



# **PROTOCOL FOR PASSION JUICE PREPARATION**

**for  
Trainers and Processors**

**Prepared  
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**PROCESSING  
FOR COMMERCIAL  
EXPLOTATION OF SELECTED  
TREE FRUITS AND  
VEGETABLES IN TANZANIA  
AND RWANDA PROJET  
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## 1. INTRODUCTION

Fruits are an important crop in Eastern and Central Africa, just as they are the world over. They are a source of essential vitamins, minerals, antioxidants, fibres and carbohydrates which our bodies crucially need. These nutrients improve the quality the human diet and protect us from chronic diseases. Fruits, however, are highly perishable leading to drastic nutritional and economic losses. This means that during the off-season, households face shortage of fruits and vegetables due to lack of knowledge on how to preserve and process them for year-round consumption. The long term implication is that supplies of locally processed products are inadequate and do not meet the required quality standards for domestic and international markets. These challenges have spurred ASARECA to invest in research and development on fresh produce technology to add onto their value and increase incomes.

In response to this particular challenge, ASARECA initiated a project; “*Processing for commercial exploitation of selected tree-fruits and vegetables in Tanzania and Rwanda*” to validate the existing protocols for processing fruit juices, among other products, on commercial but small scale basis. The project is focusing on ready-to-drink single or mixed fruit mango and passion fruits, and the vegetable *Amaranthus sp.* The project is implemented by scientists from Sokoine University of Agriculture, Tanzania; Institut des Sciences Agronomiques du Rwanda, Mikocheni Agricultural Research Institute, Tanzania, the Kigali Institute of Science and Technology, Rwanda, and the Community Food Processing and Training Centre, Morogoro Tanzania. It is managed by ASARECA’s High Value Non Staple Crops programme. The project has identified a number of key cost-effective technology packages for small scale fruits and vegetables processing to produce quality products that meet safety demands of

target markets. It has fostered linkages amongst stakeholders along the fruit/vegetable value chain to promote best handling practices and standards, and sensitized consumers to appreciate the value of locally processed fruits and vegetable products. The project has also facilitated the training of farmers, transporters, processors and traders on suitable agronomic practices, quality assurance and appropriate technologies.

Processing passion fruit into juice is one of the technologies that were validated in order to benefit food processing entrepreneurs and consumers as well. This training manual is therefore, prepared to guide trainers and processors on good manufacturing/hygienic practices in mango juice production. This manual also serves as a training guide for disseminating fruit juice making. Most of the practices described in this manual have been practically tested by 45 participating processors in the project. We have also included a typical line-up of equipment for juice production and estimated cost from suppliers in China.

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## 2. GETTING STARTED

1. Fresh and fully ripened passions without bruises and any signs of rotting must be used.

- Unripe passions usually bring difficulty in extracting pulp from the seeds.
- Those with bruises, blemishes or any signs of rotting may lead to contamination by microbial spoilage organisms which will endanger the health of the ultimate consumer.



2. Sort the passions by removing any foreign matter and discarding those which are rotten or bruised. Wash the fresh passions with safe and portable water. Cut them using a stainless steel knife and scoop out the seeds and pulp into a clean dish previously washed with portable water.

- Passions fruits which are rotten bruised or with blemishes are major sources of microbial contamination.
- Portable and safe water (e.g. boiled or treated) is that which has no microbial contamination which may lead to diseases.
- Use of knives which are not stainless steel may develop rust due reactions caused by acids present in the fruit and the metal hence entering the food which can be hazardous to the consumer.

3. Dismantle the passion fruit pulp extractor machine and clean it inside and

outside using clean and safe water. Assemble the machine and let it drain.

- Despite being previously cleaned after a processing activity, it is very important to dismantle the machine during cleaning as it contains small openings which may allow entrance to flies, cockroaches, ants, spiders and other insects or dust. It very difficult to remove these insects in cleaning in place operation without dismantling the machine. This may lead to grinding of the insects together with the pulp during extraction, thus affecting quality of the end product



4. Switch on the machine; add 4 kg of the scooped seeds-pulp mixture and wait for 30sec before adding the next 4 kg portion.

#### **Note**

- i. To attain efficient extraction by the machine from the seeds containing the pulp from the passion fruits it is proper to use 4 kg and an interval of 30sec before progressive addition of another 4kg.
  1. The weight of seeds-pulp mixture and time may be reduced or increased depending on the efficiency of the machine.
  2. If the machine is run continuously it produces heat, thus should be switched off for at least 5min between consecutive extractions.
  3. The machine should be well cleaned after usage.



5. Store the extracted pulp (12% Brix) in a safe and clean container before mixing with water it to obtain desired juice concentration.

- a. It is important to use safe and clean utensils so as to prevent hazards associated with microbial contamination especially at these final stages for juice production.

6. To prepare 1 litre of juice/nectar mix 160ml of the passion pulp together with 840ml of portable and safe water to make 1 litre of passion juice.

- a. Portable and safe water is that which has no microbial contamination which may lead to diseases e.g. boiled or treated water.
- b. It is important to use portable and safe water so as to prevent microbial contamination especially at these final stages for juice production.

7. Obtain the Brix (Total Soluble solids as sugar) value (This should be about 2% Bx) of the juice by using a *Refractometer* and gradually add white sugar (100g) to the juice while stirring until a level of 12% Brix is reached.

- a. A Brix of 12% has been has shown to be acceptable to many people.
- b. You may reduce or increase the amount of sugar depending on the consumer preference.



8. Separate the juice by using a clean stainless steel sieve immediately after the juice is removed from boiling before it starts to cool down.

➤ It is important to sieve the juice while it is still hot and use a clean sieve so as to prevent contamination by microorganisms which may cause health hazards to consumers especially at these final stages of juice production.

9. Pasteurize the juice at a temperature of 80°C for 10min while stirring continuously.

- a. Heating the juice at 80°C for 10min is sufficient to destroy a majority of the microorganisms which may cause health hazards to consumers.
- b. Heating the juice at a temperature less than 80°C or for a shorter time than 10min is insufficient to destroy a majority of the microorganisms which may cause health hazards to consumers.
- c. It is important to stir continuously during boiling to avoid localized heating so as to achieve uniform heating throughout the juice.
- d. Heating for more than 10min at 80°C will lead to loss of volatiles like flavor compounds and impart a burning taste thus not attracting consumers.

10. Store the pasteurized juice in a clean container and cover with a clean lid until it reaches a temperature of 60-65°C. Add 0.02g of Sodium metabisulphite and 0.1g of Potassium sorbate as preservatives to 1litre of the juice and stir to mix.

1. Adding the preservatives at a temperature of 60-65°C of the juice increases the ability to react and destroy the microorganisms thus increasing the shelf life of the



juice.

2. Covering the juice is important to avoid foreign contamination by microbes and dirt.

11. Pack the juice at a temperature not less than 45°C into clean plastic bottles which have been washed by safe portable water.

- The juice is packed at a temperature of not less than 45°C so to attain the effectiveness of the preservatives in combating microorganisms.
- Packing the juice at higher temperatures may cause melting or shrinking of the packaging material; lower temperature can result in growth of microbial contaminants

12. Label the products so as to conform to the required labeling standards and store in a cool dry place for 5 days for monitoring.

- i. A label that which conforms to the required labeling standards is that which has: manufacturing and expiring dates, batch number, net content, ingredients, products name, manufacturers address, targeted consumers and how to use the product.
- ii. It is important to note that the labeling and packaging describes the quality of the product thus they should attractive so to reduce the marketing costs in advertising.
- iii. It is important to monitor the product for 5 days so as to assure it conforms to the quality and safety standards and to prove that it can not spoil in the market before its shelf life.

13. If the products show good results they can be marketed or stored for future use.

- Storage and transportation conditions of the product should consider factors such as light and surrounding humidity.
- In case 30% of the batch is seen to show spoilage signs such as gas accumulation or color changes, the whole batch should be recalled and disposed off safely.

14. Put 2 samples in the laboratory for every batch

- It is important to store two samples in the laboratory for every batch so as to resolve any complaints associated with the product quality arising from consumers.

## **NOTE**

1. Juice which has been produced by this method has the following qualities:
  - Titratable Acidity of 1-1.2%
  - pH of 3.2-3.4
  - 12% Brix of sugar as Total soluble solids
  
2. If all the steps are carefully followed, the passion juice can stay for 6 months without spoiling.

## **3. GOOD HYGIENIC PRACTICES**

### **3.1 Personal hygiene**

Human beings (food handlers) are natural carriers of many micro-organisms and can often be a major source of contamination. The main sources include the hair, skin, mucous membranes, digestive tract, wounds, infections and clothing. Good personal hygiene is primarily directed towards preventing both disease and discomfort. Therefore, food handlers should be clean and practices high level of hygienic habit. They are expected to attend training programmes on food handling hygiene when these are available. Basic requirements for personal hygiene include:

### **3.2 Health status**

- ❖ Food handlers should have health certificates from recognized health department.
- ❖ Routine medical examination of food handlers is generally recommended
- ❖ Sick food handlers should be exempted from processing if suffering from an illness that includes symptoms such as jaundice, diarrhoea, vomiting, fever, coughing, sore throat, skin rash or skin lesions such as boils or cuts. They should report this to their supervisor before starting work

### **3.3 Hands**

- ❖ Hands should be washed regularly with soap in clean water, but especially before starting to handle food, after going to the toilet or changing a baby, receiving a phone call and after handling raw food, food waste or chemicals
- ❖ Finger nails should be kept short, clean and free from nail polish during processing
- ❖ Jewellery such as rings and bangles should be removed as dirt can become lodged under these and may be difficult to remove

### **3.4 Dressing and body cleanliness**

The food handler should do the following:

- ❖ Dress appropriately e.g. wear laboratory/dust coats, gloves, head covers gumboots etc. depending on the nature of processing.
- ❖ Avoid walking to the streets with processing clothes.
- ❖ Avoid rubbing their hands on coats and apron.
- ❖ Maintain personal cleanliness including body and clothes.

### **3.5 Personal behaviour**

The food handler should do the following

- ❖ Minimise talking in the processing room and encourage use of mouth masks.
- ❖ Not tasting or eating food being processed or other food during processing
- ❖ Avoid coughing into their hands, food or touching their hair, nose or mouth while handling food without washing their hands afterwards.
- ❖ Not smoking in food processing area

### **3.6 Training**

All personnel should receive appropriate hygiene training and be made fully aware of their individual responsibilities. Such training should be repeated and updated as required.



Medical check up



Hand washing



Proper dressing



No smoking



Training

Good personal hygiene practices

### **3.7 Equipment hygiene**

The following should be done to ensure equipments' hygiene

- ❖ All equipment, utensils, and seams with which food comes into contact or may come into contact with, should be properly cleaned before and after use
- ❖ Wooden equipment, e.g. tables and benches should be scrubbed with soap, water and brushes and then rinse thoroughly.
- ❖ Equipments and utensils should be dried on a dish rack or wipe them dry with a clean cloth and store them in a dust free place.

## 4. EQUIPMENT AND MACHINES BY VARIOUS MANUFACTURERS



### 山东工大机械有限公司 GONGDA MACHINE CO., LTD. SHANDONG

公司地址: 中国·山东·济南市历城区开源路12号

电话 (T): +86-531-82378335

ADDRESS: No.12 KAUYUAN ROAD OF LIOPENG AREA, JINAN, CHINA

传真 (F): +86-531-82378345

#### 1. Water treatment

Equipment list and description

This whole series includes the raw water tank, water pre-treatment unit (including quartz sand filter, active carbon and water-softener), middle exchange water tank, main machine unit (including micro filter, high pressure pump and refining membrane), ultraviolet sterilizer clean water tank and the control system and pipelines.

Water pre-treatment unit tank material: fiber glass



#### 2. Apple crusher

Mainly used in the crushing of the pre-boiled fruit.



#### 3. Pulper

This is mainly used in the juice extractor after the fruit is crushed.



#### 4. Pre-cooker

Model: GD-MPH-1

Dimensions: 2700x600x1350(l\*w\*h)

Rating capacity: 500kg/h

Steam required: 200kg/h

In-feed at normal temperature and outlet at 60~85°C adjustable

Tubular structure with end plates

Heat exchanging area: 2.25 square meter



#### 5. Centrifugal filter machine

Filtering tank inner diameter: 800mm

Tank volume: 100L

Max. Loading weight: 140kgs





## 山东工大机械有限公司

**GONGDA MACHINE CO., LTD. SHANDONG**

公司地址: 中国·山东·济南市历城区开源路12号

电话 (T): +86 - 531 - 82378335

ADDRESS: No.12 KAIYUAN ROAD OF LIUENGBEAJI NAN CHINA

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### 9. Bottle washing machine

#### Technical Features

This can cleaning machine is used in the cleaning of bottles before beverage filling. It works automatically with high efficiency.

#### Principal parameter

Model: GD-CP-12

Production capacity: 2000B/H

Height of bottle: 90-135mm

Diameter of bottle: 40-80mm

Washing nozzle: 12

Motor Power: 0.75kw

Outer size: 1200×1200×1700mm



### 10. Juice filling machine

This machine is specially designed for PET bottle filling, for juice it is hot filling.

Model: GD-GZ-12

Production capacity: 2000B/H

Height of bottle: 90-135mm

Diameter of bottle: 40-80mm

Filling nozzle: 12

Motor Power: 1.1kw

Outer size: 1200×1060×1700mm

Weight: 1500kg



### 11. Screw capping machine (screw cap)

This machine is designed for plastic bottles or glass bottles with screw caps.

Model: GD-XG-1

Working nozzle: 1 nozzle

Suitable bottle size: 1200×900×2300mm

Main power: 0.75KW

Production capacity: 2000B/H

Fit for: non-carbonated beverage







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### 12. Sleeve labeling machine

#### Performance:

1. The machine is made of stainless steel and high quality Aluminum alloy, perfect in structure, conveniently adjustable.
2. No need ground feet bolts, move conveniently, flexible assort production field.
3. Shrink film label stand, adjust according to different label size.
4. Transmission machine can be adjusted conveniently without tools, which make it more suitable for bottle sizes.
5. Forced insertion design proves reasonable and convenient.
6. Equipped with inspection system to inspect the cutting size, accurate and efficient.
7. Special designed cutter head, no need adjustment of the cutting plate in certain range.
8. Using Japanese servo motor and high-delicacy photo electricity, cutting labels precisely.



### 13. Semi-auto film wrapping machine





Zhengzhou Amisy machinery & trading Co.,Ltd

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This fruit pulping machine is used to many fruits,such as apple, pear, tomota, grape, mango, peach etc.

There are two working room, the first step is for pitting, and the second for pulping.

The machine is made of stainless steel with good quality.



Zhengzhou Amisy machinery & trading Co., Ltd

TEL: 0086-371-65903478 FAX: 0086-371-65903401

Contact point: Penny sun EMAIL:sunlijie1@hotmail.com



### Specification

Model	Capacity (t/h)	Scree cloth specification (diameter×length)m m	sieve mesh diameter (mm)	Running speed (rpm)	Power (kw)	size (L×W×H) mm
MDJ1-2.5	1.5t/h	350×700	1.1	970	7.5	1535×1420×1533

**Price of the machine: FOBQingdao 5850USD per set**

### III . Remark:

- I. Delivery time: One week after payment.
- II. Payment term: 40% as down payment by T/T, 60% by seeing the faxed B/L by T/T.
- III. Valid time : This quotation is valid for one month.
- IV .Quality Guarantee Terms:



Food  
Processing  
Machine  
From



**Kishore & Company**



**Kishore & Company**

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## Filtration & Washing Equipments

### Filter - Press

Suitable for filtration of juices, wines, & any kind of other Liquids.

Available 200 ltrs. to 2000 ltrs. Per Hour.



### Fruit & Vegetable Washing Machine (Rotary Type)

Suitable for washing fruits and vegetables. The jet spray action thoroughly washes the products while in tumble rotation.

Capacity : 2-3 T/hr  
Total length of drum : 8 x 3 feet  
Total electric load : 2 HP



## Juice / Pulp Extraction Equipments



### Fruit Mill (Crusher)

Suitable for crushing hard seedless fruits before pulping or juice extraction.

Available in 1hp, 3hp, 5hp.



### Pulper

Suitable for extraction of pulp from vegetables and fruits like mango, litchi, guava, pear, tomato, passion fruit, grape etc.

Pulpers are available in following capacities :

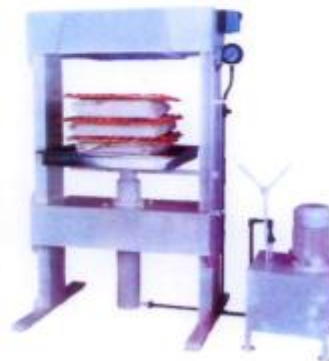
KC-120	2.5-3 T/hr	7.5HP
KC-117	1-2T/hr	5.0 HP
KC-114	1.0 T/hr	3.0 HP
KC-111	0.5 T/hr	1.0 HP
KC-108	80 Kg/hr	0.5 HP



### Hydraulic Juice Press

Suitable for extraction of juice from crushed fruits like pineapple and apple etc. After crushing then in fruit mill.

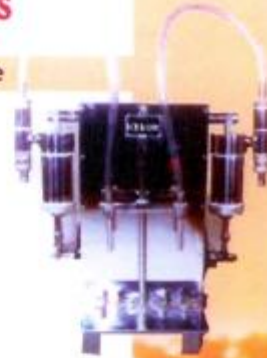
Available in 40 and 50 tonnes pressure capacity. (Also available roll-in-roll-out type and rotary type presses for higher capacity utilization).



## Canning & Bottling Equipments

### Semi Automatic Volumetric Bottle Filling Machine

Suitable for filling of any kind of bottles from 50ml to 1000ml



### Automatic Volumetric Bottle Filling Machine

Suitable for filling of any kind of bottles from 50ml to 1000ml

### Automatic Bottle Capping Machine

Suitable for Capping of any kind of bottles.



### Sachet Filling & Sealing Machine

Suitable for filling of any kind of Liquid like Juices, Wines, water etc.

### Semi Automatic Capping Machine

Suitable for Capping of any kind of bottles.





## Filling & Sealing Machines



Automatic Tube Filling & Sealing Machine



Semi Automatic Past Filling Machine

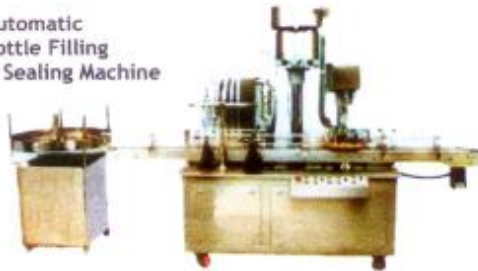


Cream Filling Machine



Automatic Sticker Labeling Machine

Automatic Bottle Filling & Sealing Machine



Automatic Glue Labeling Machine



RO P. P. Cap Sealing Machine



Screw Capping Machine



Pouch Fill & Seal Machine

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All articles mentioned in this brochure are for professionals. All mentioned prices are VAT excluded.

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## Industrial jam kettle

Industrial double-walled jam kettle with heavy duty mixer and heater in a double wall. With digital thermostat. All stainless steel construction and mounted on a wheeled stand.



Art.no.	Content	Description	Price
123.150.	100 l	Electric, 9 kW	€ 9.500,00
123.150.	200 l	Electric, 15 kW	€ 10.600,00
123.150.	300 l	Electric, 15 kW	€ 12.500,00
123.150.	200 l	Gas, 35 kW	€ 11.400,00

## Pasteuriser ECO

A juice pasteuriser in stainless steel with large juice tank on top and a spiral pasteuriser below. Can be used on gas heaters and burners. The capacity of a domestic electric burner is not sufficient. Comes complete with ball valve, thermometer for juice temperature and thermometer for hot water temperature. Dim. (Ø x H) : 45 cm x 70 cm. Capacity : up to 1000 l/h.



015.406.2 € 1.159,00

## Pasteuriser PA90

Compact pasteuriser with water bath and spiral (indirect heating = no caramelisation), for professional usage. Equipped with high capacity heating elements (6kw, 380 volt), ensuring a capacity up to 90 l/hour.



015.410.4 € 1.179,00

## Pasteurising kettle

These professional kettles are equipped with a double wall, a powerful heating element and a digital thermostat. It is possible to pump cold water through the double wall after boiling, with an accelerated cooling as result. Because of this, they can be universally used as pasteurising kettle for milk or juice, as a mash kettle in breweries etc. Entirely made of stainless steel. Tilting kettle with tap, 2-part lid and mounted on a wheeled base. Powerful heating element with digital thermostat. Available with several options : cud cutting unit for cheese rooms, filter bottom, programmable thermostat etc. Also available with a gas kettle.



Art.no.	Content	Heating capacity	Price
090.370.50	50 litres	4 kW	€ 4.860,00
090.370.100	100 litres	10 kW	€ 5.200,00
090.370.200	200 litres	18 kW	€ 6.120,00
090.370.300	300 litres	20 kW	€ 6.900,00
090.370.400	400 litres	30 kW	€ 8.670,00
090.370.500	500 litres	30 kW	€ 9.310,00
090.370.650	650 litres	45 kW	€ 10.330,00
090.370.800	800 litres	45 kW	€ 11.850,00
090.370.1000	1000 litres	45 kW	€ 12.110,00

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