

**Title** The complexity of preventing diffuse skin browning (D.S.B.) on 1-MCP (SmartFresh SM) treated 'Golden Delicious' apple.

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**Keyword** Browning; 1-MCP; apple

### **Abstract**

Pre-storage application of 1-MCP to many apple cultivars benefits the maintenance of their firmness, texture and taste, in addition to inhibition of superficial scald, especially during shelf-life after storage. Yet, treating 'Golden Delicious' apples with 1-MCP immediately after harvest has been found to cause severe damage to the fruit peel during storage. This damage, which has been termed D.S.B. (Diffuse Skin Browning), appears as brown stains on the skin and reduces the market value of the fruit. Experiments were conducted to gain an understanding of the development of the D.S.B. disorder and to find effective ways to avoid it, using different conditions of application or storage. It was found possible to prevent D.S.B. occurrence by cooling the fruit to 7°C instead of to 0°C, prior to 1-MCP treatment, thereafter gradually reducing the temperature to 0°C within 3 weeks, before applying controlled atmosphere conditions (CA - 2%CO<sub>2</sub>, 1.5%O<sub>2</sub>) for 9 months. However, this treatment was less effective when the treated fruit was stored for 7 months in regular air (RA). In an experiment aimed at understanding the importance of the timing of the 1-MCP treatment, apples cooled immediately after harvest to 7°C were treated following different delay periods of 1, 10, 15 or 20 days. The fruit were then cooled gradually to 0°C, as recommended, and stored in RA for 6 months. Control apples, not treated with 1-MCP, were stored immediately in air at 0°C. The apples treated 1 day after cooling had 37% D.S.B. upon removal from storage, whereas delaying the treatment for 10, 15 and 20 days prevented D.S.B. development. 1-MCP treatment after 20 days was not sufficiently effective in maintaining fruit firmness, color and flavor, which did not differ from that of untreated fruit, although ethylene production was inhibited. Apples treated with 1-MCP after 10 days 7°C had the best marketing quality. The D.S.B disorder appears to be affected by the temperature and timing of the 1-MCP treatment and subsequent storage atmosphere conditions. From these results, it is not yet clear if gradual cooling to 0°C after exposure to 1-MCP is necessary to inhibit D.S.B. development.