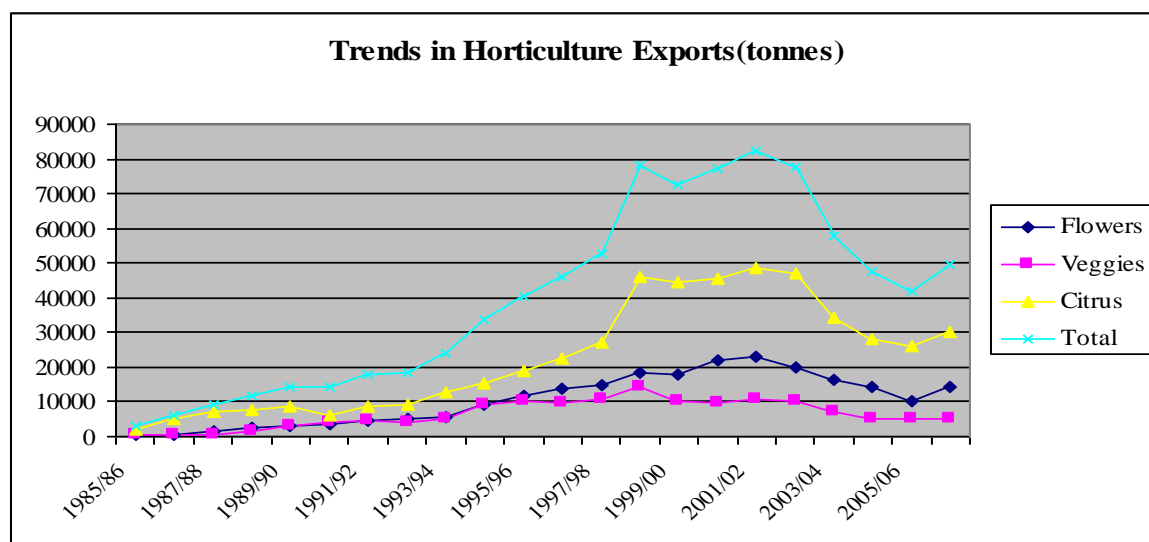


# AGROPROCESSING OF MANGO FRUIT IN ZIMBABWE

## Background

Fruits and horticulture was one of the fastest growing subsectors in Zimbabwe agriculture during the 1990s. From a total of 20,000 tonnes of produce exported in 1992 the industry grew to over 80,000 tonnes exported by 2001. However since then total exports of vegetables, fruits and flowers have declined rapidly to total about 50,000 in 2007(Figure 1). This was due to change in land ownership leading to loss of markets. Efforts are currently underway to revamp this lucrative sector target both commercial and smallholder farming areas.

**Figure 1: Horticulture Export Trends**



Source: Horticulture Promotions Council

While production for export has tended to demand high levels of skill in production and marketing, there are still lot of fruits and vegetables that have been adapted to the Zimbabwean natural environment where they thrive with minimum management practices. Of particular interest in this project are the Mangoes, peaches, guavas and tomatoes. These are grown in all areas that out the 1,2million households on farms, nearly a million do have at least three to five mango trees, and several guava trees with a sizable also having a couple of peach trees. With regards to tomatoes, most households produce for own consumption while many of the hundred smallholder irrigation schemes grow excess tomatoes they often encounter problems in disposing during production peak periods. The results have been massive loss of income in the short term and nutrition insecurity during off-season for fruits.

The trees grow well in most parts of the country with limited management, though they can also be agronomically managed through use of fertilizer, both organic and inorganic, irrigation, pest control practices and proper spacing in an orchard environment.

## Barriers to fruit production

The growth in production of these fruits has been hampered by difficulty in marketing the fruits during harvesting time. In other words local markets cannot absorb or consume all the produce at maturity resulting rotting which presents hygienic and health challenges.

The trees are generally large for the domesticated varieties, presenting viable carbon sinks. There is potential to increase this vegetation mass if the farmers can realise some consistent income from sale of the fruits. The table below shows the yield potential for some the fruit

**Table 1: Summary of Fruit Production Data**

Fruit	Growing region	Harvesting	spacing	Yield
Mango	2, 3, 4 & 5	Dec to mid-April	8 x 8m	15 – 25t/ha
Peach	1, 2, 3, 4	-	7 x 7	200 trees/ha
Tomatoes	All	-	-	20 –60t/ha

Source: Farm management Handbook; 2010

## PROJECT IMPLEMENTATION

Despite the fact that fruits are source of nutrition, not all households do have fruit trees. Fruits can be consumed in various forms chiefly as fresh, dried and canned. Drying and canning increase the shelf life of the fruit, making sure it can be consumed off-season. Processing also increases marketing options, as preserved fruits can even be exported. However, despite the ease of production, many households have not considered fruit farming as a viable enterprise. The reasons are varied, but the bottom line is that of viability as an enterprise and lack of motivation from an environment perspective.

The project therefore seeks promote fruit farming, starting with naturally growing trees listed above; these are; mangoes, peaches, guavas and tomatoes. These have been chosen because they are widespread in nature. The tree sizes present significant carbon sinks serve for tomatoes.

It is proposed that the project stimulate fruit production by investing in fruit processing equipment and techniques. Processing will broaden the market base for fruits, creating a win – win situation for the farmers, the public and the environment. Initially, mangoes will be targeted for processing while the rest will be marketed professionally in the first phase of the project.

It is envisaged that 3 processing plants will established starting with high fruit growing areas. Priority will also be given to remote areas where access to fresh produce market is restricted.

A marketing specialist will support the services of Agriculture Extension Officers to improve uptake of the produce. The issues of product quality and health and safety issues will also take centre stage.

A survey will be conducted to determine the areas to benefit initially as well as consumer preference analysis for proposed new products to be developed. The project should last three years so that the farmers receive training in production, processing and marketing. The government and NGOs will surely reap the benefit of carbon absorption while farmers are rewarded for the production efforts.

### **Collaborating institutions**

Ministry of Agriculture, Mechanisation and Irrigation Development

Horticultural Promotion Council

Ministry of Environment and Natural Resources

Climate Change Office

Ministry of Health and Child Welfare

### **PROJECT SUMMARY**

Mango is a fruit which has many varieties and is grown in majority of the states of the country. Pulp or juice of ripe mangoes is consumed along with main course. Many taste enriches are made from unripe mangoes and their shelf life is enhanced either by processing them or by using preservatives.

We propose to process ripe mango into ready to drink juice.

### **Manufacturing Process:**

The ripe mango is washed and manually inspected for defective fruits. The fruit is heated in screw blancher and the pulp is extracted by Super Pulper. Sugar syrup is prepared and mixed to make ready to drink juice. The juice is heated in the pasteurizer and the homogenizer improves the consistency of the juice.

Feed is received in a level controlled feed balance tank and then passed from top of the evaporator; the product is being wiped in the inner shell of the evaporator in order to get a thin film over the inner shell. The evaporation takes place under vacuum, which is maintained mainly by vacuum system through the condenser.

The product is bottled in the bottling section and is ready to be marketed.

PROJECT Mango Processing into ready to drink juice.

PRODUCTION CAPACITY Based on 3 Shift Basis of 8 Hours each

1. Ready to Drink Juice 300 kg/hr. ( 6000  
Litres / day).

RAW MATERIAL 500 kg/hr. of Ripe Mango

SCOPE Design, Engineering, Supply of Machinery & Equipment and  
Technical Know how

PET Bottle Packaging Line

The capacity will be around 4000 bottles per hour from pre forms in the capacity of 100-1000  
LPH

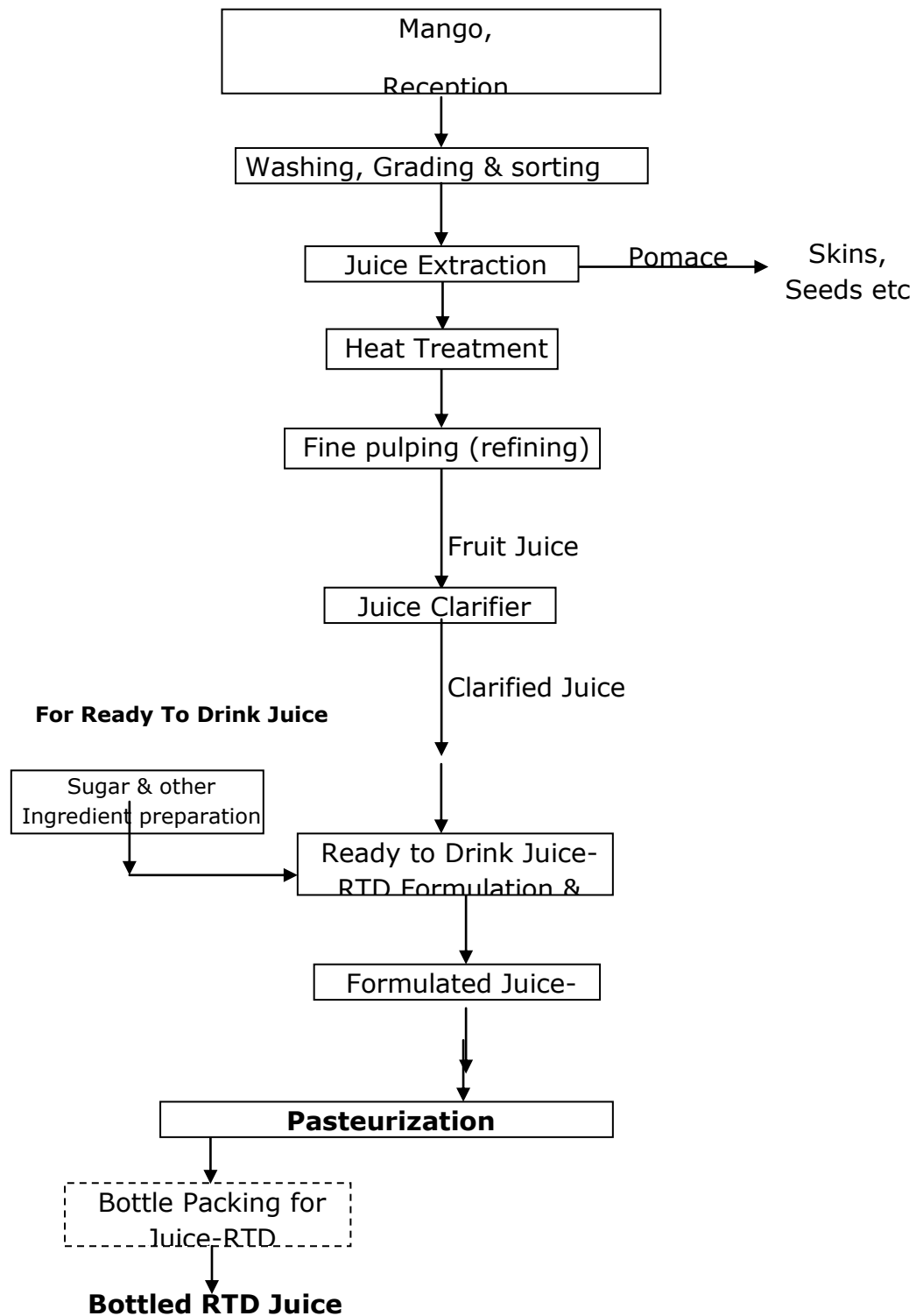
### **Basis of Design**

In absence of data and feedback of regular sizing & type of final packing for finished products  
from client, it is presumed that Mango Juice shall be packed in PET Bottles of 200ml, 500 ml &  
1000ml sizes. Cost of packaging machines / finishing lines has been worked accordingly.

Also included is the PET bottle manufacturing line through pre forms, in range of 100 to 1000  
LPH.

All foundations, civil works and buildings (both plants and administrative) have been excluded,  
as it has been presumed that these will be contracted to local contractors for optimization of  
project costs.

## **FRUITS PROCESSING PLANT – 10 Ton/DAY FRUITS INPUT**



## **Project Description**

The fruit processing plant will be a unit where fresh fruits will be processed to manufacture ready to drink fruit juice (RTD juice)

Fresh fruits would be received at reception section and passed on to the fruit washing and grading section. Fruits from reception will be washed in washing section to remove outer dirt and foreign matter from the fruit skin. Washed fruits would be fed to the inspection cum sorting conveyor where unwanted, damaged fruits would be separated out manually.

Washed & graded fruits would be passed on to the fruit juice extraction and processing unit. From fresh fruits the juice will be extracted out in juice extraction system. The outer skin, seed and fiber pomace of fruits would be separated out from extraction machine and then disposed manually. Extracted juice is passed to the heat treatment to avoid the quality degradation. Again it is fine pulped in pulper cum finisher to get fine juice. This juice will go for clarification in the juice clarifier. Clarified juice is used for to further processing to manufacture ready to drink juice

In ready to drink juice the juice after heat treatment would be used at formulation and blending section. The other supporting formulating ingredients like sugar, citric acid, etc would be made ready for the formation. As required, formulation of RTD would be done in formulation and blending tanks. Formulated RTDJ would be pasteurized and packed in PP bottles.

<b><u>Sr. No.</u></b>	<b><u>Particulars</u></b>	<b>Price in US Dollars</b>
1.0	Cost of Machinery & Equipments, Packaging line & DG Set	1,850,000
1.1	Supervision of erection & commissioning	
1.2	Training	
2.0	Cost of Spares	40,000
<b>Total Price per site</b>		<b>1,890,000</b>

### Budget summary

Item	Cost (US\$)
1.Planning, progress review workshop (x5)	100 000
2.Site selection surveys	100 000
3.Training (farmers, Extension Staff & Project personnel)	150 000
4.Marketing activities (product, packaging, promotion locally-globally)	200 000
5.Plant establishment (3processing/bottling plants)	5 700 000
6.Project vehicles (3x7ton trucks, 3xPickups, 1 Twin cab & 6motorbikes)	300 000
TOTAL	6 500 000