LEMON AND NECTARINE QUALITY/PHYTOTOXICITY AFTER ALTERNATIVE MB TREATMENTS

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Both physical and chemical approaches are used to maintain fresh commodity quality, increase commodity resistance to temperature and quarantine-induced stress and reduce phytotoxicity. In treatments involving heat/cold for pest disinfestation, the temperature is precisely controlled to prevent/minimize fruit injury while providing efficacy. For example, the use of high temperature forced air for Mediterranean fruit fly, heating nectarines to a seed surface temperature of 47.2°C and holding at that temperature for 2 min. before cooling, was tested on early-, mid- and late-season nectarines. Quality evaluation made after storage at 0°C for 14 d and 20°C for 4 d simulating shipping and sale of fruit showed no adverse alteration in marketability of the fruit. Heat-treated fruits were firmer than non-heated fruit, but retained the ability to soften. For desert lemons, cold treatment of 1°C for 2-6 weeks was an effective quarantine procedure for pest disinfestation, but caused unacceptable phytotoxicity. Conditioning lemons at 15°C for 1 week, however, significantly reduced the severity of chilling injury. Recent work with both desert and coastal lemons indicated conditioning at 15°C for 3-6 days significantly altered soluble sugars in the flavedo which may be associated with the ability of lemon fruit to withstand temperature stress (Aung *et al*., 1999). Investigations are continuing with lemons grown in different geographic regions of California and different stages of fruit maturity. In addition to soluble sugars, other changes in biochemical constituents such as antioxidants and expressed proteins are being examined during fruit conditioning (Ryan and Aung, 1999).

In nectarine and lemon, the effects of three potential postharvest fumigants have also been tested at various dosages on fruit quality and phytotoxicity. Responses such as fruit surface scalding, browning, spotting, pitting, discoloration, accelerated or delayed ripening, change in firmness or increased decay, due to the fumigants were examined. A rating scale was used to gauge severity of injury, visual color changes measured using a Minolta colorimeter and fruit firmness to indicate ripeness measured by a UC Firmness Tester. Carbonyl sulfide intensified nectarine peel color and increased firmness, but did not alter overall fruit quality at 20, 40, 60 and 80 g/m^3. Methyl iodide at dosages of 15, 20 and 25 g/m^3 with 2 h aeration significantly increased nectarine firmness, but caused severe phytotoxicity. However, methyl iodide fumigation at a dosage of 20 g/m^3 followed by prolonged (> 24 h) aeration significantly reduced lemon phytotoxicity. Sulfuryl fluoride tested on coastal lemon at dosages of 10, 20, 40 and 80 g/m^3 caused unacceptable amount of phytotoxicity. However, continuing work with off-gasing fumigants soon after fumigation could help to lessen phytotoxicity and establish effective dosage(s) of fumigants for fresh commodities.

References

Aung, L. H., J. F. Jenner, D. C. Fouse and L. G. Houck. 1999. Postharvest conditioning temperatures and fruit maturity on flavedo soluble sugars of coastal and desert lemons. J. Hort. Sci. & Biotechnol. 74:288-292.

Obenland, D. M., M. L. Arpaia and L. H. Aung. 1999. Quality of nectarine cultivars subjected to forced-air heat treatment for Mediterranean fruit fly disinfestation. J. Hort. Sci. & Biotechnol. 74 (in press).

Ryan, F. J. and L. H. Aung. 1999. Changes in biochemical constituents of lemon flavedo during conditioning. Acta Horticulturae (In press).