

## ABSTRACT

Breadfruit as many other tropical commodities has a high export potential in its fresh fruit state. This can only be realised if it is possible to store this highly perishable commodity for reasonable lengths of time.

The investigations reported in this thesis deals with the beneficial effects of controlled atmosphere storage and the examination of the parameters which influence cooling so as to provide a basis for recommending the optimum pre-cooling treatments.

A controlled atmosphere (CA) research facility was designed and built capable of regulating carbon dioxide and oxygen concentrations to within 0.5 %, and maintain a temperature to a uniformity of 0.5 °C.

The storage life of breadfruits has been found to extend from nine (9) days under refrigeration only at 12° C to twenty one(21) days by the application of controlled atmosphere at a combination of 2.5% oxygen and 5.0% carbon dioxide at 12° C.

Various physical and thermal properties were determined for breadfruit. Using these, a mathematical model using the finite element technique has been presented to predict transient cooling characteristics. The model has been shown to predict experimentally determined temperature profiles for breadfruits under natural convection systems. A surface heat transfer coefficient of 60 W/m<sup>2</sup>K was evaluated for this particular case and was applicable to the full range of fruit radius.