

Abstract

Superficial scald of 'd' Anjou' pears is an economically devastating disorder. The occurrence of superficial scald is associated with the oxidation of α -farnesene to the conjugated trienes (CTs) which accumulate in fruit peel. This study was undertaken to determine the influence of low oxygen controlled atmosphere (CA) storage and pretreatment of 1-methylcyclopropene (1-MCP) or 1, 2-dihydro-6-ethoxy-2, 2, 4-trimethyl-quinoline (ethoxyquin) on the incidence of superficial scald and the accumulation of α -farnesene and CTs in peel tissue of 'd' Anjou' pears. Fruit were either treated directly after harvest with 1-MCP (300 nl l⁻¹ for 24 h at 20°C) or ethoxyquin (1000 g l⁻¹ line spray) and then stored in regular air (RA), or stored in low oxygen CA (0.8 kPa O₂ for 3 months + 2 kPa O₂/1 kPa CO₂ for 1 month) without pretreatment. Fruit stored in RA without pretreatment was left as control. All fruit were stored at -1°C for four months and α -farnesene, CTs, ethylene production, fruit firmness and titratable acidity were monitored monthly during storage, and superficial scald was evaluated 7 d after transferring the fruit to 20°C from cold storage. Superficial scald occurred in control fruit stored three months or longer. However, all three treatments of CA, 1-MCP and ethoxyquin prevented scald completely during four month storage. α -Farnesene in fruit peel increased immediately after harvest, and remained at high levels in untreated control fruit. CTs also increased continually in the control. CTs did not accumulate following ethoxyquin application. However, α -farnesene increased to levels higher than those found in untreated control. Both 1-MCP pretreatment and CA storage not only eliminated CTs but also significantly decreased α -farnesene accumulation. Both 1-MCP and CA also decreased ethylene production and losses of flesh firmness and titratable acidity, which ethoxyquin did not. The results indicate that CA, 1-MCP and ethoxyquin prevented scald at different metabolic levels. Ethoxyquin inhibited specific metabolism – the oxidation of α -farnesene to CTs. However, CA and 1-MCP were broad spectrum inhibitors which slowed down the whole metabolic system of fruit, including inhibiting the biosynthesis of α -farnesene.