



DRY SALTED LIME PICKLE

Dry salted lime pickles are produced in Asia and Africa. They are particularly popular in India, Pakistan and North Africa. The limes are treated with dry salt which extracts the juice from the fruit to create a brine. The salted limes are left to ferment, during which time lactic acid bacteria grow and multiply, producing lactic acid as a by-product. The lactic acid gives the pickle its sour taste and also acts as a preservative. The final product is a sour lime pickle. Various spices are added to the pickle depending on local preference. In India and Pakistan, the pickle is usually very spicy and hot due to the chilli added. It is usually eaten as a condiment.

The dry salting method is used for pickling many vegetables and fruits including limes, lemons and cucumbers. For dry salt pickling, any variety of common salt is suitable as long as it is pure. Impurities or additives can cause the following problems:

- Chemicals to reduce caking should not be used as they make the brine cloudy.
- Lime impurities can reduce the acidity of the final product and reduce the shelf life of the product.
- Iron impurities can result in the blackening of the vegetables.
- Magnesium impurities impart a bitter taste.
- Carbonates can result in pickles with a soft texture

This technical brief should be read together with 'Pickled fruits' which gives an overview of the process of lactic acid fermentation of fruit and vegetables.

Raw material preparation

Select fully ripe limes that are free from bruising or damage. Wash the limes in potable cold water and drain. It is important that the water used for washing is clean – boiled water is ideal – to avoid contamination of the brine by water-borne bacteria. Chlorinated water should not be used for washing the fruit as this could prevent the natural fermentation taking place. Cut each lime into quarters or make four slits on the skin. All spices used should be of good quality and free of mould.

Processing

Place a layer of cut limes in a fermentation container (a large plastic barrel or bucket). Cover with a layer of salt. Use 1 kg of salt for every 4kg limes. Add another layer of limes and cover with salt. Continue with this layering process until the container is three quarters full, finishing with a layer of salt. Place a cloth on top of the lime and salt. Add a heavy weight on top to compress the fruit down and assist with the formation of a brine. The brine is formed as the juice from the limes is drawn out and mixes with the salt. This takes about 24 hours depending upon the ambient temperature. As soon as the brine is formed, fermentation starts and bubbles of carbon dioxide appear. Stand the container in a warm sunny place for a week to allow the fermentation to continue. A temperature of 21°C is ideal for lactic acid fermentation. Fermentation is complete when no more bubbles appear.

Add spices to the fermented limes according to local taste. Fenugreek seeds, mustard seeds, cumin seeds, dried chillies and turmeric powder are commonly added to the fermented limes to make a hot spicy pickle.

Roast the fenugreek and cumin seeds and the dried chilli. Grind them with the turmeric powder. Heat a few teaspoons of oil in a pan and cook mustard seeds until they pop. Add the ground spices and mix with the fermented lime.

Sample recipe

10 fresh limes
1-2 cups salt
1 tsp cumin seeds
1 tbsp mustard seeds
1 tbs. fenugreek seeds
20-25 dried red chillies
1 tsp turmeric powder

Flow diagram

Fruit selection	Only ripe limes should be used
↓	
Wash	In clean water
↓	
Cut	Cut into four pieces or slice the skin
↓	
Mix with salt	1kg salt for 4kg of limes
↓	
Ferment	Leave the container in the sun for a week to ferment
↓	
Add spices to taste	Dry roast, grind and mix with oil
↓	
Package	

Packaging and storage

Pack the pickle into glass or plastic bottles or into small plastic pouches which are heat sealed. The bottles should be sterilised before filling. Oil is sometimes added to the top of the pickle to help preservation.

Lime pickle keeps well if stored in a cool place. Due to the high acid level of the final product, the risk of food poisoning is low.

Equipment required

Fermentation bucket – plastic bucket with lid
Thermometer
Weighing scales
Salometer (optional)

Equipment suppliers

Note: This is a selective list of suppliers and does not imply endorsement by Practical Action

Cutting and slicing equipment

A range of manual and powered cutting and slicing machinery is available.

Eastend Engineering Company

173/1 Gopal Lal Thakur Road
Calcutta 700 035
India
Tel: +91 33 2553 6397

Narangs Corporation

P-25 Connaught Place
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Tel: +91 11 2336 3547
Fax: +91 11 2374 6705

Gardners Corporation

158 Golf Links
New Delhi 110003
India
Tel: +91 11 2334 4287/2336 3640
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Weighing machines

It is important to have accurate weighing machines. Quite often more than one machine is required - a large one to weigh the fruit and a small one for weighing out the dry ingredients such as pectin and spices.

Fischer Scientific

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377/22 6th Cross Wilson Garden
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Alvan Blanch

UK (see above)

Narangs Corporation

India (see above)

Gardners Corporation

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Bottle filling and packaging equipment**H Erben Limited**

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Bombay Engineering Industry

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Gardners Corporation

India (see above)

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Eastend Engineering Company

India (See above)

Rank and Company

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Mark Industries (Pvt) Ltd

Bangladesh (See above)

John Kojo Arthur

University of Science and Technology
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Narangs Corporation

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Thermometers

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Fisher Scientific UK Ltd

UK (see above)

Gardners Corporation

India (see above)

References and further reading

Practical Action Technical Briefs

- Pickled fruits
- Pickled cabbage (kimchi)
- Pickled dry salted limes
- Pickled cucumbers

This document was produced by Dr. S Azam Ali for Practical Action March 2009. Dr. S Azam-Ali is a consultant in food processing and nutrition with over 15 years experience of working with small-scale processors in developing countries.

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technical brief