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Manipulating avocado fruit ripening with 1-methylcyclopropene

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Abstract

Previous investigations with 1-methylcyclopropene (1-MCP) on avocado (*Persea americana* Mill.) fruit have focussed mainly on improving storage life by reducing the severity of disorders causing discolouration of the flesh. Development of 1-MCP and ethylene treatments, which also help control the time to reach the eating ripe stage, may confer additional practical benefits. In this context, the current study investigated the potential of 1-MCP to accurately manipulate ripening of non-stored 'Hass' avocado fruit by treatment before or after ethylene and at different times during ripening. To investigate this, 500 nL L⁻¹ 1-MCP was applied within 1 day after harvest, followed by ethylene 0–14 days after 1-MCP. In addition, fruit were treated with ethylene, then 1-MCP 0–8 days after ethylene. Treatment of fruit with 500 nL L⁻¹ 1-MCP for 18 h at 20 °C provided the maximum effect by increasing the days from harvest to ripe (DTR) from 8 (with no 1-MCP) to 20. Fruit treated with 500 nL L⁻¹ 1-MCP for 18 h at 20 °C remained insensitive to 100 μL L⁻¹ ethylene applied between 0 and 14 days after 1-MCP for 24 h at 20 °C. Ripening of fruit exposed to 100 μL L⁻¹ ethylene for 24 h at 20 °C could be delayed by up to 3.3 days by applying 500 nL L⁻¹ 1-MCP for 18 h at 20 °C up to 2 days after ethylene treatment. However, once the fruit started to soften (sprung) there was little effect of 1-MCP on DTR, compared with no 1-MCP. 1-MCP treatment was associated with increased severity of body rots (caused mainly by *Colletotrichum* spp.) and stem-end rots (caused mainly by *Dothiorella* spp.), which was likely due to the increased DTR in these treatments. Significant differences in disease severity were found between orchards (replications), with replicates with low disease severity being less affected by 1-MCP treatment. These results indicate that 1-MCP can delay ripening, but careful sourcing of fruit is required to reduce the risk of diseases in ripe fruit. There is some capacity to delay ripening using 1-MCP after ethylene. There is little potential to control ripening using ethylene after treatment with 500 nL L⁻¹ 1-MCP, but lower concentrations may be more effective.

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