

Evaluating the Relationship between Controlled Atmosphere Storage, Peach Fruit Size and Internal Breakdown.

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Fruit size significantly influenced the onset and intensity of flesh mealiness and flesh browning symptoms in peaches stored at 0°C (32°F) or 3.3°C (38°F) under air or CA. Size 42 (~275g), 54 (~175g), and 70 (~125g) 'Elegant Lady' and 'O'Henry' peaches, harvested at commercial maturity and treated with iprodione (Rovral) and wax, were collected from the packinghouse immediately after packaging. Fruit were transported to the F. Gordon Mitchell Postharvest Laboratory at Kearney Agricultural Center and cooled overnight to a pulp temperature of 32°F. After cooling, the fruit were stored at 32°F for 4 days then subdivided into storage treatments having four replications of 60 fruit for each size. Fruit were stored under CA (17% CO₂ + 6% O₂) or air at either 0°C (32°F) or 3.3°C (38°F). After 7, 14, and 21 days storage, 20 fruit per each of the replications were removed and firmness, SSC, and acidity measured immediately on half of them. The remaining fruit were ripened at 20°C (68°F) until soft (approximately 2-3 pounds-force) and then evaluated for textural quality (juiciness, mealiness, leatheriness) and flesh browning. In both cultivars after one week storage, an informal taste test was conducted on ripened size 42 fruit with respect to perception of sweetness, acidity, peach flavor intensity, and acceptability of texture.

For 'Elegant Lady' fruit sizes 70 and 52, flesh mealiness symptoms did not develop under CA at 0°C (32°F), even after 3 weeks storage. With size 42 fruit, CA storage at 0°C (32°F) was necessary to maintain a high percentage of fruit that were juicy after 3 weeks. After 2 weeks storage in air at 0°C (32°F), only about 21% of size 42 fruit remained juicy while 87% of the CA stored fruit were juicy. The results were similar after 3 weeks at 0°C (32°F) with 67% of CA stored fruit remaining juicy as compared to 21% for those kept in air.

At 3.3°C (38°F), 'Elegant Lady' fruit developed mealy flesh in all three sizes tested (70, 52 and 42). The first symptoms became visible in the size 42 fruit within the first week and in

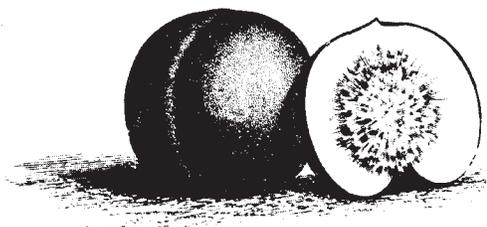
sizes 54 and 70 after 2 weeks. With size 42 fruit, CA provided significant protection against the development of flesh mealiness. After the first two weeks, CA reduced mealiness by approximately 39%. After 3 weeks, there was no difference between the CA and air stored fruit with respect to mealiness. CA stored size 54 fruit had approximately 50% less internal breakdown than air stored fruit of the same size after 1 and 2 weeks. CA storage did not show any significant benefit for size 70 fruit.

For size 70 'O'Henry' fruit stored under CA at 0°C (32°F), flesh mealiness symptoms did not develop even after 3 weeks when size 54 fruit started to become mealy. CA storage was necessary to maintain the juiciness of size 42 fruit after 2 weeks storage. Fruit stored under CA at 0°C (32°F) for 2 weeks were 100% juicy vs 69% in the air stored fruit (63%). After 3 weeks at 0°C (32°F), CA stored fruit still had a higher percentage of juicy fruit (83%) than the air treatment (4%).

All three sizes (70, 52 and 42) of 'O'Henry' fruit became mealy at 3.3°C (38°F). The first symptoms became visible in the size 42 fruit after one week and in size 54 after 2 weeks storage. With size 42 fruit stored for 2 weeks, CA reduced mealiness by approximately 60%, but had no effect after 3 weeks. With size 54 fruit, CA storage reduced mealiness by approximately 75% after two and three weeks. CA storage did not show any significant benefit for size 70 fruit.

In 'Elegant Lady', flesh mealiness was observed in the small size (70) fruit when stored under CA at 3.3°C (38°F) for two weeks. Further studies have to be carried out to determine if these symptoms are a consequence of chilling injury or high CO₂ and/or low oxygen injury. Controlled atmosphere conditions during storage reduced the rate of softening, loss of acidity and soluble solids concentration at 0°C (32°F)

and 3.3°C (38°F) for 'Elegant Lady' and 'O'Henry' peaches. A computer model to predict mealiness incidence of fruit shipped at these temperatures in air or CA was developed for 'Elegant Lady' and 'O'Henry' peaches.



In all of these tests, mealiness developed at least one week earlier than flesh browning. This agrees with our observations during the last 5 years of fruit grown under San Joaquin Valley, California conditions. For this reason, we consider mealiness development to be a more accurate indicator of internal breakdown than flesh browning.

In informal taste tests, storage temperature had a significant effect on the perception of fruit juiciness in large size 'Elegant Lady' or 'O'Henry' fruit. All of the fruit stored at 0°C (32°F) were judged acceptably juicy, whereas about 25% of the fruit stored at 3.3°C (38°F) were rated as having poor texture. Some tasters also noted off-flavors in fruit stored for one week at 3.3°C (38°F).

Maximum and minimum market life was related to fruit size and storage temperature and atmosphere (Table 1). The end of market life was determined when more than 25% of the fruit were mealy or 15% of the fruit had a flesh browning score of 3 (25% flesh browning) or higher. In both cultivars, the

one week air storage 0°C (32°F) period prior to the CA treatment did not affect fruit performance under CA.

Table 1. Market life of 'Elegant Lady' and 'O'Henry' peaches under different storage conditions.

Treatment	Market Life ^Z (days)			
	'Elegant Lady'		'O'Henry'	
	CA	Air	CA	Air
0°C (32°F)				
Size 42	19	7	21+	13
Size 54	21+	19	21+	16
Size 70	21+	21+	21+	21+
3.3°C (38°F)				
Size 42	9	1	14	5
Size 54	15	6	18	6
Size 70	16	21+	18	12

^ZThe end of market life was determined when more than 25% of the fruit were mealy.