COMPARATIVE RESPONSE OF GRAPEFRUIT TO VAPOR HEAT OR HOT WATER TREATMENT

W.R. Miller and R.E. McDonald
U.S. Horticultural Research Laboratory
Agricultural Research Service, U.S. Department of Agriculture
2120 Camden Road, Orlando, FL 32803

Grapefruit must be certified for security against unwanted pests prior to entry to some domestic or export markets. Heat applied as hot air is approved against Anastrepha spp. for early- and mid-season grapefruit; and vapor heat (VH) is an approved quarantine treatment for Clemintine mandarin, grapefruit and round oranges imported into the U.S. from Mexico. Previous research has shown that the application of heat by hot water (HW) causes severe injury to grapefruit; however, there are no reports of direct comparisons between VH and HW heat treatments on similar fruit.

We subjected mid-season Florida 'Marsh' grapefruit to VH until the center pulp reached and was maintained at 43.5 for 50 min or to HW. Temperatures monitored directly under the cuticle of fruit receiving the VH treatment were precisely duplicated by a computer-controlled water bath in fruit receiving the HW treatment. Immediately after (< 24 hr) treatment moderate peel scald appeared on about 1% of HW-treated fruit, and no scald was evident on VH or control fruit. After 2 and 4 weeks' of storage at 10C and one additional week at 20C, scald affected 6%, 6% and 5% of HW-treated fruit, respectively, and 16%, 21%, and 20% of VH-treated fruit, respectively. There was no scald on control fruit. Weight loss was similar for HW- or VH-treated fruit (5%) after 5 weeks of storage, however HW-treated fruit had a 5-fold increase in aging symptoms compared with VH-treated fruit. However, control fruit had significantly more aging than VH- or HW-treated fruit after similar storage. Decay was slightly higher in HW-treated fruit compared with VH-fruit (7.4% vs 5.5%), but was less than control fruit. Both VH- and HW-treated fruit had less green peel color than control fruit after similar storage. Juice and pulp flavor of heat-treated fruit was less preferred compared with control fruit. HW-treated fruit had a significantly lower score for pulp texture (73) compared with VH (78) or control fruit (77).

These findings indicate that when the heating profile is the same for both VH- and HW-treatment more grapefruit peel injury may be expected from the VH treatment, mostly due to surface scald.