TARO CORM QUALITY AND POSTHARVEST HANDLING FOR PROCESSING

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Abstract

Objectives to study the relationships between physiological age of corms, storage capabilities, and final snack food chip quality of dryland taro are outlined. Background information is to be developed that will assist in the development of the snack food chip market. The first problem is to define quality and attempt to focus on those aspects which are most important for fried chip manufacture.

Introduction

Taro corm growth and development was studied in 1969 (K.W. Ching, 1969, 1970). Four commercial cultivars were planted under dryland conditions at Waimanalo Experiment Station. Corms were sampled every 31 days after 5 months growth. Corm weight began to level out after 7 months of growth with starch content reaching its highest value at about the same time. Total soluble corm sugars began to increase at this time and continued to increase as the leaf area began to decline. These results suggest that older corms may make poorer quality chip, i.e. chips with a darker background color, because of the higher sugars. The result also suggest that corms harvested at 7 to 8 months may make better chips.

There have been many proximate analysis of taro flour and poi (Bradbury, 1988). The starch is mainly amylose with smaller amount of amylopectin (Amin, 1955). The higher amount of amylopectin leads to high oil retention during frying. The amylose is readily degradable such as during poi manufacture (Standal, 1970). The "free" or alcohol soluble sugars could be partly pentosan (Bilger and Young, 1935) and dextrins (Payne *et al.*, 1941). Payne *et al.*, (1941) also reported that dryland taro had less starch but more complex sugars and ash than wetland varieties.

Corm size is a problem in processing as well as for fresh corm consumer acceptance. Small corms are more appropriate for currently available processing equipment. Planting density is the most likely way to reduce corm size. There are a number of papers dealing with planting density and yield of both upland and dryland taro (De La Peña, 1977, 1978; Kagbo *et al.*, 1980). These papers deal with the production of corms for the fresh market and poi production. The interaction of planting density with fertilization, such as potassium with the high densities that are envisaged to reduce corm size and fried chip quality, is unknown.

Possible Measures of Corm Quality

Failure to understand the relationship between physiological age of the corm, storage capabilities and final snack food chip quality of dryland taro will hamper development of the industry. This project will concentrate on dryland Chinese taro, the object is to develop background information that will assist in the development of the snack food chip market. The first problem is to define quality and attempt to focus on those aspects which are most important for fried chip manufacture.

<u>Possible measures of quality include</u>:

- *i)* Size of corm, weight and length to circumference, including specific gravity.
- *ii)* Skin thickness and ease of removal.
- *iii)* Freedom from disease and injury
- *iv)* Corm storagability.
- *v)* Corm flesh color.
- *vi)* Corm flesh starch content and starch type.
- *vii)* Corm flesh free sugar, mucilage and phenol content.
- *viii)* Corm texture when boiled.
- *ix)* Chip texture, color and taste.

The measure of corm quality for fried chips is different from the quality criteria in the fresh corm market. There is, however, some overlap with a preference for smaller corms weighing from 2 to 3 lbs, freedom from disease and injury, and good color. There may, however, be a difference in textural requirements of boiled corms in the fresh market versus fried chips texture.

Large corms are a problem for both the fresh and chip processing market. Wholesalers indicate that consumers show a preference for 2 to 3 pound corms. This preference is reinforced when the cost is over $1 a pound, and a corm weighs 7 to 9 pounds. Larger corms also have to be cut before they can be mechanically processed. This requires additional handling and generates greater amounts of small chip fragments.

The published data on storage of corm after harvest is meager. The most quoted data is from a small study in 1923 that recommended storage at 55 to 60^{o}C (Browne, 1923). Maximum storage life was given as 1 to 5 months. The type of taro used was dasheen and not the Chinese Bun Long. Storage would be necessary to even out the supply for processing and in surface shipment of fresh corms. The effect of storage or holding for any period has not been studied. There is some suggestion that holding at room temperature for a week, leads to poor quality fried chips. The changes that occur in the corm during storage need to be correlated with the quality of chips produced.

The matter of corm postharvest injury and disease are interconnected. Frequently, postharvest disease starts in areas of tissue that have been damaged by mechanical injury. This relationship between injury and disease has not been determined for taro corms. The difficulty in handling 50 pound bags means they can suffer abuse engendered by frustration. Cartons (30 to 40 pounds) would be much more suitable, providing greater protection and ease of handling. The cartons are also preferable if a premium grade of corm sorted to 2 to 3 pounds is developed. For processing, handling in field bins (4 ft x 4 ft x 18 in) would be more appropriate than bagging.

Overall Objectives:

The overall objectives of this 3 year study of dryland taro for taro chips are therefore to:

(1) Determine the ability to store dryland taro corms harvested at various stage of development.
(2) Determine the snack food chip quality of corms harvest at different ages with and without storage.
(3) Determine whether simple methods can be used to evaluate corm chipping characteristics.
(4) Determine the growth, development and changes in chemical composition of dryland taro corm under irrigation.
(5) Determine the effect of planting densities and fertilization on taro corm growth and quality.

This project is part of an overall program on taro. The cooperators for this project include Ed Miranda and Alton Arakaki on Molokai; Steve Fukuda and Jim Silva on Oahu, and Dwight Sato on the Big Island. We will also be cooperating in other projects to monitor the effects of other agronomic practices on corm and chip quality.

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