

per pound if six pallets instead of only one pallet are treated at \$610 (table 4).

TABLE 4.—COSTS OF METHYL BROMIDE FUMIGATION OF HAWAIIAN SWEETPOTATOES

Number of pallets	Weight (pounds)	Cost (cents per pound)
One	1,500	40.6
Two	3,000	20.3
Three	4,500	13.5
Four	6,000	10.1
Five	7,500	8.1
Six	9,000	6.7
Nine	13,500	7.6
Twelve	18,000	6.9

Source: Hawaii Department of Agriculture.

APHIS monitoring of the treatment costs \$368 per treatment. This is based on a minimum of 2 hours required to set up for the fumigation, a minimum of 2 hours for necessary after-treatment labor such as certification, and 2 hours minimum travel time each way to monitor the fumigation. The total 8 hours at \$46 per hour amounts to \$368. Due to the time delays involved in inter-island movements of sweetpotatoes, all fumigations are conducted after 4 p.m. or on weekends, which means that APHIS treatment monitors are paid “time-and-a-half” wages. If the sweetpotatoes being treated belong to more than one shipper, the APHIS costs are evenly divided between the shippers, regardless of the relative quantities treated for each shipper. For example, if two shippers are involved, each would pay \$184, even if one shipper’s sweetpotatoes comprised more than half of the total treated. APHIS monitoring costs for fumigation do not vary with the number of sweetpotatoes treated.

Various time delays are involved in the inter-island movement of the sweetpotatoes for fumigation, meaning that this transportation is sometimes problematic. Shipments from the main island, Hawaii, generally leave Hilo on Monday, with the barge arriving at Oahu on Wednesday. These shipments are treated on Wednesday or Thursday and arrive by Friday on the mainland U.S. west coast if transported by air. The barge that leaves Hilo on Thursday arrives at Oahu on Saturday. Weekend fumigation is conducted at significantly higher costs and Sunday pickup at the pier is not allowed. Thus, shipping sweetpotatoes on the Thursday barge is generally avoided.⁹

There are also concerns regarding the future cost and availability of methyl

bromide given the continuing reductions in the use of methyl bromide mandated by the Montreal Protocol, which governs the use of substances that deplete stratospheric ozone; in 2005, all uses of methyl bromide in developed countries other than quarantine and pre-shipment applications and critical or emergency uses will be prohibited. The price of methyl bromide has increased significantly as worldwide production of methyl bromide has decreased from its 1991 baseline. According to the Environmental Protection Agency, U.S. west coast end-user prices of methyl bromide gas have increased from \$1.25 per pound to \$4.50 per pound over the period 1995 to 2001. This represents an increase of 366 percent. Further price increases are deemed likely as the 2005 phase-out date approaches.

Costs of Irradiation

The cost of irradiation is estimated at 15 cents per pound, regardless of the amount of sweetpotatoes treated.¹⁰ Lot sizes will be as requested by shippers. Irradiation treatment generally occurs between 8 a.m. and 4 p.m. At these times, an APHIS inspector would already be on-site at the irradiation facility to monitor the treatment under the terms of the compliance agreement irradiation facilities must operate under in order to treat fruits and vegetables from Hawaii for interstate movement. Therefore, there would generally be no additional APHIS charges associated with irradiation treatment. Shippers could choose to have their sweetpotatoes treated outside of normal hours and thus incur APHIS charges for overtime labor, but such scheduling would be optional; as noted above, all fumigation treatments currently must be conducted during overtime hours.

The irradiation will occur mostly at an existing facility in Hawaii, prior to the shipment of the sweetpotatoes to the mainland United States. The X-ray irradiation facility in Hawaii commenced its commercial operation on August 1, 2000. At first, only papayas were treated. Five hundred to 1,000 boxes of papayas are treated per day, 4 times a week. The facility is currently also used to treat mangoes, bell peppers, eggplants, pineapples (other than smooth Cayenne), Italian squash, and tomatoes. Most of the fruits and vegetables produced in Hawaii for which irradiation is an approved treatment are irradiated in Hawaii before they are moved interstate, but some fruits and vegetables are occasionally taken to one of three

irradiation facilities in the continental United States. These include facilities in Libertyville and Morton Grove in Illinois, and a facility in Whippany, New Jersey. Various other tropical fruits, such as papaya, litchi, rambutan, carambola, and atemoya, are at present shipped to Illinois for cobalt irradiation treatment.

The quantity of sweetpotatoes to be shipped annually from Hawaii is projected to fill approximately 21 forty-foot long shipping containers. Allowing irradiation as an alternative to fumigation with methyl bromide as a treatment for sweetpotatoes moving interstate from Hawaii may lead to increased production of sweetpotatoes in Hawaii if the lower cost of treatment makes sweetpotato a more profitable crop to produce and ship. The magnitude of the impact of this alternative treatment on production is presently unknown. Due to production limitations, it is estimated that the total volume of sweetpotatoes moved interstate from Hawaii could not exceed 100 containers per annum.

Benefits of Irradiation Treatment

The approval of irradiation as an alternative treatment for sweetpotatoes moved interstate from Hawaii will benefit various stakeholders. At 15 cents per pound, irradiation can be conducted at a lower cost than fumigation of one to two pallets (20.3 to 40.6 cents per pound) (table 4). Though larger quantities of sweetpotatoes, which fill more pallets, can be fumigated at lower per-unit costs (6.7 to 13.5 cents per pound), irradiation eliminates the transport costs associated with fumigation. These transport costs include moving the crop from the island of Hawaii to Oahu (2 to 3 cents per pound) and trucking and handling costs of moving the crop between the harbor or airport and the fumigation site on Oahu (\$34 per pallet, about 2.3 cents per pound). Irradiation also eliminates the cost of \$368 per treatment attributable to APHIS monitoring of fumigation, which is currently conducted outside standard business hours.

Growers and shippers on the main island of Hawaii will benefit from lower transportation costs, since shipment of the crop from Hawaii to Oahu for fumigation will no longer be necessary. The availability of treatment at a more convenient location will also remove various logistical complications. This will reduce the total expense and time delay in moving the product and will enable sweetpotatoes to be treated and shipped at a lower cost than is currently possible with fumigation. The importance of alternative treatments is

⁹ Source: Hawaii Department of Agriculture.

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