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Reducing the use of salt (sodium chloride) in natural gherkin fermentation process and storage

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The current practice of gherkin pickling maintain a fruit to brine ratio of 60/40 and fermenting for 4 to 6 weeks with 5 – 7 % of salt allowing natural micro flora to act. Microorganisms utilize sugars diffused from the gherkins, producing lactic acid and reducing pH to 3.5. This is followed by increasing brine strength gradually up to 13 – 16 % by adding dry salt. The combination of low pH and high salt preserve the product more than one year by suppressing the activity of spoilage microorganisms. This study was conducted to reduce the amount of salt used for storage of fermented gherkins, below the current level. Gherkin fermentations were carried out in brine containing potassium sorbate (0.07 %) and glacial acetic acid (0.05 %) as practiced industrially and with modified new concentrations. Changes in brine pH and acidity (as lactic), reducing sugar, yeast and mold were followed over time. The modified brine containing potassium sorbate (0.1 %) and glacial acetic acid (0.15 %) developed maximum acidity and required minimum pH of <3. The low acidity in industrial brines are caused by yeast fermentation and luxurious scum (surface film) of fungus during fermentation. But, improper pack out ratio (fruit to brine 45/55) in modified brine resulted in a low buffering action that resulted in reaching an inhibitory pH level of 3.15 for lactic acid bacterial fermentation. In modified brine, the yeast fermentation is controlled by high levels of potassium sorbate that results in a lesser brine acid production and incomplete utilization of fermentable sugars. However, industrial brine shows quick completion of fermentation with the involvement of both lactic acid bacteria and yeast. Further studies were carried out with modified brine by adjusting the pH and maintaining anaerobic storage conditions at a salt level of 5 – 7 %. After one month of storage period, there was no significant difference in texture, color and aroma of gherkin fermented by industrial and modified methods. The adjusting pH in modified brine maintained the acidic environment along with the yeast and mold activity, because this pH level did not increase up to undesirable levels that favored growth of spoilage bacteria. The modified brine can used in industrially, with fruit to brine ratio of 60/40 to develop high acidity (>1.0 %) and low PH (3.0 – 3.2). Combination of acidification and anaerobic condition can be used with modified brine to store fermented gherkins at 5- 7 % salt having same color, texture and aroma of the current product.

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