A GENERIC IRRADIATION DOSE FOR POSTHARVEST CONTROL OF FRUIT FLIES WORLDWIDE

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Currently approved irradiation quarantine treatment doses for *Bactrocera cucurbitae* (Coquillet), melon fly, *Ceratitis capitata* (Wiedemann), Mediterranean fruit fly, and *Bactrocera dorsalis* (Hendel), oriental fruit fly, infesting fruits and vegetables for export from Hawaii to the continental U.S. are 210, 225, and 250 Gy, respectively. Irradiation studies were initiated to determine whether these doses could be reduced in order to lower treatment costs, minimize any adverse effects on quality, and support a proposed generic irradiation dose of 150 Gy for fruit flies.

Dose response tests were conducted with late third instars of wild and laboratory strains of the three fruit fly species, both in diet and in fruit. After x-ray irradiation treatment, data were taken on adult emergence, and adult female fecundity and fertility. Melon fly was the most tolerant of the three species to irradiation, and oriental fruit fly was more tolerant than Mediterranean fruit fly. Laboratory and wild strains of each species were equally tolerant of irradiation, and larvae were more tolerant when irradiated in fruit compared with artificial diet.

In large-scale confirmatory tests, an irradiation dose of 150 Gy applied to 93,666 melon fly late third instars in papayas resulted in no survival to the adult stage, indicating that this dose is sufficient to provide quarantine security. Irradiation doses of 100 Gy and 125 Gy applied to 31,920 Mediterranean fruit fly and 55,743 oriental fruit fly late third instars, respectively, also resulted in no survival to the adult stage.

Results support a proposed generic irradiation quarantine treatment dose of 150 Gy for all tephritid fruit flies. Lowering the irradiation dose for fruit flies would reduce costs and increase capacity for treatment facilities by decreasing the required treatment time, and could accelerate the approval of irradiation quarantine treatments for specific crops. Irradiation is a viable alternative to methyl bromide for control of quarantine pests in fresh commodities.