

Impact of Smoke and Ethephon as Artificial Fruit Ripening Agents on Ripening Behaviour, Quality and Safety of Papaya

H.D.S.R. Premaseela^{1,3*}, M.G.D.S. Perera¹, I.G.N. Hewajulige¹,
M.M.N.P. Gunasekera¹, S.S.K. Madage¹, R.A.D.S.M.R. Weerasekara², and
K.K. Ganegedon³

¹*Food Technology Section, Industrial Technology Institute, 503/A, Halbarawa Gardens, Thalahaena, Malabe, Sri Lanka*

²*Residual analysis laboratory, Industrial Technology Institute, 363, Baudhaloka Mawatha, Colombo 7, Sri Lanka*

³*Department of Export Agriculture, Faculty of Agriculture, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*

**sashini.rukshika@gmail.com*

Papaya is one of the best demanded fruits in Sri Lanka, which is ripened artificially after being transported. However, the improper use of ripening agents causes health risks. The study evaluates the safest method out of the most common ripening methods, smoke and ethephon for ripening of papaya in relation to safety and marketable quality. Six treatments were arranged with three replicates: (T1) control - untreated fruits in a closed cubicle, (T2) control out - untreated fruits at ambient condition ($28\text{ }^{\circ}\text{C} \pm 2$), (T3) Fruits exposed to ethylene gas liberated from ethephon for 24 hours (25 ml of 1 ml L⁻¹ ethephon + 2.5 g NaOH), (T4) fruits dipped in 1 ml L⁻¹ ethephon solution, (T5) ethephon spray (1 ml L⁻¹ ethephon solution) and (T6) smoke treatment (using burnt banana leaves) for 3 minutes. Quality of fruits were assessed in terms of physico-chemical parameters (physiological weight loss %, firmness (kPa), pH, total soluble solids ($^{\circ}\text{Brix}$), titratable acidity %, and peel color (L*a*b values). Safety for consumption was assessed in terms of ethephon residues in ethephon treated fruits (Liquid Chromatography Tandem Mass Spectrometry System- LC/MS/MS) and polycyclic aromatic hydrocarbons (PAHs) in smoke treated fruits by using the High-Performance Liquid Chromatography (HPLC) system. The results revealed PAH residues in smoke (on peel 121.55 $\mu\text{g kg}^{-1}$) and ethephon residues in ethephon dip (1.0 mg kg^{-1} on peel) and spray (2.0 mg kg^{-1} on the peel and 0.2 mg kg^{-1} in the flesh) treatments. Ethylene gas treatment liberated from ethephon can be recommended as a safe fruit ripening technique that ensures fruit quality and safety.

Keywords: *Artificial fruit ripening, Residual analysis, Ethephon residues*