Food Safety in the Home Gardens

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Following many recent outbreaks of microbial pathogens in the nation's food, consumers are more familiar than ever with *E. coli* and *Salmonella.* While the public health surveillance systems are closely focused on the nation's food producers there is little emphasis on food safety in the home garden. Illnesses caused by *E. coli* or *Salmonella* in vegetables, meat or eggs are not solely restricted to products found in supermarkets. Food borne illnesses can also be caused by unsafe growing and handling practices in backyard gardens. No matter if you garden because it's a hobby, or you are trying to cut down on the grocery bill, home gardeners need to become aware of fresh produce safety.

Foodborne Pathogens and Manure

There are a number of foodborne microbial pathogens associated with the contamination of fresh fruits and vegetables. Microbial pathogens such as *E. coli, Salmonella* and others occur most frequently in manure and in fresh manure much more often than in mature, or composted, manure. Root crops and leafy or uncooked vegetables have the greatest risk of being tainted by manure applications to soil. These crops can also become contaminated through direct or indirect contact with pets, and wild or domestic animals. While the bacteria do not appear to make these animals sick, the animals carry and shed the bacteria in their feces. And, although plant derived compost has reduced food safety risk, birds, dog, cats, reptiles, rodents and other animals or insects could add their waste to a home garden compost pile, contaminating otherwise pure vegetable derived compost. The composting operation should not allow cross contamination of finished compost with fresh uncomposted materials.

Drinking and recreational waters have been identified as carriers in several outbreaks, possibly from fecal contamination by infected animals or people. Surface water in close proximity to where animals have defecated should never be used for irrigation, the applications of pesticides or for washing harvested produce. Ground water or well water also can be contaminated in this manner. To minimize exposure to animal waste, livestock, pets and wild animals should not be allowed to freely roam in plant growing areas or in water sources used for gardening.

The Dangers of *E. coli* O157:H7

While fresh produce can be contaminated with several pathogens, *E. coli* O157:H7 is of most concern, as this is the pathogen that has been implicated in most *E. coli* outbreaks. The pathogen can survive drought, refrigeration, freezing, and can even tolerate dry, acidic or salty conditions. Furthermore, it's remarkably infectious, being able to cause serious illness after only minimal exposure. Ingesting very few bacterial cells can result in human infection. Particularly vulnerable to *E. coli* O157:H7 are young children and the elderly. Symptoms of illness have been shown to progress quickly, often with severe consequences in susceptible individuals.

Animal and human feces, manures, and tainted water can all carry pathogens, especially *E. coli* O157:H7. While most bacterial strains are destroyed at composting temperatures that range from 130-140°F, *E. coli* O157:H7 cannot be consistently killed except by composting at temperatures that are above 160°F.

Reducing the Threat of Foodborne Pathogens in Gardens

The microorganism's survival in unfavorable conditions, severe disease potential, and small infectious dose demand significant strategies to minimize the risk of food contamination. Fortunately, the risk of developing a foodborne illness can be minimized. The following center on the reduction of foodborne pathogens, particularly *E. coli* O157:H7, in the garden.

WATER

Water is used to irrigate, transport applied nutrients to plant roots, deliver pesticides and wash harvested fruits and vegetables. When feasible, potable water should be used for these purposes to reduce the risk associated with the spread of microbial pathogens. If this is not possible, minimize the threat of water contamination on consumables by inspecting the area around the water source to:

- Confirm that manure is not stored near garden water supplies.
- Ensure that septic systems are not leaking near the source of irrigation water.
- Make certain that uncomposted manure is not applied to areas near water used for irrigation.
- Validate that livestock, pets and wildlife have restricted access to irrigation water.
- Verify that surrounding neighbors are controlling potentially contaminated runoff into the garden.

It is essential to avoid direct contact of contaminated water with the fruits or vegetables you plan to harvest and consume, and the type of plant affects how water could be applied. Limiting direct contact between potentially contaminated water and the crop is essential. Thus, it is advisable to water with a drip system or a furrow or flood system rather than with sprinklers, if the edible portion of the crop is located above the soil such as in leafy greens, tree fruits and cole crops.

GARDEN SITE

Gardens are generally safe, healthy, and enjoyable environments, but it is important to keep safety in mind when consuming the garden fresh produce. Locate a vegetable garden in an area with the smallest potential for contamination from fresh manure. It should be as far away as possible from manure or composting piles and isolated from animals, including wildlife, pets and livestock. This added measure will lower the risk associated with microorganisms within fecal waste by reducing direct contact of fresh manure with fruits and vegetables. If the garden site is close to manure piles or animal pens, covering those areas could prevent contaminated water from flowing into vegetable growing areas.

MANAGING MANURE

Most animal manures are exceptional organic soil amendments and fertilizers. However, it is not recommended to spread fresh, uncomposted manure to soils where fruits or vegetables are grown. While composting manure properly will kill most pathogens, uncomposted and raw manures can contain, *E. coli* O157:H7 and other environmentally resilient microbes. To properly compost manure, the following conditions should be met:

- Mixing. When a compost pile is adequately mixed, not only is aeration and subsequent breakdown of the material enhanced, but mixing also increases the required temperature to kill even the hardiest microbes.
- Curing. Allowing the composted manure to cure for two to four months before applying it to a garden soil will improve the likelihood for beneficial bacteria to replace disease-causing bacteria.
- Home Composting. Soil enriched with compost promotes healthy plant growth while saving money on fertilizer costs. Commercial composting facilities compost manure at higher and more uniform temperatures, use larger compost volumes and greater temperature monitoring, home composting could be considered riskier than commercial composting operations. However, home composting plant materials alone (without manure) avoids potential pathogen problems. And, composting manure with yard and garden waste has been shown to reduce the risk of contaminating garden vegetables with pathogens. Most importantly, ensure that during composting, piles reach temperatures above of 140°F for several days to reduce the risk of microbial contamination.
- Aged Manure. When using aged (not composted) manure in a garden, the following practices will minimize the potential for contamination:
    - Avoid the application of uncomposted manure to growing food crops.
    - Never leave aged manure on the soil surface where it can have direct contact with the crop. Always incorporate into the soil.
    - Do not apply manure immediately prior to harvest. Delaying harvest at least 120 days from manure application can significantly minimize the risk of food borne contamination. This can be safely reduced to 90 days if the edible portion is protected by a husk, pod or shell.

Gardens can be a pleasurable and relaxing kind of work and is an ever-changing, ever-evolving hobby. It's fun to try new growing methods or new foods. When you practice safe growing habits you can rest assured that the food you produce is fresh and safe.

Happy and safe gardening!

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Always Remember...

- *E. coli* O157:H7 is especially of concern because of its link to human illness and resilience in the environment.
- When feasible, always irrigate growing areas with potable water.
- Apply only correctly composted manure to growing food crops.
- Compost manure properly to destroy *E. coli* and *Salmonella* before using in the garden.
- Before working with food, always wash hands thoroughly.
- Always wash fruits and vegetables before eating them.