Abstract

Developing heat treatment methods to control insect pests in harvested commodities has traditionally relied on empirical trial-and-error approaches. There is a need for an effective means to systematically develop and assess heat treatments to save time and expense. In this study, we developed a cumulated lethal time model based on the efficacy of different hot water treatments for killing codling moth in cherries. Minimum temperature–time combinations to achieve complete kill of codling moth larvae in cherries were determined and compared with the prediction of the cumulated lethal time model. In experiments to validate the model, larval mortality of the codling moth, *Cydia pomonella* (L.) (Lepidoptera: Tortricidae), was evaluated in infested cherries subjected to various periods of temperatures in warm water baths. This model calculates the accumulative lethal effect of the complete process by using measured temperature–time data in the core of cherries along with established intrinsic thermal death kinetics information on the target insects. This model predicted minimum treatment times to achieve a total mortality of the pest population in cherries for different treatment temperatures. The results show that this model can be used to predict the thermal mortality of the insects in fruit for any pattern of heat treatment, provided that the temperature–time profile in the infested fruits is measured. This procedure should allow for rapid efficacy comparisons in a range of thermal treatments against codling moth larvae in different commodities.