IMPORTANCE OF COMMODITY INJURY IN THE DEVELOPMENT OF POSTHARVEST INSECTICIDAL QUARANTINE TREATMENTS

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Treatments developed as alternatives to MB fumigation of postharvest commodities for quarantined insects must address concerns for injuries to the fruit as well as efficacy of the treatment for the target insects(s). While minor cosmetic injuries to fruit peel might be tolerated by consumers if there are no other treatments available, any treatments causing major blemishes, and especially treatments increasing fruit decay rates, cannot be tolerated and will not be used in commercial situations even if such treatments are approved by regulatory agencies.

The response of citrus fruit to approved (APHIS Plant Protection and Quarantine Treatment Manual) cold treatments (0-2.2°C) for tephritid fruit flies is being determined. The injury to lemons by quarantine cold treatments was found to vary with the time of year when fruit were harvested and injury was much reduced if fruit were cured one week at 15°C before treatment (J. Hort. Science 65, 1990). Tests with lemons from other geographic areas show lemons grown in the San Joaquin Valley and coastal-grown lemons are not as susceptible to this chilling injury. Similar tests with grapefruit show that fruit from desert areas are generally not injured by quarantine cold treatments, and that curing before cold treatment reduces injury that does develop. Coastal-grown grapefruit are more chilling susceptible.

We are also evaluating the approved combination treatment of MB fumigation followed by various cold treatments. These treatments use 32g MB/m^3, less MB than is required when MB is used alone (thus reducing the emissions of MB from postharvest commodity fumigations), combined with short cold treatments, shorter than when cold treatments are used alone. This treatment reduces the objections of expensive, time-consuming cold treatments that delay marketing of citrus and that increase senescence of fruit and development of decays. We have found that lemons and navel oranges given the combination MB + cold treatments are injured more by the combination treatments than fruit given the MB treatment alone or the cold treatment alone. Fruit aerated for 2 hours after MB fumigation then cold treated developed 3-4 times more injury than did fruit that was MB-fumigated only. If fruit were aerated 24 hours between MB fumigation and cold treatment, then injury was reduced 2-fold. Lemons were more tolerant of these treatments than were the late-season navel oranges that were tested.

In conclusion, it is important that the effects of alternative quarantine treatments on the quality of the host commodities is considered when developing new quarantine treatments. The host should be evaluated under the same conditions of temperature, maturity, handling procedures and curing that would be used in commercial situations where the quarantine treatment will be used.