



THE COMBINED EFFECT OF LEMON ESSENTIAL OIL AND JUICE AS NATURAL PRESERVATIVES IN PEAR AND GRAPE JUICES

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INTRODUCTION

The desire for natural preservatives is motivated by the demand for safer, healthier, and more sustainable food products that meet modern consumer expectations. Lemon essential oil has a high concentration of limonene and lemon juice contains citric acid, they act as natural preservatives in fruit juices and have the potential to extend shelf life as well as to satisfy consumer demand for natural products. Grape and pear can be found globally and are usually turned into juices for the everyday diet.

AIMS

To examine the combined effect of two natural substances (lemon essential oil and lemon juice) in inhibiting microbial growth and extending the shelf life of the juices.

MATERIALS AND METHODS

The experiment involved the preparation of two types of agar, Malate Extract Medium (MEA) for bacterial count and Tryptone Glucose Extract (TGE) for yeast count. Pear and grape juices were obtained through a careful juicing process and subjected to different treatments, including untreated juice, pasteurized juice (80°C), addition of lemon essential oil (0.25 µl/ml) and 1% lemon juice to untreated and heat-treated juice (60°C).

The efficacy of natural preservatives was evaluated by measuring cell numbers (using pour plate method and spread method) over a period of 4 weeks under chilled conditions. Additionally, sensory evaluation was conducted by 6 untrained panelists who rated the juice's taste, color, smell, and consistency on a scale of 1 to 5, with 1 being the least liked and 5 being the most liked.

RESULTS

Looking at Figure 1, the untreated pear and grape juices (A) showed the highest initial total bacteria count at 3.49 and 3.67 log CFU/ml, respectively. Fresh juice treated with natural preservatives (C) displayed a similar trend to A for both juices but had fewer bacteria in the fourth week. The graphs demonstrate that pasteurization (B and D) resulted in a significant reduction percentage initially. Furthermore, all of the treated fruit juices of both types maintained the limit for acceptable total bacteria count (5 log CFU/ml)^{1,2} for the first three days and up to two weeks for grape juice that underwent a combination of heat treatment and natural preservatives, which had a total bacteria count of 3.81 log CFU/ml.

Figure 2, depicting the yeast count, follows a similar pattern to Figure 1. Pasteurization (B and D) reduced the total yeast count to less than 3 log CFU/ml in the first three days for both juices. Notably, grape juice treated with a combination of natural preservatives and heat exhibited no detectable yeasts in the first 3 days and remained the least yeasty in the fourth week, accounting for 4.30 log CFU/ml.

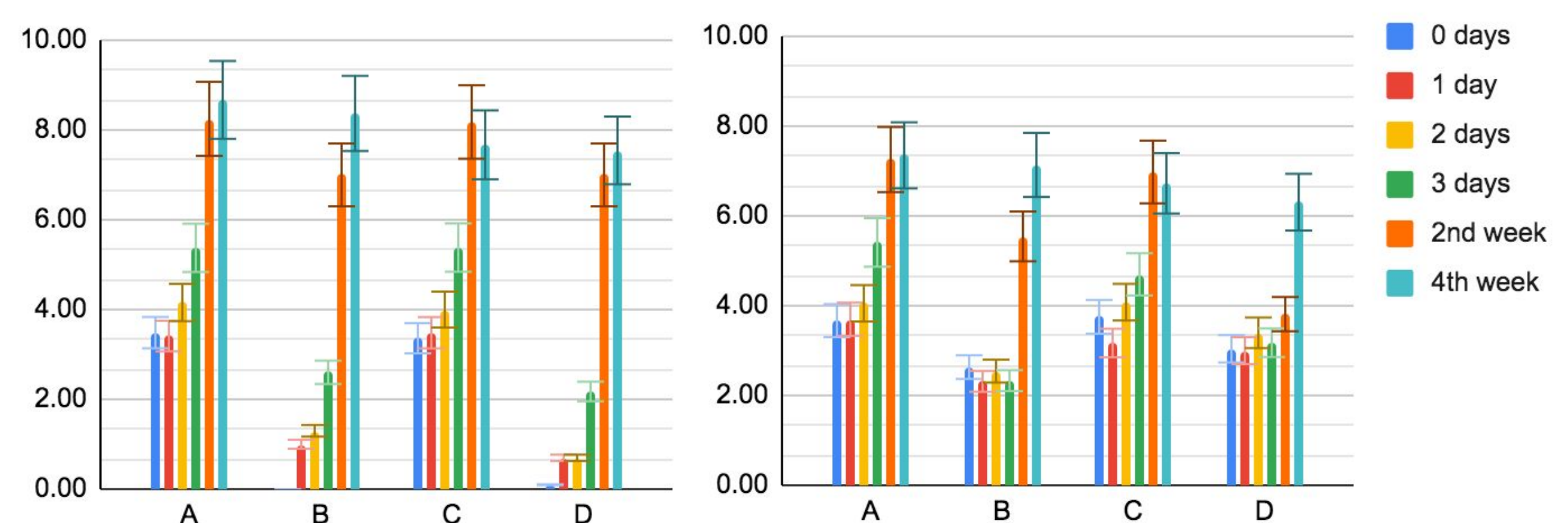


Figure 1. Total bacteria count in pear juice (left) and grape juice (right) measured in log CFU/ml

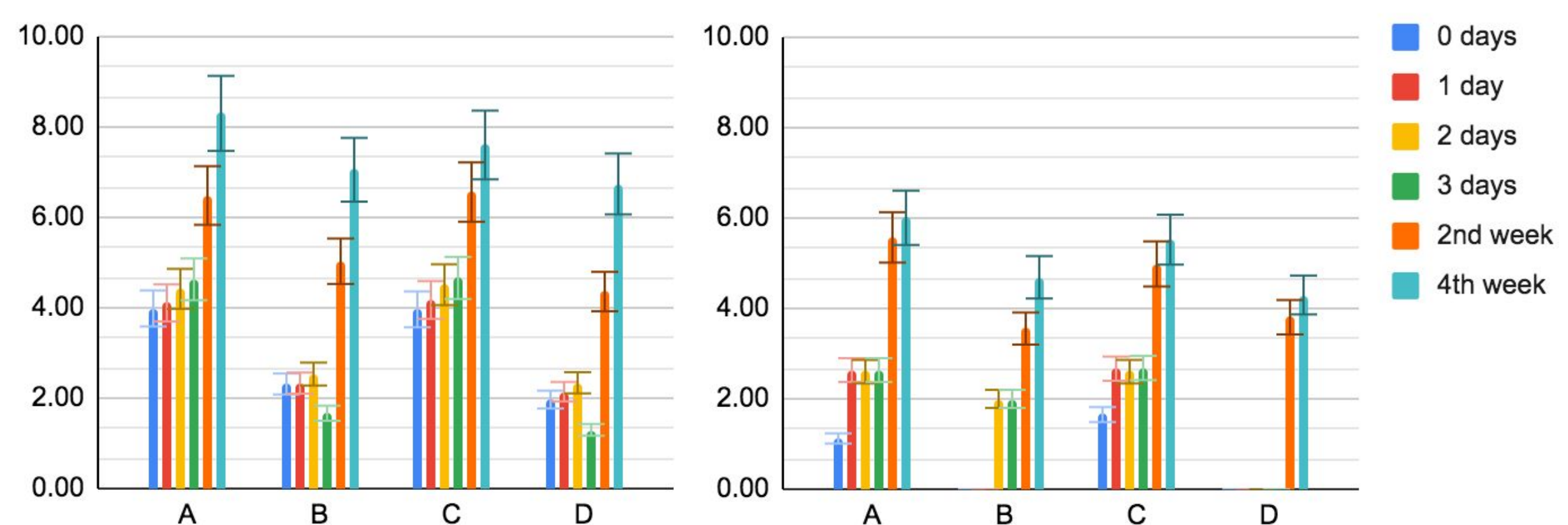


Figure 2. Total yeast count in pear juice (left) and grape juice (right) measured in log CFU/ml

The organoleptic test resulted in the untreated fresh grape (A) juice scoring the highest, with a score of 3.88 out of 5. Meanwhile, both pasteurized pear juice (B) and fresh pear juice treated with lemon essential oil and juice (C) had the same highest score, with 4.25 out of 5.

CONCLUSIONS

These findings suggest that lemon essential oil and lemon juice synergistically enhance the effect of pasteurization in fruit juices to extend their shelf life while maintaining their sensory qualities.

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