

Study on respiration rate and respiration quotient of green mature mango (*Mangifera indica* L.) under aerobic conditions

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Accurate measurement of respiration rate is an important aspect in designing and operating systems such as controlled and modified atmosphere storage that will extend the shelf life of the perishable produce. The respiration rate and respiratory quotient of fresh mature green mango cv. Mallika were determined under closed system at 5, 10, 15, 20, 25 and 33°C (ambient) temperatures. The respiration rate based on carbon dioxide production in aerobic condition decreased about 20 per cent relative to air atmosphere. However, the oxygen consumption sharply reduced to 25-30 per cent relative to air atmosphere at 25°C temperature. The results suggest that, the respiration rate of mango increased with temperature and decrease with storage time. Results of the study can be applied to the MAP design for extending shelf life of mango.

Key words : Mango fruit, Physico-chemical properties, Respiration rate, Respiratory quotient

How to cite this paper : Singh, Ranjeet, Giri, S.K., Kulkarni, S.D. and Ahirwar, R. (2012). Study on respiration rate and respiration quotient of green mature mango (*Mangifera indica* L.) under aerobic conditions. *Asian J. Bio. Sci.*, 7 (2) : 210-213.

INTRODUCTION

Respiration can be defined as the metabolic process that provides energy for plant biochemical processes (Del and Baiano, 2006). It involves oxidative breakdown of organic reserves to simpler molecules, including CO₂ and water, with the release of energy. The significance of respiration in extending the shelf-life of fresh fruits and vegetables stems from the fact that there exists an inverse relationship between respiration rate and the shelf-life of the commodity (Lee *et al.*, 1991). Respiration rate, which is commonly expressed as rate of O₂ consumption and/or CO₂ production per unit weight of the commodity, reflects the metabolic activity of the fruit tissue in the form of biochemical changes associated with ripening (Lee *et al.*, 1996). Another important parameter associated with respiration is the respiration quotient (RQ). Depending on the organic reserve being oxidized, the RQ values for fresh produce normally range from 0.7 to 1.3 (Fonseca *et al.*, 2002). Very high values of the RQ or a sudden shift in RQ value indicate a shift in the respiration cycle to the anaerobic cycle (Saltveit, 1997). This helps select appropriate packaging materials when designing modified atmosphere (MA) packaging systems, identifying the vital heat in calculation of refrigeration load, select fan size and location for optimal air flow within controlled atmosphere (CA) facilities and formulate

appropriate process control for ventilating storage facilities (McLaughlin and Beirne, 1999). Thus, the accurate measurement of respiration is an important step in the successful design and operation of storage techniques for horticultural produce like mango. Keeping in view the above advantages and shelf life enhancement of mango, the present study was undertaken to study the respiration rate of mature green mango 'Mallika' cultivar under aerobic condition at different temperatures.

RESEARCH METHODOLOGY

Fruit material:

Mango cv. Mallika was procured from fruit farm of Central Institute of Agricultural Engineering, Nabi-Bagh, Berasia Road, Bhopal for experimentation and study. The mangoes were graded manually to remove damaged, infested and non-uniform fruit. Fruits were selected to insure uniform size, shape and weight for further experimentation

The parameters such as unit fruit weight, pulp, peel and stone fraction, length, width, thickness, sphericity, fruit volume, true density, TSS, acidity, pH, colour and firmness were determined objectively in the lab for mature green mango before start of the respiration rate study as per the method adopted by Singh (2011) and Mangraj and Goswami (2011).