TECHNOLOGY TRANSFER ISSUES OF TEMPERATURE TREATMENTS FOR PERISHABLE COMMODITIES

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Cold storage and heat treatments have been used to rid perishable commodities of quarantined insect pests. Cold storage is relatively easy to apply, and convenient if the required storage period happens to coincide with a market window. Cold storage can be undesirable if the storage period detracts from the already limited storage life of the commodity or if the commodity is sensitive to damage from chilling injury.

Commodity and insect tolerance to heat are affected by the method used to transfer heat into the fruit. Heat will transfer most rapidly when a commodity is immersed in hot water or exposed to forced vapor. A greater number of different commodities will be able to tolerate an insecticidal exposure to forced hot air if the dewpoint temperature inside the treatment chamber is maintained a few degrees cooler than the temperature of the fruit surface. Rapid air flow inside the treatment chamber is also critical for efficient transfer of heat to the fruit.

Hot water immersion and forced air are currently being used commercially to disinfest mangoes and papaya, respectively, of fruit flies. Some of the major factors that limit more widespread application of heat treatments are the limited commodity/pest complex for which heat treatments have been developed, the engineering requirements needed to ensure that the heat treatment is applied without damaging the commodity, and regulatory logistics such as standard treatment criteria and equipment certification. For example, treatment criteria for 7 heat treatments listed in the 1994-1996 edition of the APHIS- PPQ treatment manual for various fruit fly species are described in Table 1. Target center temperatures are specified for the forced air treatments, yet not for hot water immersion treatments. Target temperature approach times and holding times are specified for some, but not all treatments.

Research is currently in progress to specify heat treatment requirements in a manner which will permit a broader commodity and pest range. The fundamental assumption is that a defined temperature profile at the fruit center or seed surface will kill the target fruit fly life stage irrespective of the commodity. As long as a specified temperature profile is generated in a commodity, the user can determine the specific exposure temperature and treatment duration.