Starter Culture: Study and Comparison

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Introduction

Fermentation is a traditional process used to preserve vegetables. Well-known fermented vegetables, such as sauerkraut and kimchi, have been the subjects of numerous studies, demonstrating their various health benefits. Nevertheless, this time-honored method of food preservation involves a number of drawbacks: it is uncontrolled, and its success is dependent on the flora that are naturally present on the vegetables at the time of processing. This flora could include yeasts, moulds, and pathogens. Starter cultures can be used to control the fermentation process, and to ensure safer and more consistent results. This study compares the performance of three starter cultures that are currently available for home use, and includes a control, without a starter.

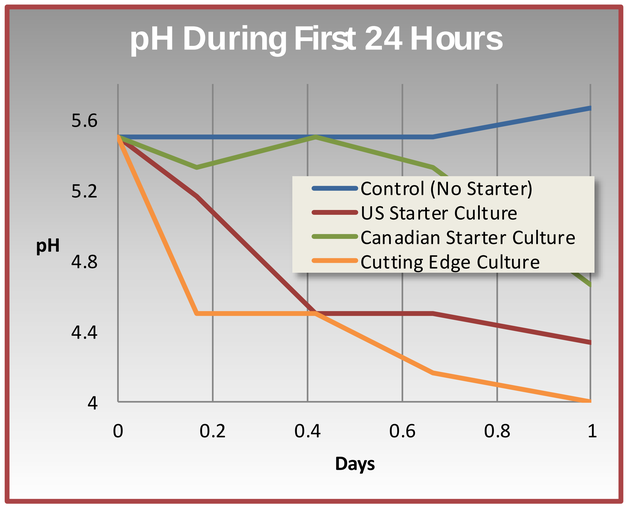
Material and Methods

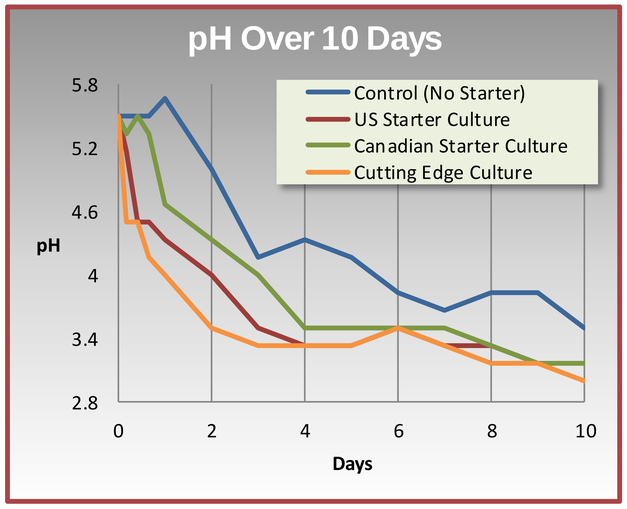
Fermentation: The starter cultures were added to the proportionate amounts of shredded cabbage at the recommended ratios, together with a solution of 1.8% NaCl in water. The control was fermented with the same ratio of NaCl but without a starter. The fermentation vessels were stored at a constant 70°F (20°C) for 10 days and regularly analyzed for acidity (pH).

Analysis: pH measurements were taken four times in the first 24 hours, and subsequent readings were taken every 24 hours thereafter for a total of 10 days. All protocols were performed in triplicate. The results are the means of the 3 data sets.

Results and Discussion

It's well established that a rapid drop in pH in the initial 24 hours of fermentation is critical for the safety of the final product. The pH should reduce as quickly as possible in order to discourage the development of yeasts, moulds, and pathogens. The Cutting Edge starter reduced the pH the most during the first day. Acidification during this timeframe was slower for the other starters, and non-existent for the control.





As the fermentation progressed over the subsequent 9 days, all samples reduced in pH, but at varying speeds. The control was the slowest, and took almost 5 days to reach a pH of 4. Slow acidification may present a window for pathogens, yeasts, and moulds to proliferate. The US starter recorded a good rate of acidification, but the Cutting Edge starter was the first to reach a pH of 4, in the second day.

Both the Canadian starter and the Cutting Edge starter contain the appropriate bacteria strains for fermenting vegetables: *Lb. plantarum, Ln. mesenteroides* and *Pc. acidilactici*. The US starter contains a mixture of appropriate and inappropriate strains. The importance of introducing extra bacteria via a good starter culture is well illustrated by the data in this study, especially in the case of the control. The latter relies on traditional spontaneous fermentation, in which the indigenous bacteria found on the vegetables compete during the initial stages. This can frequently lead to inconsistent results and slow pH reduction.

Conclusion

Numerous factors can be controlled in order to increase the likelihood of producing high-quality fermented vegetables consistently and safely, both in domestic and commercial settings. These factors include: the proportion and quality of salt, the quality of vegetables, the fermenting temperature, the production process, and the introduction of appropriate bacteria strains.

The precise management of all these parameters is the key to achieving the desired results. A suitable starter culture can significantly increase the rate of acidification, especially during the first day of fermentation.

Although the issue of salt reduction has received considerable publicity in recent years, salt is crucial for the successful fermentation of vegetables. It plays an important part in the fermentation process, and its presence is necessary for maintaining the safety, flavor, and texture of the final product. Salt promotes the production of lactic acid bacteria, discourages the growth of pathogens, and helps to achieve a firmer texture.

References

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