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TREATMENT WITH 1-METHYLCYCLOPROPENE COMPLEMENTS TEMPERATURE MANAGEMENT IN MAINTAINING POSTHARVEST QUALITY OF BROCCOLI

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Postharvest life of broccoli is short, limited by yellowing, water loss, decay, and off-odor development. In this study we evaluated the effectiveness of 1-MCP as a supplement to low-temperature storage in protecting the appearance of harvested broccoli. 'Marathon' broccoli heads were treated immediately after harvest with 2 ppm of 1-MCP for 6 h, cut into 2-cm florets, placed in folded, unsealed plastic bags and stored at 1, 10, and 20 ºC. Untreated controls were handled and stored similarly. Postharvest changes in color and fresh weight were measured throughout the storage period. Untreated broccoli lasted 3, 14, and 82 days at 20, 10, and 1 °C, respectively. Broccoli treated with 1-MCP retained an acceptable postharvest appearance for 4, 22, and 94 days, at 20, 10, and 1 °C, respectively. Postharvest life of broccoli stored at 20 and 10 ºC was shortened by yellowing, whereas at 1 °C decay was the limiting factor. The average hue angle of broccoli florets at the beginning of the storage period was 125.1. Untreated broccoli reached a hue angle of 110 in 2.6, 15.1, and 75.2 days, at 20, 10, and 1 °C, respectively. 1-MCP-treated broccoli needed 3.4, 22.9, and 97.3 days to reach the same hue at 20, 10, and 1 °C, respectively. Initial chroma was 11.2 and increased during senescence. Untreated broccoli reached a chroma value of 20 in 2.6, 15.2, and 74.6 days, at 20, 10, and 1 °C, respectively. In 1-MCP treated samples the same chroma was achieved in 3.6, 20.2, and 86.6 days, at 20, 10, and 1 °C, respectively. Lightness (L*) also increased during senescence. Fresh weight decreased during storage at an average rate of 1.16, 0.36, and 0.03% per day, for broccoli stored at 20, 10, and 1 ºC, respectively. 1-MCP treatment is a useful supplement to low temperature storage in preserving postharvest appearance of broccoli.

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IMPROVING SHELF LIFE OF PRE-RIPE AND RIPE 'GALIA' MELON FRUIT BY 1-MCP

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Galia melons (*Cucumis melo* L. var. reticulates 'True Galia') harvested at pre-ripe and ripe stages were treated with 5 $\mu L \cdot L^{-1}$ 1-methylcyclopropene (1-MCP) for 18 h at 20 °C and stored at the same temperature. Respiration and ethylene production, mesocarp firmness, soluble solids concentration, electrolyte leakage, pH, titratable acidity, and visual changes were noted for the period of storage. 1-MCP not only delayed the respiratory climacteric peak 10 days but reduced the respiration rate as well. In contrast, the respiration pattern of ripe fruit was not significantly affected by 1-MCP. Peak climacteric ethylene production of pre-ripe fruit treated with 1-MCP was delayed 6 days and reduced by 65%. 1-MCP resulted in higher ethylene production rate in ripe fruit (68%) from day 3 to the end of storage. Fruit treated with 1-MCP at the pre-ripe stage demonstrated higher firmness values throughout storage compared with control. Firmness was 11.1 N in pre-ripe fruit on day 11 (last day of control fruit), while only 2.4 N in pre-ripe control. The firmness was also higher (67%) in ripe 1-MCP-treated fruit after day 3: Ripe 1-MCP-treated fruit, were 14.6 N and 12.2; and ripe control fruit, were5.04 N and 4.85 on day 5 and 9, respectively. Loss of titratable acidity and green rind color was delayed by 1-MCP in both pre-ripe and ripe fruit. Electrolyte leakage of mesocarp tissue was lower in 1-MCP-treated, compared with control fruit, in both pre-ripe (throughout storage) and ripe fruit (after day 6). Windows of edibility of both pre-or ripe 1-MCP-treated fruit was extended by 40 to 50%.

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POSTHARVEST QUALITY OF FRUIT FROM A LONG-LIFE CULTIVAR OF TOMATO TREATED WITH 1-METHYLCYCLOPROPENE

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Long-life tomatoes (*Lycopersicon esculentum*, Mill cv. Thomas) at pink stage of maturity, were treated with 1-Methylcylopropene at 0 (control), 0.085 or 0.845 $\mu L \cdot L^{-1}$ for 20.5 h at 20 °C, and then stored at 20 °C for 12 d in polypropylene macroperforated bags. The harvest at this stage of maturity is common for exporting to UK markets. The goal of the work was to study the extent of the delay in ripening events due to 1-MCP treatment during no refrigerated storage. Control fruit were too soft after 10 d of storage, while only 1-MCP treated fruit developed decay after 10 or 12 d at 20 °C. 1-MCP treatment reduced the rate of ripening as measured by a delayed decrease in skin lightness or hue angle, while chroma index (a^2+b^2) 0.5 of the skin increased irrespective of the treatment used. Only fruit treated at 0.845 $\mu L \cdot L^{-1}$ showed signs of delayed changes in the juice pH and coloration (recorded as hue angle), as well as in pericarp firmness or deformation characteristic of the fruit measured with a deformeter. Both treatments reduced the rate of normal ripening as measured by increased pH, and decreased titratable acidity or soluble solids. These results reveal some barrier to 1-MCP gas diffusion within tomato tissue and the stronger effects on delaying ripening at higher 1-MCP concentrations below 1 $\mu L \cdot L^{-1}$.

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EFFECT OF ETHYLENE AND 1-METHYLCYCLOPROPENE ON CHLOROPHYLL CATABOLISM IN FLORETS OF BROCCOLI

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Branchlets of broccoli (*Brassica oleracea* L.) were used to examine ethylene-stimulated chlorophyll catabolism. Branchlets treated with: 1) air (CK); 2) 1 $mL \cdot L^{-1}$ of 1-methylcyclopropene (1-MCP) for 14 hours at 20 C; 3) 1000 $mL \cdot L^{-1}$ ethylene (C_2H_4) for 5 hours at 20 C; or 4) 1-MCP+ C_2H_4 were stored in the dark at 20 °C for up to 3 days. Hue angle of controls decreased during the storage period, and 1-MCP treatment delayed this change. Yellowing of broccoli was accelerated by C_2H_4 treatment, however, prior treatment with 1-MCP prevented degreening stimulated by C_2H_4. Treatments did not result in differences in lipoxygenase activity, however, 1-MCP with or without ethylene resulted in reduced activity of chlorophyllase (Chlase) and peroxidase (POD). Exposure to C_2H_4 stimulated Chlase activity and remained a higher level of POD activity. In 1-MCP+ C_2H_4 treatment, the activity of POD was reduced and the increase of Chlase activity was delayed. The results suggested that chlorophyll in broccoli was degraded by the POD – hydrogen peroxide system normally, and C_2H_4 induced the activity of Chlase and remained higher POD activity to accelerate yellowing. 1-MCP treatment delayed the yellowing of broccoli due to the inhibition of POD and Chlase activities.

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APPLICATION OF GIBBERELLIC ACID TO SWEET CHERRIES (*PRUNUS AVIUM* L.) CV. 'SWEETHEART': EFFECTS ON FRUIT QUALITY AT HARVEST AND DURING COLD STORAGE

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Large fruits are preferred by most consumers and gibberellic acid (GA) is used to increase fruit size and firmness. The effects of a preharvest GA application on quality of 'Sweetheart' cherries, at harvest and during cold storage were evaluated. Sweet cherry trees were sprayed with 10 and 30 ppm GA (T10 and T30, respectively) when fruit color was straw-yellow (aprox. 74 Hue) and compared with a control (unsprayed trees). When fruits reached their commercial color (aprox. 21 Hue), samples of 20 fruits/tree were harvested and quality was evaluated in terms of: weight, size, color, firmness, flesh/stone ratio, pedicel aspect, soluble solids content (SSC) and cracking index. Additional samples of 20 units were placed in plastic trays, packed in HDPE bags and stored at 0 °C during 21 days. Fresh weight loss, firmness, color, SSC, pedicel aspect and decay were registered on a weekly basis. Treated fruits reached harvest maturity 5 days later and an increase in size, weight and firmness was observed when compared to the control. T10 had the highest flesh/stone ratio, followed