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Enzymatic Nixtamalization: An Improved Corn Masa Flour Production Process

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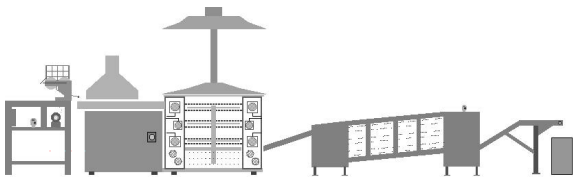
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Dr. Sahai is a Research Assistant Professor in the Department of Food Science & Technology, University of Nebraska - Lincoln. This research has been funded by the National Science Foundation and the Environmental Protection Agency (NSF/EPA) for developing environmental friendly nixtamalization technology.

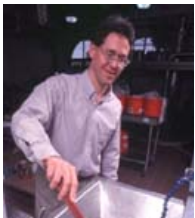
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David S. Jackson, Ph.D.



Dr. Jackson, Associate Professor, Department of Food Science & Technology, University of Nebraska-Lincoln has conducted extensive research in the area of corn nixtamalization. He has authored several re-

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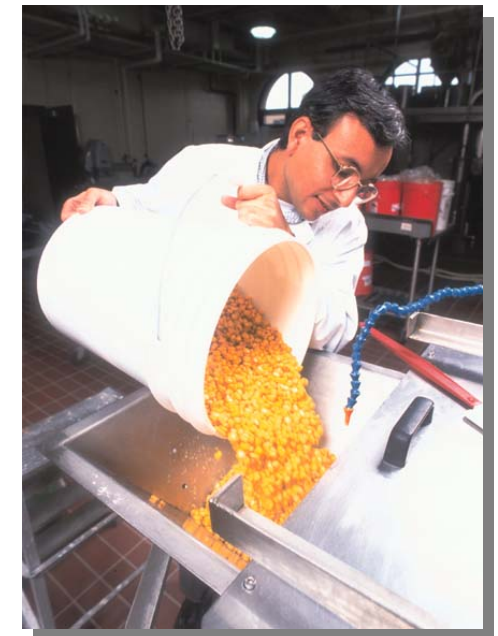
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Enzymatic Nixtamalization: *An Improved Corn Masa Flour Production Process*



Process Developed

by

Deepak Sahai & D. S. Jackson

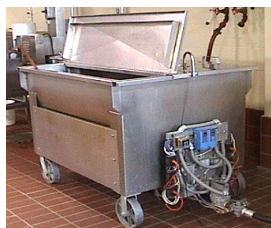
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Why Enzymatic Nixtamalization ?

A major concern during commercial masa or instant masa flour production is the proper disposal of the excess wastewater generated from the nixtamalization process.

Nixtamalization causes partitioning of corn solids between nixtamal and waste water. It has been estimated that corn solids loss during nixtamalization varies between 5-14% depending on corn type & quality. Nejayote waste is highly alkaline, with high chemical and biological oxygen demands (BOD & COD) and is considered an environmental pollutant. A typical corn nixtamalization facility processing 200 US tons of corn every day, uses over 50 gallons of water per minute and generates nearly the equivalent amount of alkaline wastewater in 24 hours.



Enzymatic Nixtamalization Technology:

An improved enzymatic nixtamalization process from whole kernel corn has been developed to produce instant masa flour. The enzymatic process eliminates cooking of corn in an alkaline lime solution, so there is no nejayote generation. Enzyme masa flour has characteristics similar to commercially available instant masa flour and can be used to produce masa food products using typical food processing equipment.

Instant Masa Production by Enzymatic Nixtamalization:



For production of instant masa flour, whole kernel corn is cooked in water without any lime in a nixtamalization tank. The hot cook water can be reused for subsequent cooks.

The cooked corn is then steeped (digested) with a small amount of lime in a 0.05% solution of an enzyme at 50-60°C.

On steeping the pH gradually starts decreasing to become mildly acidic. After steeping for 3-4 hours, the corn is removed and ground to coarse particles in a stone masa grinder. Corn solids loss is usually under 2%. Ground corn is dehydrated and milled into masa flour.

Powdered lime, CMC or other gums, flavorings etc. can be blended to improve flavor and texture characteristics.

Enzymatic nixtamalization offers an economical and an environmentally friendly alternative to alkaline corn processing.



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Advantages of Enzymatic Nixtamalization

- ◆ Enzymatic nixtamalization eliminates the essential step of cooking whole kernel corn in a solution of lime; there are no alkaline waste streams (nejayote).
- ◆ The amount of corn solids lost is significantly lower, providing higher masa yields.
- ◆ Conserves water and energy, hot cooking liquid can be recycled.
- ◆ Requires significantly lower quantities of lime, as it is needed only to achieve an alkaline pH.
- ◆ Cooking and steeping can be completed in only 3-4 hours.
- ◆ Hard and soft hybrids, stress-cracked or broken kernels can all be used without adversely influencing corn solids loss.
- ◆ Superior product quality - extra white masa flour with near neutral pH.
- ◆ Economically viable - increased product yields alone compensates for enzyme costs. Minimum waste treatment and disposal costs.

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