# SOME IMPORTANT ASPECTS IN PINEAPPLE (*ANANAS COMOSUS*) PROCESSING AND EXPORT

K.P.G.A. NANAYAKKARA
*Research Officer,*
*CARI,*
*Gannoruwa,*
*Peradeniya.*

## Introduction

Pineapple (*Ananas comosus* cv. Mauritius) is one of the major fruit crops where exporters adopt the practice of using cold storage facilities to export fresh fruits under reefer container conditions. During the last few decades the exportation of fresh fruits of pineapple under the export development programme through sea transport was considerably decreased as a result of fruit core-deterioration and internal browning disorder. The initial symptoms of the disorders are formation of watery patches and yellowing spots in the core and flesh. These spots then coagulate and become brown. But the external appearance of the fruits appear to be unaffected or normal after removing fruits from the cold storage. Thus it was a common complain from the exporters since it was necessary to keep the fruits under reefer container conditions ($10^0$ and 80-85% relative humidity) for 2 to 5 weeks periods during transit. (Nanayakkara, 1991)[1]

## Conditions Needed :

The fruits between 1.5 Kg to 2.5 Kg in weight are harvested when the basal part of the fruit turns into pale yellow colour. This stage of maturity is currently used by some air freight fruit export dealers. In practice when large quantities of well matured fruits are required all the harvested fruits are not at uniform maturity stage. About 5% of the fruits have to be rejected at packing time since they are either over mature or under mature. (E.D.B.,1989)[2]

The fruits are also harvested with a 15-25 cm long fruit stalk, in the field. The stalk of the collected pineapples are re-cut to 2cm to 5cm length and immediately the cut end is dipped in a suspension of 0.5g per liter Benomyl and packed immediately in paper cartons. The fruits are placed vertical. The fungicidal treatment prevents infections which can cause 'Thielaviopsis soft rot'.

Thereafter the boxes are sealed and stacked in shade. When sufficient quantities of boxes have been filled, they are loaded into covered trucks of vans and transported immediately to coldrooms in Colombo.

It is essential that the cartons of fruits are placed in cold storage as soon as possible after harvest, essentially within 6 hours. The cold room temperature is maintained at $8^0$ C to $10^0$C and the cartons are stacked on pallets to allow air circulation around and through the cartons.

When the cartons are stored at this temperature ($8^0$C - $10^0$C) the fruits are subjected to a physiological disorder resulting in core deterioration with brown spots in the flesh.

However, when fruits are stored at low temperatures like $2^0$C - $6^0$ C the formation of above symptoms are slow, besides the occurence of common chilling injury.

## The Requirements of Reefer Containers for Storage:

Reloading is done as quickly as possible to pre-cooled reefer containers to prevent the fruits from warking. There are two types of reefer containers available in Sri Lanka. First type is supplied by Ceylon shipping Corporation and it is 20 feet long. In this, air enters at the top and passes through the boxes by convention to be returned to the cooler - area at the bottom. Second type is supplied by a cargo company and it is 40 feet long and has an air circulation system where the air is delivered at the bottom of the container and taken out

at the top. These two types of containers require cartons which have differnt locations for ventilation holes. The stacking methods are also different. The ventilation and stacking methods for the different types of containers are demonstrated to exporters. The first type of container requires side ventilation holes in cartons and the second type requires ventilation holes at the top and the bottom of the cartons.

When the first type of cartons are sacked, the air can freely pass around them. When the second type cartons are stacked they are in a solid block, in such a way that the top hole in one carton coincides with the bottom hole of the carton above.

**Pineapple Canning, Preservation and Uses :**

The canning procedure of pineapple can be divided into three stages.

a. Preparation of the fruit
b. Preservation
c. Storage and transport

The juice collected during the process of removing the edible flesh from the peel is of the highest quality and flavor. The juice may be preserved in several ways, principle being the sterilization with minimum heating.

In every cannery there is a general pattern of fruit handling, and sequence of operations. These are continuous processes from the time of harvesting upto the finished product ready for the market.

For packaging pineapples, the compaines are always on the alert to develop new and appealing ways of presenting pineapple to the consumer. Within recent years, companies produce different varieties of canned pineapple products for the local market and export market.

Pineapple juice is canned as natural unsweetened juice, 12 -14%. Brix and pH approximately 3.6, and canned pineapple slices are made by consisting of whole cored slices of sound.

**By Products :**

Following pineapple by-products may be obtained from the fruit residues produced during the canning of pineapple fruits and from the leaves and stems.

1. Alcohol
2. Cattle feed
3. Organic acids
4. Waxes and sterols
5. Starch (from stems)
6. Pineapple proteases (bromelin)
7. Fibre (leaves)

**Further Research Needs :**

There is a need for investigators to be more difinitive when using the word "Maturity" in pineapple and to adopt a common terminology. The difference between maturity index which defines how a harvested fruit will behave physiologically and one which reflect the likely eating quality of a fruit when ripe, needs to be recognized. Large increase in production that is likely in Sri Lanka suggests that there is a need towards the development of cold storage facilities and harvesting techniques. With the development of these techniques, appropriate maturity indices and grading techniques should also be developed for sorting manually harvested fruits.

Present evidence suggest that long term storage of Mauritius pineapple may be difficult to achieve.

Studies should also be conducted rate of ripening, the development of core detrioration, internal browning and high and low temperature injuries are also to be studied particularly with stage of maturity at harvest.

Packages used in Sri Lanka are designed to suit medium temperature handling of this crop using a stacked handling system within a sub-tropical marketing environment. Such packages may need further modification if they are to withstand the high humidity conditions that prevail in a tropical marketing environment. Modification may also be necessary to make then suitable for use, in control atmosphere storage (CA) or hypobaric storage systems. Most pineapple

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exports are currently moved by air. Hence mode of transport and techniques suited to sea transport need to be developed.

**Conclusions :**

These factors clearly show that there is an urgent need to overcome above disorders and thereby increase the fresh fruit production for exports in Sri Lanka through sea transport.

The amount of fresh frits and canned products exportation could be increased significantly by overcoming these problems and thereby increases the economic value of fruits under cold storage.