STONE FRUIT QUALITY FOLLOWING HIGH TEMPERATURE/ CONTROLLED ATMOSPHERE TREATMENT

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High temperature forced air in combination with 1% oxygen and 15% carbon dioxide (known as CATTS) is an effective quarantine treatment against oriental fruit moth and codling moth in peaches and nectarines but the effect of treatment on fruit quality must be fully ascertained prior to any commercial implementation. In the first two years of this project it was demonstrated that a 4 h treatment at 44 °C (heating rate 12 °C/h) or a 3 h treatment at 46 °C/h (heating rate 12 °C/h) in the presence of 1% oxygen and 15% carbon dioxide was able to achieve quarantine kill of the target pests while causing no significant quality loss to the large majority of cultivars tested. In the 2003 season additional research was performed to: 1) further define the upper tolerance limit of peaches and nectarines to CATTS treatment; 2) investigate the influence of forced air cooling on minimizing surface injury on heat-susceptible cultivars; 3) test CATTS treatment on conditioned fruit; 4) Evaluate the effect of CATTS treatment on taste and other visual sensory aspects using a trained sensory panel.

Development of CATTS from a laboratory technique to a commercially viable treatment will require engineers to construct large-scale chambers capable of treating substantial quantities of fruit. Data concerning the tolerance limit of fruit to CATTS treatment would greatly aid this development. To aid in the provision of this data four peach cultivars were subjected to treatment at 46 °C (12 °C/h ramp, 1% oxygen and 15% carbon dioxide) for 0, 3, 4, 5, 6 and 7 hours to extend the treatment beyond what had previously been examined. The most obvious change in the fruit was an inability of fruit to ripen following treatments of 5 h or more. Surface injury gradually became more prevalent with increasing amounts of treatment and generally surface quality declined to render the fruit non-marketable beyond 4 h of treatment. None of the other quality factors were altered in a negative way by the extended treatments. From the survey of four peach cultivars that we performed it appears that stone fruit have considerable tolerance to CATTS treatment in excess of what is required to achieve quarantine security.

A few cultivars of stone fruit, such as the peach cultivars Diamond Princess and Sugar Lady, have been found to develop excessive surface injury as a result of CATTS treatment. An attempt was made to reduce the occurrence of this injury by applying forced air cooling to the fruit of these two cultivars immediately

following a CATTS treatment of 46 °C for 3 h. Cooling was found to not reduce surface injury development following treatment and to have no influence on any of the examined quality factors.

Conditioning, a procedure that consists of holding fruit at 20 °C for 48 h following harvest, can help control internal breakdown during storage and is a technique that is being increasingly used commercially. Since conditioning greatly alters the ripening stage of the fruit as compared to the normal commercially-ripe fruit that had been evaluated for tolerance to CATTS in past experiments, tests were run using the peach cultivar Elegant Lady to compare treatment effects on conditioned and non-conditioned fruit using the standard 46 °C treatment. The only negative aspect of conditioning with respect to CATTS treatment was found to be a slightly greater prevalence of surface injury in the conditioned fruit. The amount of injury, however, did not render the fruit unmarketable. Juiciness tended to be higher in conditioned fruit, regardless of treatment. No other quality factors were influenced by conditioning. Conditioning does not appear to render stone fruit incapable of being treated with CATTS.

The ultimate test of a quarantine treatment is determining whether or not a consumer would find that the fruit quality has been negatively altered by the treatment. In addition to evaluating surface injury and other standard quality factors, this means also examining how the fruit tastes following treatment and storage. To address this question data from a trained sensory panel will be reported comparing untreated, CATTS treated, and methyl bromide fumigated fruit.