



# The Use of Human Wastes on Food Crops in Hawai'i: What Is Allowed and What Is Not

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**H**uman feces and urine contain potential plant nutrients such as urea, nitrogen, and phosphorus (1). They can also contain pathogens harmful to humans. These pathogens include viruses, bacteria, protozoans, and helminths (worm-like organisms), among others (2). It is important that food does not become contaminated with human feces along the farm-to-fork food chain. This is especially true when foods are eaten raw. Uncooked foods are not exposed to a “kill step” prior to juicing, cutting, mixing, chopping, or serving. A kill step is any process, such as cooking, that destroys pathogens. So if a food product is contaminated with even a small amount of feces containing human pathogens, and a kill step not used, a person could become ill from eating the raw or fresh-processed product. Some pathogens, such as *E. coli*, can multiply from one cell to over a million cells in just 10 hours given the right growth conditions (3). In the case of certain species of *E. coli*, 10 live cells consumed on food, is enough to harm certain humans. Therefore, food safety begins where food is grown: on the farm and in home and school gardens. Everyone has a responsibility not to contaminate food, even consumers. Food safety is critically important when feeding the most vulnerable populations: children, pregnant women, the elderly, and immunocompromised individuals. This fact sheet covers current state and federal rules for the use of raw human feces and urine, composted human waste, biosolids (treated human waste from wastewater treatment facilities), and recycled wastewater (from wastewater treatment facilities). In the absence of rules or laws, Good Agricultural Practices are recommended.

## Regulations for Using Solid Human Waste in Food Production

The Hawai'i Department of Health (DOH) has the legal authority to issue a permit for the establishment of wastewater treatment facilities. These permitted facilities use chemicals and other treatment technologies to recycle home and commercial sewage. This process transforms liquid and solid human discharges into stable, pathogen-free, nutrient-rich sewage sludge, or “biosolids.” DOH inspects these permitted public and private facilities and enforces state rules, as well as the U.S. Environmental Protection Agency (EPA) Biosolids Rule, 40 CFR Part 503 (4). This science-based federal regulation contains processing precautions that ensure human pathogens are destroyed during treatment. The goal is to make certain the resulting biosolids do not compromise human health. Because of stringent processing requirements, biosolids (and recycled and treated water) can be used on most farms and in the landscape in Hawai'i. A memo from the DOH's Deputy Director for Environmental Health confirmed the intent of this rule on December 27, 2007 (5). This memo also stated, “The department is not allowing the use of raw waste (night soil), untreated sludge or wastewater, or sludge or recycled water that is not properly treated.” Here, “properly” is defined as being processed in a permitted facility.

Biosolids, however, cannot be used in certified organic production. The United States Department of Agriculture (USDA) National Organic Program rules, Title 7 CFR §205.105 (g) forbid the use of biosolids in food production even if EPA and DOH allow it (6). It is important to under-

stand that farms in Hawai'i are not "permitted" wastewater treatment facilities. According to the 2007 DOH memo on the subject (5), farms cannot legally process human waste on-site for further use on food crops either by composting it or by other treatment processes. Nor are farms allowed to apply, sell, or dispense on-farm-processed human waste for use in food production. Hawai'i Administrative Rules Title 11, Chapter 11, Sanitation that covers the fertilization of vegetables (and fruits) states, "(a) It shall be unlawful to use human body discharges, whether in liquid or solid form, as a fertilizer for plants raised for human consumption" (7). The DOH also confirms that it is unlawful to feed family, workers, volunteers, or friends, food that has come in contact with "homemade" fertilizers or soil conditioners made from human discharges.

### Regulations Regarding the Use of Human Wastewater in Food Production

In Hawai'i, wastewater is recycled by permitted wastewater facilities. Under specific conditions, government-regulated recycled water can be used to irrigate food crops. There are three categories of recycled water (8):

**R-1 Water:** Significant reduction in viral and bacterial pathogens. R-1 water can be used on all food and edible root crops and can come into contact with the edible portion of these crops.

**R-2 Water:** Disinfected secondary-23 recycled water, which means secondary treatment with disinfection to achieve a median fecal coliform limit of 23 coliform bacteria per 100 ml based on the last seven days for which analyses have been completed. R-2 water can be used for subsurface irrigation of food crops that are aboveground and not contacted by the recycled water. R-2 water can also be used on food crops that will undergo extensive commercial, physical or chemical processing if DOH determines these processes kill all pathogens.

**R-3 Water:** Nondisinfected secondary recycled water. R-3 water can be used for surface, drip, or subsurface irrigation of orchards and vineyards if the water does not come in contact with the edible portion of the crop or on food crops that will undergo extensive commercial, physical, or chemical processing if DOH determines these processes kill all pathogens. This use must be discontinued at least 30 days before harvest.

Recycled water is often dispensed through purple-colored PVC pipes marked with the phrase "CAUTION: RECYCLED WATER-DO NOT DRINK," so that the water is not confused with "potable" (drinkable) water that is also permitted by DOH. And to repeat, Hawai'i Administrative Rules Title 11, Chapter 11, Sanitation, states in §11-11-8 Vegetables (a) Fertilizer: "It shall be unlawful to use human body discharges, whether in liquid or solid form, as a fertilizer for plants raised for human consumption." This refers to human discharges that have not been properly treated in a permitted facility.

Unlike the prohibition on biosolids for the organic industry, the USDA National Organic Program does not prohibit the use of recycled "purple pipe" water (6).

### Requirements for Toilet Facilities and Their Use on Food-Production Farms

No state or federal agency expressly prohibits defecation in an active food production area by farm workers, volunteers, students, or farm owners. Hawai'i Department of Agriculture (HDOA) regulates some food-related issues on farms, but has no jurisdiction over the safety or integrity of the raw food, other than when a pesticide is misused. Conversely, the DOH only regulates food once it leaves the farm and enters the commercial market (wholesaler, retailer, restaurant, farmers market). This lack of expressed on-farm legal oversight exists even though there is a danger of contaminating the crop with human pathogens. Further, there is no expressed ban on defecating in a 5-gallon bucket, or similar open vessel, on a food farm. However, common sense dictates that using this type of system is risky. The chance of transmitting pathogens to food or food contact surfaces such as baskets, tools, tables, etc. would be higher than if a well-maintained toilet facility with sufficient hand-washing facilities were used.

The U.S. Department of Labor rules under the Occupational Safety & Health Administration (OSHA) require proper toilets and hand-washing facilities on an "agricultural establishment where eleven (11) or more employees are engaged on any given day in hand-labor operations in the field (for 3 hours or more)" (1928.110(c)(2)) (9). Most farms in Hawai'i, however, have on average fewer than 11 employees.

A farm can use a compost toilet, according to DOH, but it must abide by Hawai'i Administrative Rules Chap-

ter 11-62. According to this rule, the compost toilet needs to be “NSF (National Sanitary Foundation, International) certified” (<http://www.nsf.org/consumer-resources/green-living/wastewater-treatment-system-alternatives/composting-toilets/>) and designed by a licensed engineer. Normally, a compost toilet will be installed with a proper graywater system. Both need to be designed for installation by an engineer licensed to work in Hawai‘i. For more information on this rule and composting toilets, contact DOH’s Wastewater Branch at 808.586.4294.

### **Selling Produce That Has Come in Contact With Human Discharges**

The U.S. Food and Drug Administration (FDA) protects the health of humans and animals as it is related to food, by authority of the Food, Drug and Cosmetic Act of 1934 (FD&C Act). Under Title 21, Chapter 9, Subchapter IV, Section 342, this Act prohibits the sale of food adulterated with physical (such as bits of plastic, cigarette butts, splinters of wood, etc.); chemical (such as illegal pesticide, residues from cleaning produce, etc.); and biological contaminants, among others. Biological contaminants include pathogens found in human discharges; therefore, these discharges must not be applied to food crops unless properly treated in a licensed wastewater facility. In addition, Hawai‘i Administrative Rules Chapter 50 §11–50-30 prohibits the sale of produce that is contaminated.

### **Summary**

Human wastes in the form of biosolids can be used on non-certified organic food crops in Hawai‘i if the wastes have been treated in legally permitted wastewater facilities. Recycled water, however, can be used for irrigation on both organic and non-organic food crops if similarly treated. Farms can use compost toilets if they are NSF approved and installed under the direction of an engineer licensed in Hawai‘i. Farms in Hawai‘i cannot legally process or compost human waste or use, sell, or dispense it. There are, however, no written state or federal restrictions on humans defecating in active food production fields, nor are there requirements for toilet facilities on farms with fewer than 11 workers. However, there are state and federal prohibitions on selling produce contaminated with untreated human waste. Farmers would reduce risk to themselves and consumers of their produce by using proper toilets and hand-washing units that have potable

water, non-bar soap, and single-use paper towels. Good Agricultural Practices recommend these fundamental facilities, but they are still voluntary until the FDA Food Safety Modernization Act of 2011 requires it of certain sizes and types of farms nationwide. This regulation, once in force, will also be applied to some farms that import produce to the United States.

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### **Note**

This fact sheet has been reviewed for accuracy by relevant members of the Hawai‘i Department of Health and Hawai‘i Department of Agriculture.