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Modeling for modified atmospheric packaging of sapota

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In the storage and transportation process of fresh fruits and vegetables, respiration rate control plays major role in prolonging the self life of the product. The lowering of O_2 gas concentration and the elevating the CO_2 gas concentration surrounding the produce are usually effective for respiration depression. Respiration rate can be determined by measuring the consumption of O_2 and evolution of CO_2. So based on respiration rate, surface area of packaging material, storage temperature and permeability of packaging material this model was developed for obtaining time for equilibration by which design of packaging parameters was determined for the better self life of the commodity.

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INTRODUCTION

Fresh fruits and vegetables, after their harvest, continue to respire by consuming oxygen (O_2) and giving off carbon dioxide (CO_2). Lowering of respiration rate increases the shelf life of product. Modification of storage environment by reducing temperature, lowering O_2 concentration and increasing CO_2 concentration can reduce respiration rate and increase shelf life. Lowering O_2 concentration, increasing CO_2 concentration and reducing temperature beyond certain limits is harmful. Below about 1.5 volume per cent of O_2 or above 18 volume per cent of CO_2 lead spoilage due to anaerobic respiration (Lee *et al*., 1991; Das, 2005). For maximum shelf life, optimum concentration of two gasses lies normally between 0.02 and 0.05 (volume fraction) for both O_2 and CO_2. It is possible to attain these concentrations by packing the commodities inside flexible type packaging material. Packing materials differ in their CO_2 and O_2 permeability. Normal values of this permeability are such that they allow increased CO_2 concentration and decreased O_2 concentration at the inside of package. Since, due to the respiration of the commodities, atmosphere that is present inside the package gets 'modified' from the environment, this type of packaging and storage is given the name as 'modified atmosphere packaging and storage'.

For the experimental purpose here sapota was selected which is known as Chikoo/Chiku in India having scientific name (*Achrus sapota*). The fruit of sapota is small, ranging from 5 to 9 cm in diameter with a round to egg-shaped appearance, from 75 to 200 g in weight. It consists of a rough brown skin, which encloses a soft, sweet, light brown to reddish-brown flesh. Hence, for prolonging the self life of sapota a model was developed for modified atmospheric packaging based on its respiration rates.

Parameters of modified atmosphere packaging:

In modified atmosphere packaging and storage system according to the permeability of the packaging material and respiration of the commodities, atmosphere that is present inside the package gets 'modified' from the environment. Equilibrium

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