MORTALITY OF BLUEBERRY MAGGOT LARVAE EXPOSED TO GAMMA RADIATION

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Blueberry maggot, *Rhagoletis mendax* Curran, is a tephritid pest of blueberries. Blueberries grown for markets in California and Ontario and British Columbia must receive an approved quarantine treatment that kills all stages of the fly. Methyl bromide fumigation is the currently used quarantine treatment method. Because the continued manufacture and use of the fumigant is uncertain, alternative treatments are needed to ensure that markets remain open to meet consumer demands.

Infested highbush blueberries, *Vaccinium corymbosum* L. var Elizabeth, collected manually in an abandoned orchard near Whitesbog, New Jersey, during July and August, 1994 and 1995, and near The Trevor Nichols Research Complex, Fennville, Michigan, in August, 1994, were sent by overnight mail to the Subtropical Horticulture Research Station, Miami, Florida. Blueberries in 3.785 liter plastic zip-lock bags were weighed and then irradiated using a Gammacell 220 irradiator with cobalt 60. Unirradiated blueberries served as the controls to estimate the number of treated larvae. Treated and unirradiated blueberries were put on hardware cloth fitted inside separate plastic trays with open lattice bottoms. The trays loaded with blueberries were placed over sand. Mature larvae left the blueberries, fell onto the sand and formed puparia. Sand was sifted weekly until all puparia were recovered from the blueberries. Puparia were irradiated with 10-250 and 3-750 gray (Gy) of gamma radiation in 1994 and 1995, respectively. Irradiated and unirradiated puparia collected during the 1994 season were exposed to cold temperatures to induce diapause. Pupae collected in 1995 were exposed to 18 hours of light to break diapause. Only two adults emerged in 1995. The pupae collected in 1994 and in 1995 will be exposed to cold temperature again this year.

No irradiation dose completely stopped the formation of puparia from treated larvae. No puparia emerged in 1995 that had been treated as larvae during the 1994 season. From the controls collected in 1994, only 10% of the puparia produced adults. Additional adults may emerge during following seasons.

The results from tests done in 1994 show that 10 Gy prevented the emergence of adults from puparia that had been treated as larvae. Results from tests done in 1995 could show that doses less than 10 Gy prevent emergence of adults from puparia that had been treated as larvae. A generic dose of 150 Gy proposed by the United States Department of Agriculture for tephritid flies of *Anastrepha* would provide quarantine security against blueberry maggot in blueberries. Blueberries can tolerate up to 750 Gy of gamma radiation without exhibiting adverse effects to their quality.