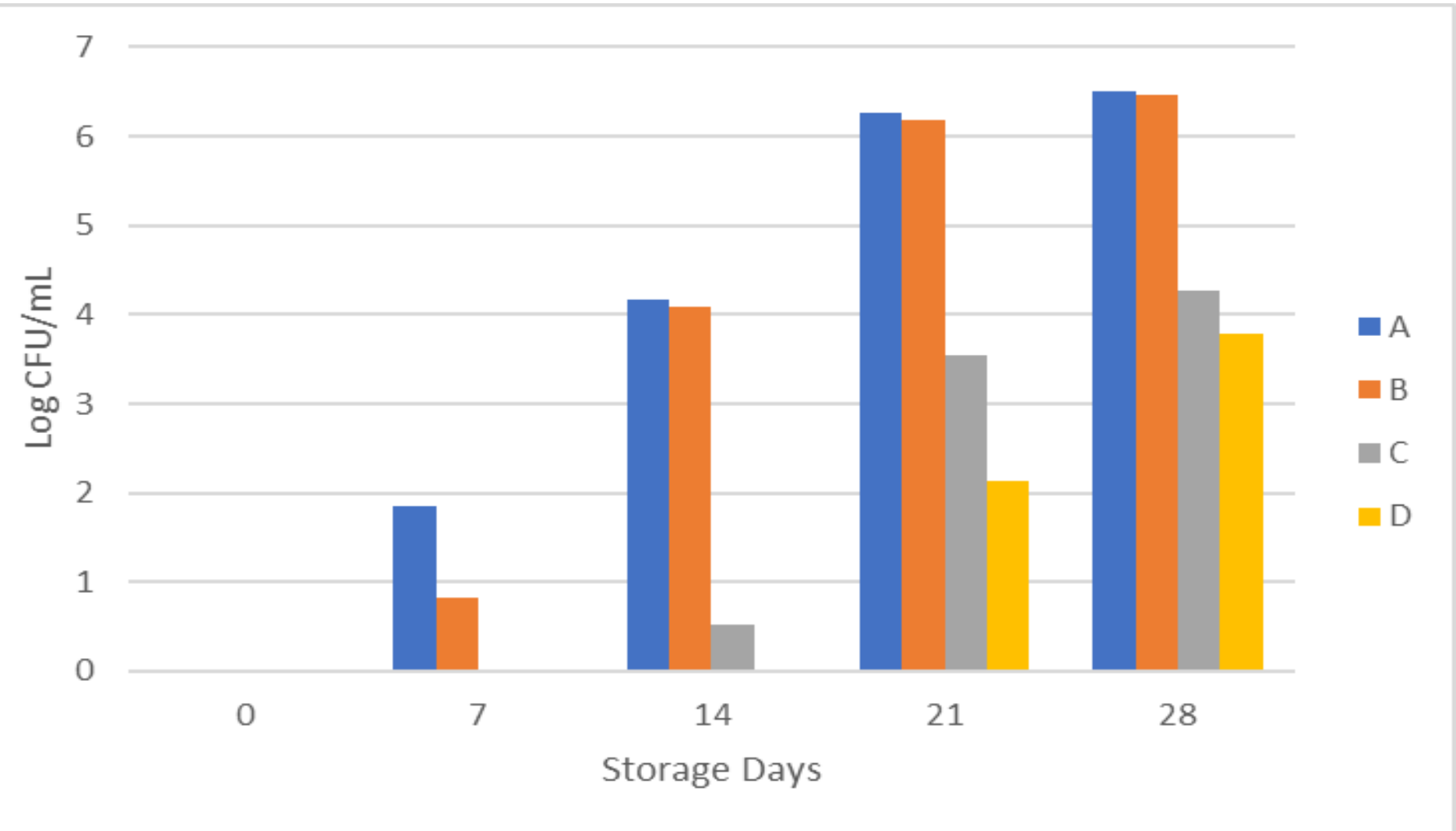


Fig.1 Total bacteria growth in pear milkshake (ratio 70:30)

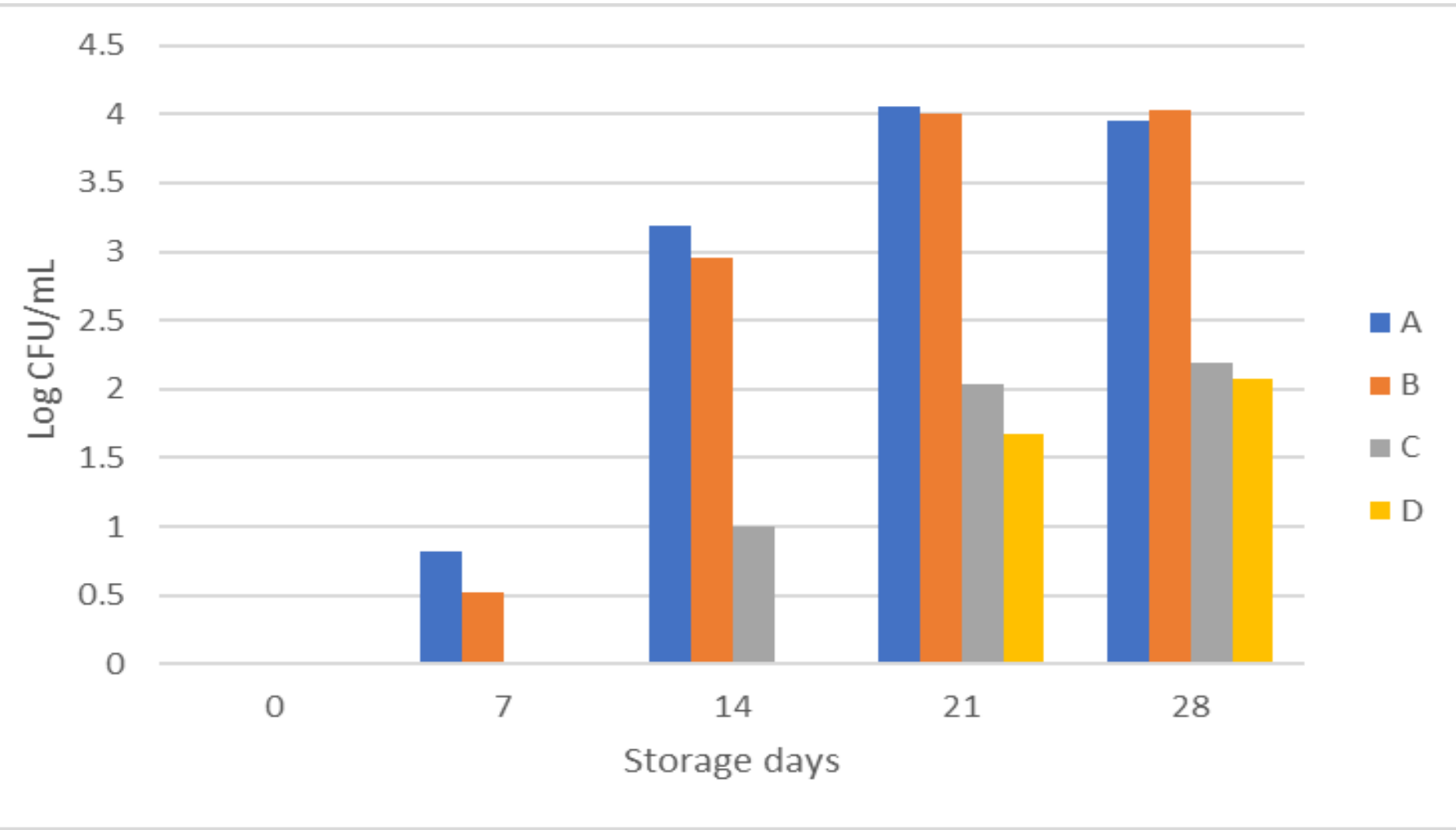


Fig.2 Mold and yeast growth in pear milkshake (ratio 70:30)

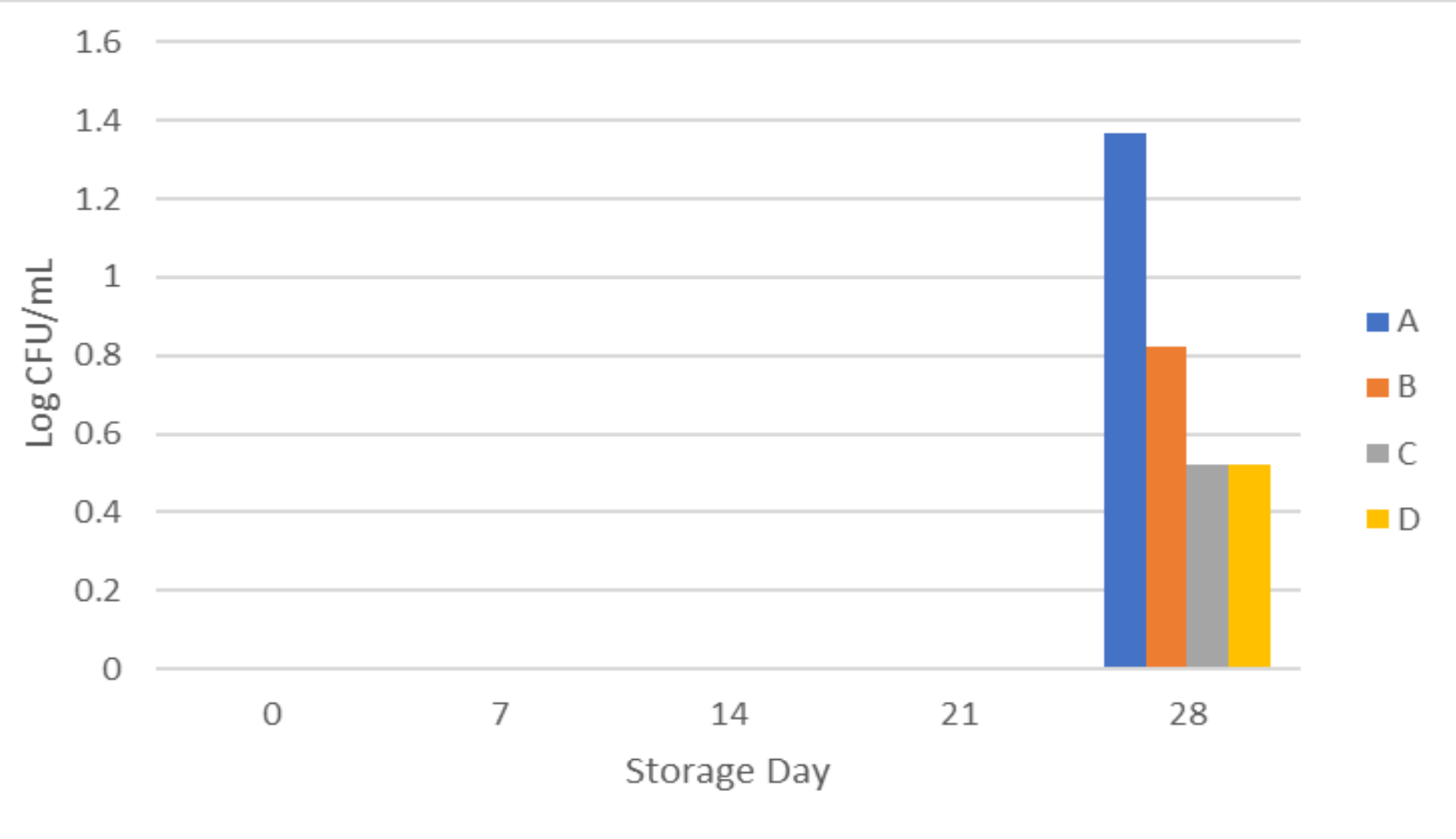


Fig.3 Total bacteria growth in raspberry milkshake (ratio 80:20)

MATERIALS AND METHODES

The milkshake were prepared by mixing pasteurized milk with fat content of 2.8% and pasteurized pear and raspberry juice in different milk: fruit juice ratio as 60:40; 70:30; 80:20. After that milkshake were divided into 4 treatments

- A.Milkshakes without any preservatives
 - B.Milkshakes with 1% pasteurized lemon juice
 - C.Milkshakes with 0.25 %lemon essential oil
 - D.Milkshakes with 1% pasteurized lemon juice and 0.25 % lemon essential oil
- The most acceptable milkshake ratio were evaluated by sensory evaluation and further used to investigate the shelf life. Salmonella, Listeria, total cell count and mold and yeast were determined immediately after the milkshake preparation. The milkshakes were then stored under refrigerator condition for four weeks (28 days) with the assessment of microbiological evaluation every week.

RESULTS

The sensory evaluation demonstrated that the milkshake ratio 80:20 and 70:30 are the most preferable taste to consume for pear and raspberry milkshake, respectively (table 1 and table 2). Moreover, pear and raspberry milkshake with lemon odour were acceptable with the highest score.

After preparation of pear and raspberry milkshake samples, Salmonella and Listeria were not detected in every samples as well as bacteria and mold and yeast. During the storage of pear milkshake ratio 70:30, there was bacteria and mold and yeast growth in treatment A and B samples after one weeks while there was no microbials growth in treatment C and D samples as shown in fig.1 and 2. Moreover, there was still no microbial growth observed in treatment D after 14 days of storage. After storage for four weeks, pear milkshake with treatment C and D show a significant lower bacteria growth as well as mold and yeast growth due to the addition of lemon essential oil and combined lemon juice and lemon essential oil, respectively. For raspberry milkshake ratio 80:20, according to the low pH of milkshake sample (pH 4.44-4.68), there was no mold and yeast growth in raspberry sample during the storage of 28 days. However, at the end of the four weeks least microbial growth was observed in the raspberry milkshake samples with treatment C and D samples (fig.3). The result indicated that 0.25% lemon essential oil and combined 1% pasteurized lemon juice and 0.25% lemon essential oil can work as natural preservatives in both pear and raspberry milkshake.

Table 1. The highest average score (the most preferable) of pear milkshakes.

Ratio (Milk: Juice)	The Most Preferable (Highest score)			
	Taste	Color	Smell	Consistency
60:40	C, D (4.33)	C (4.50)	D (5.00)	A, C (4.17)
70:30	C (4.17)	C, D (4.33)	A, D (4.50)	C (4.33)
80:20	C (4.33)	A, D (4.50)	C (4.50)	C (4.50)

Table 2. The highest average score (the most preferable) of raspberry milkshakes.

Ratio (Milk: Juice)	The Most Preferable (Highest score)			
	Taste	Color	Smell	Consistency
60:40	A (3.67)	C (4.83)	B (4.50)	A (4.17)
70:30	A (4.17)	D (4.33)	C, D (4.00)	B, C (3.50)
80:20	A (3.17)	D (3.83)	C (3.67)	C (4.17)

CONCLUSION

Combined pasteurized lemon juice and lemon essential oil as natural preservative showed a great antimicrobial potential and the ability to extent the shelf life of pear and raspberry milkshake by at least one weeks.

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