

AGRO-PROCESSING OF CITRUS FRUIT

Introduction to the General Principles of Agro-Processing:

Faced with the current economic realities, farmers worldwide are searching for new options of surviving, as well as expanding their business. One of the many opportunities to grow markets, turnover and profits, is by adding value to farm produce through further processing. Most value-added food products available to consumers have been processed in some way or other, even if the processing is as simple as cleaning produce before it is packed in plastic or net bags. Two types of processing methods may be performed on raw materials:

- **Primary Processing:** this type of processing includes the simplest of processes such as washing, peeling, chopping, ageing, the milling of wheat for flour production, and the processing of sugarcane;
- **Secondary Processing:** this type of processing involves the conversion of primary processed products into more complex food products and includes procedures such as mixing, depositing, layering, extruding, drying, fortifying, fermentation, pasteurisation, clarification, heating etc.

Agro-Processing of Citrus Fruit:

Citrus fruit is a valuable source of vitamin C and these fruits are one of the few fruits of which all parts can be processed. The flesh can be juiced, canned or frozen. The skin can be dried or sugared or used for the production of oils. The white membranes are used for pectin production. In the case of oranges, the juice can also be fermented to produce orange wine

- **Grapefruit Products**

Canned grapefruit: Grapefruit is canned in segments or wedges in sugar syrup of various strengths or artificially sweetened liquor. The canned product is a convenience product that is used to replace the fresh product. It has a long shelf life and thus extends the availability of the seasonal fresh product. It is used as a breakfast food or in bakery products.

Grapefruit juice: Grapefruit juice was originally produced as a by-product from the drippings of grapefruit sections intended for canning. Today it is a popular breakfast beverage and acidulant for other beverages. The bitterness and astringency of grapefruit juice can be made more acceptable by the sweetening and blending with other fruit juices. The single-strength juice is preserved by pasteurisation, canning or refrigerated storage but has a relatively short shelf life, unless preserved by sulphite.

- **Lemon Products**

Cold pressed lemon oil: Cold pressed lemon oil has an extensive range of applications. The main demand for the oil is as flavouring in the food and beverage industry, but is also used in cosmetics, pharmaceuticals and household products.

Dried lemon peel: Dried lemon peel is usually a by-product from juice extraction or other processes and finds application in cereals, baked products, sauces, marmalade, spice mixtures and herbal teas.

Lemon juice: Lemon juice is a popular acidulant for other fruit juices, beverages and various food products. It is rich in vitamin C and can be used to substitute salt in food. Although it is seldom consumed as a beverage on its own, it can be made more acceptable by sweetening and the blending of various other juices or ingredients.

Lemon juice concentrate: Concentration and freezing are the best long-term preservation options for lemon juice. The concentrate thus serves as a semi-processed product that can be further processed into various beverages such as lemonade, juice blends etc. or purely an acidulant.

Lemon puree: Lemon puree is prepared from sound, whole fruits that have been sliced/crushed and pureed. The puree is a semi-processed product that is useful in the commercial preparation of baked foods, beverages and frozen desserts. It is preserved by freezing. The yield of puree is approximately 50 - 60 % of the whole fruit.

- **Orange Products**

Cold pressed orange oil: Orange oil is obtained from the peel of the orange by piercing or pressing the peel. Cold pressing is the primary method of extraction and can be performed as a separate operation or form part of the commercial juice extraction process

Dried orange peel: Dried orange peel is usually a by-product from juice extraction or other processes. The peel is preserved by drying and finds application in cereals, marmalades, spice mixtures, baked products, sauces and herbal teas

Frozen orange pulp: Orange pulp is a by-product of the juice extraction plant and mainly consists of the cells removed during the finishing/sieving process. Although nearly all citrus waste can be successfully converted into animal feed or fodder products, orange pulp is mainly used to improve the flavour and mouth-feel of orange juice concentrate upon dilution. The product is preserved by pasteurisation and freezing. Concentration of the pulp is optional

Orange puree: Orange puree is prepared from sound, whole fruits that have been sliced/crushed and pureed. The puree is a semi-processed product that is useful in the commercial preparation of baked foods, beverages and frozen desserts. It is preserved by freezing. The yield of puree is approximately 50 - 60 % of the whole fruit

Orange wine (Fermented beverage): Orange wine is an alcoholic beverage that is produced through the process of fermentation of orange juice in much the same way as grape juice is fermented to produce wine. The juice from Valencia oranges is used for the making of orange wine. The final product is sweet, with an alcohol content of 14.5 % and is served as an aperitif or dessert wine.



Further Processing Options:

The products discussed above are only a small sample of the many processing methods and products available to the citrus processor. Other options range from products such as grapefruit juice concentrate, lemon essence to frozen orange puree.

All images are public domain.

The manual on the Agro-Processing of Citrus Fruit contains complete information on the products discussed above as well as many other processing methods and products available to the farmer and may be obtained from the ARC – Institute for Agricultural Engineering. Contact: Elmarie Stoltz, 012 842 4017, stoltze@arc.agric.za.