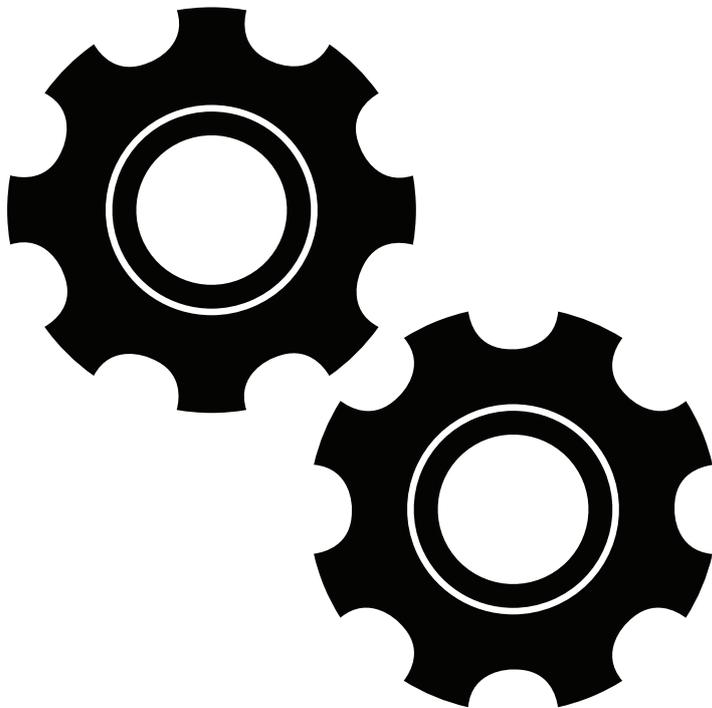


**FRUIT JUICE STARTER KIT**

# **PRODUCTION MANUAL**



**SINGLE SPARK**  
*Your business-in-a-box*

# CHAPTER ONE

# EQUIPMENT

Here you see an overview of the potentially required equipment, including a short description.



Juice extractor (pulper)



Juice press (for citrus)



Stove



Stainless steel pans



10 Kg Scale



Analytical Balance



Others: Measuring cylinder, Plastic buckets, Funnels, Strainers, Peelers, Knives, Wooden spoons, Cutting boards, Thermometer.



Cup sealing machine



Freezer (-20 degrees celcius)

## CHAPTER TWO

# JUICE PRODUCTION

For all the fruit based beverages, the first stage is the extraction of juice or pulp from the fruit. The following are the key manufacturing stages:

- Selection and preparation of raw material
- Juice extraction
- Filtration (optional)
- Batch preparation
- Pasteurization
- Filling and bottling.

Any fruit can be used to make fruit juice, but the most common ones include pineapple, orange, grapefruit, mango and passion fruit. Some juices, such as guava juice, are not filtered after extraction and are sold as fruit nectars.

Credits: All information in this chapter is from Fruit juice processing from Practical Action. [www.practicalaction.org](http://www.practicalaction.org)

### 1

#### Preparation of raw material

Select mature, undamaged fruits. Any fruits that are mouldy or under-ripe should be sorted and removed. Wash the fruit in clean water. It may be necessary to chlorinate the water by adding 1 tablespoon of bleach to 5 litres of water. Peel the fruit and remove stones or seeds. If necessary, chop the fruit into pieces that will fit into the liquidizer or pulper. Remember that at this stage, you are exposing the clean flesh of the fruit to the external environment. Make sure that the utensils are clean. Do not leave the cut surfaces exposed to the air for long periods of time or they may start to turn brown and this will discolor the juice. The fruit pieces can be placed in water that contains lemon juice (250ml lemon juice per litre of water) to stop them browning.

## 2 Juice extraction

There are several methods to extract juice depending on the type of fruit you use. For citrus fruits which are naturally juicy, the best option is to use a hand presser (see figure 1) or a revolving citrus 'rose'. Some fruits such as melon and papaya are steamed to release the juice. Apples are pressed and fruits such as mango, guava, pineapple, strawberry must be pulped to extract the juice. The fruit pieces are pushed through a perforated metal plate that crushes and turns them into a pulp. Some fruits can be pulped in a liquidizer and then filtered to remove the fruit pieces. There is a range of equipment available that varies in size and in the type of power supply (some are manual while the larger ones require electricity). For the small scale processor, the hand-powered pulper/sieve which force the fruit pulp down through interchangeable metal strainers (figures 2 and 3) is sufficient.



Figure 1: Hand presser

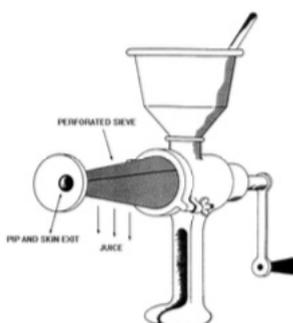


Figure 2: Hand powered pulper



Figure 3: Hand powered pulper

## 3 Filtering

To make a clear juice, the extracted juice or pulp is filtered through a muslin cloth or a stainless steel filter. Some of the larger filter presses have a filter included. Although juice is naturally cloudy, some consumers prefer a clear product. It may be necessary to use pectic enzymes to break down the pectin and to help clear the juice. Pectic enzymes may be difficult to find and expensive and therefore should only be used if really necessary and readily available.



## 4 Batch preparation

When the juice or pulp has been collected, it is necessary to prepare the batch according to the chosen recipe. This is very much a matter of choice and judgment, and must be done carefully to suit local tastes. Juices are sold either pure or sweetened. Fruit squashes would normally contain about 25% fruit material mixed with a sugar syrup to give a final sugar concentration of about 40%. Squashes are diluted with water prior to use and, as the bottle is opened, partly used and then stored, it is necessary to add a preservative (for example 800ppm sodium benzoate).

Another popular product is fruit nectar, which is a sweet mixture of fruit pulp, sugar and water which is consumed on a 'one shot' basis. Essentially, these consist of a 30% mix of fruit pulp and sugar syrup to give a final sugar level of about 12-14%. All fruits contain sugar, usually around 8-10%. The actual levels vary from fruit to fruit and with the stage of ripeness of the fruit. They also vary within the same fruit grown in different parts of the world. The addition of sugar to the fruit pulp to achieve the recommended levels for preservation must take into account the amount of sugar already present in the juice. It is important to achieve the minimum level that will prevent the growth of bacteria, however, once that level has been achieved, it is possible to add more if the consumers require a sweeter product. The amount of sugar added in practice is usually decided by what the purchasers actually want. The Pearson Square is a useful tool to use to help with batch formulation (see the appendix) and to calculate the amount of sugar to be added for preservation. In all cases, sugar should be added to the fruit juice as a sugar syrup. The syrup should be filtered through a muslin cloth prior to mixing to remove particles of dirt which are always present. This gives a clearer, higher quality product.

## 5 Pasteurization

All the products mentioned above need to be pasteurized at 80-95°C for 1-10 minutes prior to hot-filling into bottles. At the simplest level, this may be carried out in a stainless steel, enameled or aluminum saucepan over a gas flame, but this can result in localized overheating at the base of the pan, with consequent flavor changes.

Care is needed when producing pineapple juice due to a heat resistant enzyme in the juice. The enzyme damages skin after prolonged contact and workers should therefore wear gloves to protect their hands. The juice must be heated to a higher temperature for a longer time to destroy the enzyme (eg boiling for 20 minutes).

It is best to use stainless steel pans to heat fruit juice as the acidity of the juice can react with aluminum in aluminum pans during prolonged heating. However, large stainless steel pans are very expensive and may not be affordable by the small scale processors. To get round this problem, it is possible to use a large aluminum pan to boil the sugar syrup. The boiling syrup can then be added to a given amount of fruit juice in a small stainless steel pan. This increases the temperature of the juice to 60-70°C. The juice/syrup mixture is then quickly heated to pasteurizing temperature.

Bottle size (litres)	Pasteurisation time at 80°C (minutes)
0.33	10
0.5	15
0.75	20

Table 1: Pasteurisation times at 80°C for different bottle sizes

Another option is to pasteurize the juices once they have been bottled. The bottles are placed in a hot water bath which is heated to 80°C. The bottles are held in the hot water for the given amount of time until the contents reach the desired temperature. The length of time required in the water bath depends on the size and volume of the bottles (see table 1). A thermometer should be placed in one of the bottles, which is used as a test bottle per batch, to monitor the temperature and to ensure that the correct temperature has been reached. This method of pasteurization has benefits but also has problems.

Benefits	Problems
Juice is pasteurised within the bottle so the chance for re-contamination of the juice is reduced	Difficult to ensure the internal temperature of the bottles reaches the desired pasteurising temperature
No need for large stainless steel pans for pasteurisation	Require glass bottles for pasteurising

Table 2: The pros and cons of pasteurising within after bottling

The next industrial jump in pasteurization is an expensive option that involves the purchase of a double-jacketed steam kettle in stainless steel and a small boiler. The total cost is likely to be in the region of £5-10,000, which is only viable for larger scale operations.

#### Filling and bottling

In all cases, the products should be hot-filled into clean, sterilized bottles. A stainless steel bucket, drilled to accept a small outlet tap, is a very effective bottle filler. The output can be doubled quite simply by fitting a second tap on the other side of the bucket. This system has been used to produce 500-600 bottles of fruit juice per day in the West Indies.

After filling hot, the bottles are capped and laid on their sides to cool prior to labeling.

## 5

### Quality control

The freshness and quality of the expressed fruit juice is central to the quality of the final product. As soon as the juice is expressed from the fruit it starts to deteriorate, both as a result of chemical activity (enzyme action) and bacterial spoilage. It is important to move from the juice extraction stage to pasteurization as quickly as possible to minimize any spoilage.

Extracted fruit juice that is left to stand for long periods in the heat will start to ferment and may start to discolour due to enzyme activity. The juice should be stored in a refrigerator (if one is available) or in a cool place and away from the direct sunlight. It should be collected into a clean, sterile container (food grade plastic buckets is the best option) and covered to keep out dirt, dust and insects. For the best quality product, it is essential to work quickly between the extraction of the juice and the bottling stage. The longer the juice is out of the bottles, the more chance there is of contamination.

As in all food processing enterprises it is necessary to ensure that the fruit products are correctly formulated and priced to meet the customer's requirements, and that production costs are minimised to ensure that a profit is made. The quality of each day's production should be monitored and controlled to ensure that every bottle of juice has the correct keeping and drinking qualities.

In particular the following points should be observed:

- Only fresh, fully ripe fruit should be used; mouldy or insect damaged fruit should be thrown away. All unwanted parts (dirt, skins, stones etc) should be removed.
- All equipment, surfaces and floors should be thoroughly cleaned after each day's production.
- Water quality is critical. If in doubt use boiled water or add one tablespoon of bleach to 5 litres of water to sterilise it. If water is cloudy, a water filter should be used.
- Pay particular attention to the quality of re-usable bottles, check for cracks, chips etc and wash thoroughly before using. Always use new caps or lids.
- The concentration of preservative should be carefully controlled for correct preservation of squashes and cordials, and may be subject to local laws. Check first and use accurate scales to measure the preservative.
- The temperature and time of heating are critical for achieving both the correct shelf life of the drink and retaining a good colour and flavour. A thermometer and clock are therefore needed.
- The correct weight should be filled into the bottles each time.

These factors are important because a customer will stop buying the products if the quality varies with each purchase.

## 6

### The use of chemical preservatives in fruit juices and fruit drinks

As the name suggests, pure fruit juice is solely the extracted juice of fruit and should not have any preservative, or any other ingredients (such as sugar) added. Fruit drinks that are not consumed in one go can have preservatives added to help prolong the shelf life once they have been opened. There are several chemical preservatives that can be added to fruit juices. Processors need to check with local authorities or standards agencies to find the maximum permitted levels.

Compound	Comments	Commonly used levels
Sulphites and sulphur dioxide	Sulphur dioxide gas and the sodium or potassium salts of sulphite, bisulphite or metabisulphite are the most commonly used forms. Sulphurous acid inhibits yeasts, moulds and bacteria. Sulphur dioxide is mainly used to preserve the colour of fruits during drying.	0.005-0.2%
Sorbic acid	Sorbic acid and sodium and potassium sorbate are widely used to inhibit the growth of moulds and yeasts. The activity of sorbic acid increases as the pH decreases. Sorbic acid and its salts are practically tasteless and odourless in foods when used at levels less than 0.3%.	0.05-0.2
Benzoic acid	Benzoic acid, in the form of sodium benzoate is a widely used preservative. It occurs naturally in cranberries, cinnamon and cloves and is well suited for used in acid foods. It is often used in combination with sorbic acid at levels from 0.05-0.1% by weight.	0.03-0.2%
Citric acid	Citric acid is the main acid found naturally in citrus fruits. It is widely used in carbonated beverages and as an acidifier of foods. It is a less effective anti-microbial agent than other acids.	No limit

Table 3: Permitted preservatives used in fruit juices and beverages.

# CHAPTER THREE

# RECIPES #1



Fruit juice recipes  
<https://juicerecipes.com/recipes/>



Fruit juice recipes:  
<http://www.thejuicenut.com/>



Fruit juice recipes:  
<https://www.vitamix.com/Be-Inspired/Whole-Food-Juicing/13-Whole-Food-Juice-Recipes>

# CHAPTER FOUR

# RECIPES #2

**PRACTICAL ACTION**

## LIME JUICE CLEAR CORDIAL

**Production**

Lime juice cordial is a popular clear product, commonly manufactured with sugar, which is diluted to make drinks. The cordial is packaged with various concentrations (20% and 30% sugar) to allow for different sugar content changes with time. The essential manufacturing process is outlined as follows:

**Ingredients:**

- Water
- Citric Acid
- Sweetener
- Lime Juice
- Cordial Juice

**Method:**

1. The water is heated to 70°C to help dissolve the sweetener and citric acid. The water is then cooled to 40°C.

2. The sweetener and citric acid are added to the water and stirred until fully dissolved.

3. The lime juice is added to the mixture and stirred.

4. The cordial juice is added to the mixture and stirred.

5. The mixture is filtered through a fine mesh filter to remove any pulp.

6. The cordial is bottled and sealed.

**Technical brief**

**PRACTICAL ACTION**

## LIME OIL AND JUICE

**Production**

Lime oil and juice is a natural product that is produced from the fruit of the lime tree. The production process involves the extraction of the oil and juice from the fruit, followed by the addition of water and sugar to create a cordial. The essential manufacturing process is outlined as follows:

**Ingredients:**

- Lime Fruit
- Water
- Sugar

**Method:**

1. The lime fruit is washed and cut into halves.

2. The juice is squeezed out of the fruit and collected.

3. The pulp is separated from the juice and discarded.

4. The juice is filtered through a fine mesh filter to remove any pulp.

5. The juice is mixed with water and sugar to create a cordial.

6. The cordial is bottled and sealed.

**Technical brief**

**PRACTICAL ACTION**

## LIME JUICE SMALL-SCALE PRODUCTION

**Production**

Lime juice small-scale production is a process that involves the extraction of the juice from the fruit of the lime tree. The production process involves the extraction of the juice from the fruit, followed by the addition of water and sugar to create a cordial. The essential manufacturing process is outlined as follows:

**Ingredients:**

- Lime Fruit
- Water
- Sugar

**Method:**

1. The lime fruit is washed and cut into halves.

2. The juice is squeezed out of the fruit and collected.

3. The pulp is separated from the juice and discarded.

4. The juice is filtered through a fine mesh filter to remove any pulp.

5. The juice is mixed with water and sugar to create a cordial.

6. The cordial is bottled and sealed.

**Technical brief**

Lime Juice recipes

**PRACTICAL ACTION**

## PASSION FRUIT JUICE SMALL-SCALE MANUFACTURE

**Production**

Passion fruit juice is a popular fruit juice, commonly manufactured with sugar, which is diluted to make drinks. The cordial is packaged with various concentrations (20% and 30% sugar) to allow for different sugar content changes with time. The essential manufacturing process is outlined as follows:

**Ingredients:**

- Passion Fruit
- Water
- Sugar

**Method:**

1. The passion fruit is washed and cut into halves.

2. The juice is squeezed out of the fruit and collected.

3. The pulp is separated from the juice and discarded.

4. The juice is filtered through a fine mesh filter to remove any pulp.

5. The juice is mixed with water and sugar to create a cordial.

6. The cordial is bottled and sealed.

**Technical brief**

**PRACTICAL ACTION**

## MIXED FRUIT JUICE SMALL-SCALE MANUFACTURE

**Production**

Mixed fruit juice is a popular fruit juice, commonly manufactured with sugar, which is diluted to make drinks. The cordial is packaged with various concentrations (20% and 30% sugar) to allow for different sugar content changes with time. The essential manufacturing process is outlined as follows:

**Ingredients:**

- Mixed Fruit
- Water
- Sugar

**Method:**

1. The mixed fruit is washed and cut into halves.

2. The juice is squeezed out of the fruit and collected.

3. The pulp is separated from the juice and discarded.

4. The juice is filtered through a fine mesh filter to remove any pulp.

5. The juice is mixed with water and sugar to create a cordial.

6. The cordial is bottled and sealed.

**Technical brief**

Passion Fruit Juice

Mixed Fruit Juice



See your personal account to download these documents

## CHAPTER FIVE

# BOOKLETS ABOUT FRUIT JUICE

See your online account to read interesting booklet about fruit juice production and recipes.

### Fruit Juice Processing

This booklet explains in an easy about the fruit juice process. It looks at juice extraction, preparation, pasteurization, bottling, quality control, and equipment suppliers.

### Lime Juice Clear Cordial

This describes a manufacturing system capable of producing up to 250 bottles of lime juice cordial per day using simple, comparatively low-cost

### Lime Oil and Juice

The production of oil and juice from limes on a commercial scale requires the use of a range of equipment which is described in this

### Fruit juice processing FAO booklet

A lot of information about hoe to start small scale fruit juice processing businesses. Interesting information per type of fruit in: "PART 2"

### Food Processing BUILDING DESIGN

Information about floor plan and building design to process food or fruit

## CHAPTER SIX

# BUY ONLINE

Some equipment and materials can't be bought locally or are very expensive. On the internet there are several websites to buy materials and equipment from abroad. Alibaba and Ebay are the most popular ones. With the use of clear videos this chapter explains how Ebay works. To purchase products online you need a Creditcard or a free PayPal account. For PayPal you only need your bank account. The tutorial for Paypal is also included in this chapter.



These are the steps you need to take to create an Ebay account, create a Paypal account, to link them together, and to buy your first product online.



- 1 Create an Ebay account (see online video: How To Create an Ebay Account)
- 2 Create a PayPal-account (see online video: How to Make a PayPal Business Account and link your bank account)
- 3 Verify your PayPal-account with your email address (video: How to Verify Your PayPal Account)
- 4 Link your PayPal-account to your Ebay-account (video: How to Link Your PayPal Account With Ebay)
- 5 Purchase your product (video: How to Buy on Ebay)



See your personal account to watch the videos

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**Single Spark**  
**The Netherlands**  
**[www.singlespark.nl](http://www.singlespark.nl)**  
**+31(0)646902592**