DEVELOPMENT OF A CARBON DIOXIDE QUARANTINE TREATMENT FOR OMNIVOROUS LEAFROLLER, WESTERN FLOWER THRIP, PACIFIC SPIDER MITE AND GRAPE MEALY BUG ON TABLE GRAPES

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High CO2 concentrations have been shown to be effective against three insect pests of concern to the Australian authorities for import of California Table Grapes. Treatments at 0 and 5°C with 45% CO2 in air or 0.5% O2 have been the focus. Eight to ten days of treatment are required to achieve 100% mortality of Omnivorous Leafrollers (OLR)(*Platynota stultana*), Western Flower Thrips (WFT)(*Frankliniella occidentalis*) and Pacific Spider Mite (PSM)(*Tetranychus pacificus*). Studies with Grape Mealy Bug (GMB)(*Pseudococcus maritimus*) are beginning shortly and preliminary data will be presented. We find that the Pacific spider mite protonymph and Western flower thrip second instar are the most difficult insects to kill. At 0°C, Omnivorous leafroller pupae are killed in less time (4 days) than at 5°C (6 days). Our treatment has focused on high CO2 concentrations since the data indicate that high CO2 is much more effective for insect mortality than low O2 treatments. Low O2 (0.5%) in combination with high CO2 has a minor effect in reducing the treatment time required for 100% mortality. Commercially, high CO2 concentrations in air would be much easier to obtain as compared with high CO2 and low O2.

The effect on 'Thompson Seedless' table grapes of a six day treatment under these insecticidal CA atmospheres at 5°C was very minor indicating excellent fruit tolerance. Fruit quality is currently being monitored after treatment at 0°C for 10 and 15 days and results will be presented. A manuscript describing fruit quality evaluations and preliminary insect mortality results at 5 and 20°C has been submitted for publication (Ahumada et al.).

Controlled atmospheres with elevated CO2 and /or reduced O2 have been demonstrated to be effective against a number of insect pests as reviewed by Carpenter and Potter (1994). These treatments have the benefit of creating no residues on the product. Also, the technology exists to conduct CA quarantine treatments in marine containers and eventually high CO2 treatments during marine shipment will be possible.

Ahumada, M.H., E.J. Mitcham and D.G. Moore. Postharvest quality of 'Thompson Seedless' grapes after insecticidal controlled atmosphere treatments. HortScience (submitted)

Carpenter, A. and M. Potter. 1994. Controlled atmospheres. *IN*: J.L. Sharp and G.J. Hallman, Eds., Quarantine Treatments for Pests of Food Plants, Westview Press, San Francisco, P. 171-198.