PRESERVATION OF HORTICULTURAL PRODUCE AND PROCESS WASTE RECYCLING

by

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C E R T I F I C A T E

This is to certify that the thesis entitled 'PRESERVATION OF HORTICULTURAL PRODUCE AND PROCESS WASTE RECYCLING', submitted by Mr.S.P.S. GULERIA has been prepared under our supervision in conformity with the rules and regulations of Indian Institution of Technology, Delhi. The research report and results presented in this thesis have not been submitted for any degree in any other University/Institution.

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DEDICATED IN THE SWEET MEMORY

OF MY REVERED PARENTS WHO ONCE

FORMED A PART OF TOILING RURAL

MASSES OF INDIA

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ABSTRACT

Preserve or Perish! Processing and preservation are the major steps for passing on the benefits of large scale production from the areas of production to the areas of scarcity. The post-harvest technologies for perishable horticultural produce (fruits, vegetables and flowers) serve as an effective tool for getting better return to the producer and in avoiding of losses both at production site and distribution centres; and in regulating the market infra-structure. Irregularity of production, seasonal gluts or surplus, differences in physio-chemical behaviour of different commodities, rough handling, crushing, bruising, cutting, puncturing, drying and self-heating of the produce, pre-storage and post-storage physiological and pathological disorders are some of the factors leading to waste of the bounty of nature. In particular, managing cull fruits and process waste arising out of food canneries is to be given a serious thought. Such wastage are of utmost concern to the developing and less developed countries. Realization of these has led to placing increased emphasis on the development of principles, methods and technologies for handling, storing, preserving, marketing as well as process waste recycling.

Among the storage process currently in vogue are refrigeration and controlled atmosphere storage including liquid nitrogen purging systems, chemical absorption of CO_2 reduction in concentration of oxygen using a catalytic burner, selective diffusion of gases across a plastic film diffuser etc. Recently, Burg proposed hypobaric or low pressure storage (LPS) where the product is held at a stable low pressure in a refrigerated vacuum chamber which is ventilated with fresh humid air. In the present work the LPS system was evaluated for the storage of banana, cherry, straw-berry, tomato and mushroom. LPS in its present form though useful in increasing storage life was not found suitable for the rural sector of the developing countries. The following modifications were evolved: One in which the LPS system is applied for a set period of time and then closed (LPSC); another where a water jet pump is used for evacuation for creating low pressures and high humidity. This closed system is referred to as LPSJ. Different types containers were designed for better storage and cost effectiveness. LPSJ and LPSC were tested on various fruits, mixed fruits and vegetables and flowers and found useful in prolonging their life. This was attributed to the effect of high humidity, low oxygen and higher carbon dioxide concentrations.

Apart from developing above technologies for storage, handling and transportation of fresh commodities, a model for total utilization of horticultural produce based on

tomato as a case study was also evolved. New options proposed include tomato seed utilization as an anti-oxidant in ghee (concentrated butter) and white butter; 15-20 per cent tomato pomace powder fortification in bakery products; and tomato seed oil (TSO) incorporation in poultry feed. These technologies are appropriate to Indian conditions and can be integrated into small scale and larger food processing units, giving better returns to the producer and the entrepreneur in addition to improving the nutrition of the local population and eliminating pollution by waste.

I N D E X