

PRODUCTION



ASEPTIC TECHNIQUE is a must in controlled fermentation process. Pure culture of lactic acid bacteria is introduced by sterile syringe to cucumbers and sterile brine solution in jar. Cucumbers were first heat-shocked to rid them of interfering and competitive microorganisms which could cause spoilage.

Controlled fermentation improves pickling

Cucumbers, tomatoes, peppers and carrots are consistently high in quality; spoilage is virtually eliminated

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Controlled fermentation process developed by USDA in cooperation with the North Carolina and Michigan Agricultural Experiment Stations, reduces pickling time of cucumbers from many weeks in large vats to just one week in the jar. Cucumbers, tomatoes, peppers and carrots pickled by this process are consistently and uniformly high in quality; spoilage is virtually eliminated.

Quality is improved by eliminating undesirable organisms by first pasteurizing the cucumber in hot water, then aseptically adding (see photo) a pure culture of lactic acid organisms (*P. cerevisiae*, *L. plantarum*, and mixtures of these two species) to cucumbers and sterilized brine solution in jar.

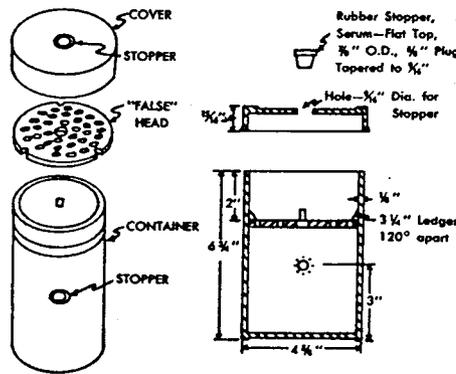
Process overcomes disadvantages of uncontrolled natural fermentation of pickles. For example, in natural fermentation process by yeasts, coliform bacteria and gas-forming lactic acid bacteria often produces "bloaters" (hollow cucumbers). Oxidative yeasts growing on the surface of

More information on pickling process is available from the United States Department of Agriculture, Southern Research and Development Division, P.O. Box 19687, New Orleans, La. 6600 on Reader Service Slip.



OTHER VEGETABLES which can be pickled by pure culture fermentation include tomatoes, sweet peppers, carrots and cherry peppers. Shown inoculating a one-gallon jar of cucumbers is Dr. Etchells of USDA.

EQUIPMENT USED for research on pure-culturing brined cucumbers. Container is a 2-qt. polyethylene jar, cover is snug-fitting friction type which is sealed in place with a 1-in wide rubber band. A "false" perforated head made of polyethylene fits inside container and holds cucumbers beneath the brine. Pure culture of lactic acid bacteria is introduced by sterile syringe through tight-fitting rubber serum stopper.



brines result in further degrading of product by reducing the lactic acid level sufficiently to allow growth of other spoilage organisms.

Commercialization of process is feasible because it offers advantages over present method — reduced pickling time, consistent high quality, reduction of spoilage losses; pickling in consumer-size packages. It also offers the pickle processor opportunities for lowering production costs. Research directed toward the full commercial application is still in progress and it may take several years to complete the change-over to large-scale operation.

An application has been filed for public service patent on the pure culture vegetable fermentation process. The details will be made available to the industry on a non-exclusive royalty-free basis. END

CURVE COMPARES GROWTH of bacterial cells and acid production in both pure culture and natural culture fermentations. Note that desired acid level of 0.6% is reached in 4 days by controlled fermentation; in 15 days by natural fermentation.

