

Title Response of 1-Methylcyclopropene treatment on ripening mechanism, quality preservation and shelf life extension in plum fruits (*Prunus domestica* and *P. salicina*) under multiple temperature regimes

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Abstract

The prime objectives of study was to assess the impact of 1-MCP on ripening changes (physical, physiological and biochemical) in plum fruits during storage at different storage temperatures (2°C, 15 °C and 20°C). European plum (cv. Hauszweitschge) fruits were treated with 0.5 $\mu\text{l l}^{-1}$ 1-MCP and 100 ppm ethylene, alone or in combination (i.e. 1-MCP+ethylene) at 2°C for 24 h. After every 15 days interval (i.e. 15, 30, 45, 60 days at 2°C) fruits were transferred to 20°C for 6 days. At both the storage temperatures, 1-MCP treated European plum fruits exhibited lower physiological loss in weight, retained better firmness and higher L values (brightness), b* values (blue-yellow axis), showed minimum change in total soluble solids, sucrose, glucose and fructose as compared to other treatments and untreated fruits. Fruits lost nearly 16% of their physiological weight during 56 days of storage at 2°C and more than 30% of their weight by end of storage period of 60 days at 2°C plus 6 days at 20°C. At molecular level, PPO activity was lowest (3.01 units $\text{g}^{-1} \text{min}^{-1}$) in 1-MCP treated fruits and also lower activities of PG and PME enzymes. Fruits treated with 1-MCP have lowest carbon dioxide (3.14±0.98 $\text{ml kg}^{-1} \text{h}^{-1}$) and ethylene (17.59 $\mu\text{l kg}^{-1} \text{h}^{-1}$) production rates as compared to other treatments. Japanese plum (cv. Santa Rosa) treated with 1-MCP (0.5 $\mu\text{l l}^{-1}$) and stored at 15°C for 9 days showed lower weight loss, decay loss and higher specific gravity, higher total soluble solids, acidity, ascorbic acid content as compared to control fruits. 1-MCP treated fruits had longer shelf life as compared to untreated control fruits. The study has shown that 1-MCP has the potential to control the ripening of plum fruit and extending the storage period by more than 15 days at 2°C and by approximately 5 days at 15°C.