**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 4 kg 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.

**Flow diagram**

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

**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  
New Delhi 110001  
India  
Tel: +91 11 2336 3547  
Fax: +91 11 2374 6705

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**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
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
Bishop Meadow Road
Loughborough
LE11 5RG
UK
Tel: +44 1509 231166
Fax: +44 1509 231893
Email: fisher@fisher.co.uk
Web: www.fisher.co.uk

Essae-Teraoka Ltd
377/22 6th Cross Wilson Garden
Bangalore 560027
India
Tel: +91 80 2216185/2241165

Narangs Corporation
India (see above)

Gardners Corporation
India (see above)

Bottle filling and packaging equipment

Orbit Equipments Pvt Ltd
175 - B, Plassy Lane
Bowenpally
Secunderabad - 500011, Andhra Pradesh
India
Tel: +91 40 32504222
Fax: +91 40 27742638
Website: http://www.orbitequipments.com

Pharmaco Machines
Unit No. 4, S.No.25 A
Opp Savali Dhaba, Nr.Indo-Max
Nanded Phata, Off Sinhagad Rd.
Pune – 411041, India
Tel: +91 20 65706009
Fax: +91 20 24393377

Sussex and Berkshire Machinery Company PLC
Blacknest
Alton, Hants GU34 4PX
United Kingdom
Tel: + 44 (0)1420 22669
Fax: + 44 (0)1420 22687
E-mail: technical@sabplc.uk
Website: http://www.sabplc.co.uk/
Dry Salted Lime Pickle

Acufil Machines
S. F. No. 120/2, Kalapatty Post Office
Coimbatore - 641 035
Tamil Nadu, India
Tel: +91 422 2666108/2669909
Fax: +91 422 2666255
Email: acufilmachines@yahoo.co.in
acufilmachines@hotmail.com
http://www.indiamart.com/acufilmachines/#products

Rank and Company
A-p6/3, Wazirpur Industrial Estate
Delhi – 110 052
India
Tel: +91 11 27376101
Fax: +91 11 7234126
Rank@poboxes.com

Autopack Machines Pvt Ltd
101-C Poonam Cambers
A Wing, 1st Floor
Dr Annie Besant Road, Worli
Mumbai 400018
India
Tel: +91 22 2493 4406/2497 4800/2492 4806
Fax: +91 22 2496 4926
E-mail: autopack@bom3.vsml.net.in
www.autopackmachines.com

Banyong Engineering
94 Moo 4 Sukhapibhaon No 2 Rd
Industrial Estate Bangchan
Bankapi
Thailand
Tel: +66 2 5179215-9

Bombay Engineering Industry
R NO 6 (Ext) Sevantibai Bhavan
Chimatpad
Marol Naka Andheri (East)
Mumbai 400059
India
Tel: +91 22 2836 9368/2821 5795
Fax: +91 22 2413 5828

Alfa Technology Transfer Centre
301 Cach Mang Thang 8
Tan Binh District
Ho Chi Minh City
Vietnam
Tel: +84 8 9700868
Fax: +84 8 8640252

MMM Buxabhoy & Co
140 Sarang Street
1st Floor, Near Crawford Market
Mumbai, India
Tel: +91 22 2344 2902
Fax: +91 22 2345 2532
yusufs@vsnl.com; mmmb@vsnl.com;
yusuf@mmmb.in

Technology and Equipment Development Centre (LIDUTA)
360 Bis Ben Van Don St
District 4
Ho Chi Minh City
Vietnam
Tel: +84 8 9400906
Fax: +84 8 9400906

Gardners Corporation
India (see above)

John Kojo Arthur
University of Science and Technology
Kumasi
Ghana

Eastend Engineering Company
India (See above)
Dry Salted Lime Pickle

**Narangs Corporation**
India (see above)

**Thermometers**
**Bellingham + Stanley Ltd.**
Longfield Road, North Farm Industrial Estate
Tunbridge Wells, Kent TN2 3EY
United Kingdom
Tel: +44 1892 500400
Fax: +44 1892 543115
E-mail: [sales@bs-ltd.com](mailto:sales@bs-ltd.com)
Website: [http://www.bs-ltd.com](http://www.bs-ltd.com)

**International Ripening Company**
1185 Pnieridge Road
Norfoplk
Virginia 23502-2095
USA
Tel: +1 757 855 3094
Fax: +1 757 855 4155
Email: [info@QAsupplies.com](mailto:info@QAsupplies.com)
Web: [www.qasupplies.com](http://www.qasupplies.com)

**Fisher Scientific UK Ltd**
UK (see above)

**Gardners Corporation**
India (see above)

**References and further reading**
*Pickles and vinegars* selection of Practical Action Technical Briefs

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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.

Practical Action
The Schumacher Centre
Bourton-on-Dunsmore
Rugby, Warwickshire, CV23 9QZ
United Kingdom
Tel: +44 (0)1926 634400
Fax: +44 (0)1926 634401
E-mail: [info@practicalaction.org.uk](mailto:info@practicalaction.org.uk)
Website: [http://practicalaction.org/practicalanswers/](http://practicalaction.org/practicalanswers/)

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