

**Title** Investigation of the use of ethylene gas released from an ethylene- $\alpha$ -cyclodextrin inclusion complex Powder for 'Calypso' mango fruit ripening

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**Citation** Abstracts of 7<sup>th</sup> International Postharvest Symposium 2012 (IPS2012). 25-29 June, 2012. Putra World Trade Centre (PWTC), Kuala Lumpur, Malaysia. 238 pages.

**Keywords** mango; cyclodextrin

### Abstract

Cyclodextrins have been used in food and agriculture applications to encapsulate a variety of volatile compounds. With a view to improving the convenience and safety of ethylene handling for fruit ripening, we encapsulated ethylene gas into  $\alpha$ -cyclodextrin ( $\alpha$ -CD) in order to convert it in a powder form. Ethylene release from ethylene- $\alpha$ -CD inclusion complexes (ICs) powder was monitored at 52.9%, 75.5% and 93.6% RH at 25°C and at 45°C, 65°C, 85°C and 105°C in natural (uncontrolled) humidity levels. Sustained release of ethylene gas was also investigated over 1 week period under 11.6 to 93.6% RH for admixtures of ethylene-  $\alpha$ -CD rcs with deliquescent calcium chloride or magnesium chloride salts. The ripening induction efficacy of the ethylene-  $\alpha$ -CD ICs was evaluated for green mature 'Calypso' mango fruit.

Ethylene release from the ethylene-  $\alpha$ -CD ICs increased with both increasing RH and temperature. For example, ethylene release was greatest at the highest RH of 93.6%. The ethylene-  $\alpha$ -CD ICs did not release ethylene at RH 52.9%. In admixture, water absorption by the two different deliquescent salts differentially regulated ethylene gas release from the ethylene-  $\alpha$ -CD ICs powder. Again, increasing RH again reduced the time to release ethylene gas. No ethylene gas was released over 1 week at 11.6% RH from ethylene-  $\alpha$ -CD ICs in presence of these deliquescent chemicals. In terms of time to eating soft, 'Calypso' mangoes treated with the ethylene-  $\alpha$ -CD ICs ripened faster than untreated fruit. Their softening was similar to that for fruit treated with ethylene gas.