



# PINEAPPLE PEEL VINEGAR

This product enables the utilisation of pineapple peels, which are usually discarded during the processing or consumption of the fruit. The product has a distinct, very light pineapple flavour and has the same uses as any commercial vinegar.

## Raw material preparation

The peels should be from very well washed ripe pineapples (damaged, rotten or infected fruits should not be used as a source of peels). Use only the peels, not the leaves or stems. The water used should be potable water, boiled if necessary. All the equipment should be well cleaned, as well as the bottles, which should also be steam-sterilised before use.

## Processing

The peels should be cut into thin strips and put into clay or pewter pots. Aluminium or iron pots should not be used.

Sugar and clean water are added. Each pot is then inoculated and covered with a clean cotton cloth, held around the pot with an adhesive tape, to prevent contamination by insects or dust. The inoculated pineapple is fermented at room temperature (about 20-22°C) for about eight days. The acidity should be checked daily. The water level should be maintained during this period. The product should be increasingly acid and by the eighth day it should have the required concentration of 4 per cent acetic acid in vinegar. If higher acidity is desired the product is left to ferment for another one or two days.

The development of acidity should be checked by tasting the product during fermentation.

The residual bacteria removed may be reused as a residue inoculum two or three times more.

The traditional process may be improved by a two-stage fermentation in which alcohol is first formed by yeast (*Saccharomyces cerevisiae*) and the 'must' is then inoculated with acetic acid bacteria (*Acetobacter pasteurianus*). In outline, the process involves liquidising the peels and diluting with water (water:pulp is 4:1), adjusting the pH to 4.0 using sodium bicarbonate and adding yeast nutrient (ammonium phosphate) at 0.14g per litre. A starter culture is added at 2.7g per litre and the fermentation allowed to take place at 25°C for two days. The 'must' is then filtered and inoculated with acetic acid bacteria and allowed to ferment for eleven days with aeration of the 'must'. Other parts of the process are similar. Additional equipment includes a pH meter, refractometer, liquidiser, fermentation locks and equipment for preparing the starter cultures.

### Flow Diagram

Pineapple	Well washed in clean water.
↓	
Peel the fruit	Take care not to damage hands
↓	
Cut the peel	Cut into thin strips and put into clay or pewter pots..
↓	
Mix with sugar	Sugar is dissolved in clean water
↓	
Ferment	Each pot is then inoculated and covered with a clean cotton cloth.
↓	
Filter	Strain through a cheese cloth
↓	
Package	

### Packaging and storage

The vinegar is bottled in clean glass bottles and stored in a cool dark place.

### References and further reading

- [Fermented Fruits and Vegetables: A Global Perspective](#), FAO,1998
- [Vino de Frutas: Serie Procesamiento de Alimentos 6](#), ITDG Latin America, 1998
- [Fruit Processing](#), a selection of Practical Action Technical Briefs
- [Fruit Waste Utilisation](#), Practical Action Technical Brief
- [Juices and Drinks](#), a selection of Practical Action Technical Briefs
- [Principles and practices of small and medium-scale fruit juice processing](#). FAO Agricultural Services Bulletin 146, Food and Agriculture Organization of the United Nations (FAO), (2001).
- [Technical manual on small-scale processing of fruits and vegetables](#), Food and Agriculture Organization of the United Nations (FAO)
- [Setting up and Running a Small Fruit or Vegetable Processing Enterprise: Opportunities in Food Processing](#) CTA
- [Starting a Small Food Processing Enterprise](#) by Peter Fellows, Ernesto Franco & Walter Rios Practical Action Publishing/CTA 1996
- [Small Scale Food Processing](#) 2<sup>nd</sup> Ed. P Fellows & S Azam Ali, Practical Action Publishing, 2003
- [Fruit and Vegetable Processing](#) UNIFEM Practical Action Publishing, 1993

### Useful addresses and contacts

Please note this is a selective list of suppliers and does not imply endorsement by Practical Action.

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# technical brief