IRRADIATION SUPERIOR TO METHYL BROMIDE FOR FRUITS

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"We can expect no silver bullet to replace methyl bromide", has been stated with confident lamentation. But for fruits especially and fresh commodities in general, ionizing irradiation is a superior treatment to methyl bromide fumigation or any other treatment from the standpoint of preserving commodity quality. A number of fruits (e.g., mangoes, avocados, guavas, papayas, and many tropicals) do not tolerate the doses of methyl bromide necessary for quarantine purposes. Nevertheless, methyl bromide fumigation is used on fruits such as citrus where some damage (peel speckling) sometimes occurs for lack of a viable alternative treatment. Citrus fruits tolerate several hundred gray of irradiation. The use of irradiation on fruits can actually enhance quality simply because fruits may be picked at a slightly later stage of maturity when they are to be irradiated. About the only fruit of those studied that does not tolerate irradiation well is avocado. Although it might still be possible to irradiate avocados if the treatment dose and the dose uniformity ratio are low. For example, the minimum absorbed dose necessary for quarantine security of Mexican fruit fly, *Anastrepha ludens*, is 70 Gy, and avocados can tolerate about 150 Gy, making irradiation of avocados against Mexican fruit fly a viable consideration.

Irradiation is the only treatment that can be used to ship white-fleshed sweetpotatoes ('boniatos') across quarantine barriers. Although methyl bromide fumigation is permitted, it discolors the white root to a degree that prevents its commercial application. Since 1999, Florida 'boniatos' have been irradiated at a minimum absorbed dose of 165 Gy for quarantine security against sweetpotato weevil, *Cylas formicarius elegantulus*, and shipped to California without problem.

In a recent price comparison of methyl bromide fumigation of purple-fleshed sweetpotatoes in Hawaii versus irradiation (Federal Register 68: 37934), the price for fumigation varied between 7 and 40 cents per pound, depending on volume, while irradiation was a constant 15 cents per pound. Extra costs, such as APHIS inspection ($368 per treatment), would be added to the fumigation procedure but not the irradiation procedure because the latter is done at a plant that already has an APHIS inspector on site. Cost of irradiation is relatively high now because the treatment has not been used enough for economy of scale to reduce prices. The cost of methyl bromide has been rising in recent years, from $1.25 per pound in 1995 to $4.50 in 2001. In a 1994 economic analysis (Federal Register 65: 34120), irradiation of several imported commodities (in 1998 dollars) ranged from 1.6 to 3.9 cents per pound. In 1994, methyl bromide fumigation cost 0.6 to 1.2 cents per pound (1998 dollars), but the cost of the fumigant has quadrupled since then.

Although irradiation may not be the “silver bullet” that some had envisioned, it is a superior alternative to methyl bromide for fresh fruits and other commodities, meaning that methyl bromide itself was never a silver bullet for postharvest fruit fumigation. Now that USDA-APHIS has permitted the irradiation of fruits against 11 fruit fly species and the mango seed weevil, *Cryptorhynchus mangiferae*, (Federal Register 67: 65016-65029), the use of this treatment to replace methyl bromide fumigation should accelerate. Other permits are being negotiated by various countries.