



Food Safety in Your Home Vegetable Garden

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“Outbreaks of foodborne illness make news headlines on a regular basis. In the United States it is estimated that as many as 76 million people contract some type of foodborne illness each year. As a result, over 325,000 are hospitalized and about 5,000 deaths occur.”¹ Everyone is at risk for foodborne illness, but people who are younger than 5, older than 50, diabetic, take antibiotics or antacids, and whose immunity is compromised are at a higher risk.

You may have heard about outbreaks of illness from bacteria such as *Salmonella* on tomatoes and cantaloupe and *E. coli* O157:H7 on lettuce and spinach. These bacteria that cause foodborne illness can be found in animal droppings and human waste.

From garden to kitchen, there are many chances for bacteria, viruses, and parasites to contaminate produce. Water, tools, animals, and manure-contaminated soil may spread harmful organisms in your garden.

Reduce the Risk of Contaminating the Food Grown in Your Garden

Clean Soil

For greatest safety when growing leafy vegetables and other commodities to be eaten raw, consider not using composted/stabilized manure or amendments containing any animal components, even though the risk of foodborne pathogens in properly processed materials is low. If used, incorporate such materials into the soil and do not leave them on the surface.

If manure-based amendments are to be applied to gardens, consider obtaining commercially composted/stabilized materials. Manure that is composted noncommercially may not be thoroughly processed. However, keep in mind that no compost material is guaranteed to be 100 percent free from bacteria such as *E. coli*.

Clean Water

Know about the quality of your irrigation water. Municipal tap water or water from a properly designed well that is tested on a regular basis are preferred sources. Use tap water for overhead irrigation or sprays on the edible parts of plants and when washing produce.

Clean Hands

Use protective or disposable gloves when working with manures and compost. Always wash hands thoroughly after working with these materials.

Clean Surfaces

Before and during harvest use clean tools, gloves, harvest containers, and work surfaces. Be aware of what hands and tools have touched before moving to another task that involves edible plants, especially picking. Hose off tools, shoes, or boots in an area well separated from your vegetable garden. Diluted bleach (1 teaspoon in 4 cups water) or pure white vinegar are safe for sanitizing work surfaces. (For equivalents between U.S. and metric systems of measurement, a conversion table is provided at the end of this publication.)

Consider Food Safety in Each Phase of Your Vegetable Garden

Follow these guidelines to reduce the risk of exposing the food grown in your garden to contaminants from water, soil and fertilizers, hands, and surfaces.

Pre-Plant

- Identify water sources for irrigation:
 - Low risk* - municipal drinking water
 - Minimal risk* - potable well water, if well casing is maintained, grouted, and livestock excluded from active recharge area and septic system drain field
 - Higher risk* - surface and reservoir water
- Learn about the quality of your irrigation water and test well or surface water sources for the presence of *E.coli* and other coliform bacteria (general fecal indicators), which indicate that the water may have been contaminated by fecal sources that can carry harmful pathogens. Below are recommendations for testing water sources. For additional information or local recommendations, consult a county Cooperative Extension educator, California's Department of Health Services (DHS) (<http://www.dhs.ca.gov/>), or the State Water Board (<http://www.swrcb.ca.gov/>).
 - Municipal water: Backflow prevention devices are recommended.
 - Well water: Test twice a year and treat the well if fecal coliform bacteria are present. Contact your county public health department for guidelines in well treatment and re-test procedures.

- Surface water: A laboratory analysis of surface water will give you the information you need to take corrective measures to provide for suitable and safe water use. Though not common for the home garden, testing during the growing season will help you understand the quality of an available surface water supply and trends that may alert you to contamination-causing activities. Contact your local DHS or Cooperative Extension offices for available laboratory services in your area.
- Home test kits for water quality, including quick tests for fecal indicators, are available for general guidance but have not been evaluated by UC researchers at this time.
- For greatest safety when growing leafy vegetables and other commodities to be eaten raw, consider not using composted/stabilized manure or amendments containing any animal components.
- Avoid using noncomposted manures.
- Avoid planting leafy vegetables and other commodities close to animal enclosures (corrals, feedlots, pastures) where windborne dust and surface water runoff can result in contaminated produce.

Production

- Be very aware of the potential for garden tools, hands, clothes, and shoes to become contaminated when working with manures and composting materials. Be especially aware that dirty hands or gloves may transfer pathogens from manure or incompletely composted organic materials to crops or containers.
- Use protective or disposable gloves when working with manure and compost, especially if you have open wounds on your hands. Always wash hands thoroughly after working with these materials and, at minimum, hose off tools, shoes, or boots in an area well separated from your vegetable garden.
- Before and after handling fresh fruits and vegetables, wash hands with special attention to cleaning around fingernails.
- Do not add fresh manure to existing compost piles.
- Ideally, keep wild and domestic animals out of compost piles and areas with edible plants during the growing and harvesting season.



- Minimize risk by using tap water for overhead irrigation or sprays on the edible parts of plants.
- Consider using drip irrigation to reduce wetting of leaf and fruit surfaces.

Harvest

- Wash hands before handling produce.
- Use clean harvest aids (tools, bins, gloves).
- While in the garden, remove excess soil from produce.
- Handle produce carefully to avoid bruising and damaging.

Postharvest Handling

- Wash hands before handling produce.
- Use tap water for all washes.
- Remove soil and potential contaminants by washing with a clean brush under running tap water rather than batch-washing in a basin.
- Diluted bleach (1 teaspoon in 4 cups water) or pure white vinegar are safe for sanitizing work surfaces.

- Always cover and refrigerate cut fruit and vegetables when preparing them in advance.
- Throw out cut fruit and vegetables if they have been held for longer than 2 hours at room temperature or longer than 1 hour at temperatures above 90°F (32°C).

Please contact your local Master Gardener for more information or go online to [http://camastergardeners@ucdavis.edu](http://camastergardeners.ucdavis.edu).

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RESOURCES ACCESSIBLE ONLINE

Web Sites

California Master Gardeners

<http://camastergardeners.ucdavis.edu/>

Center for Disease Control

<http://www.cdc.gov>

Food Safety Fact Sheets and link to EPA Consumer Handbook for composting

<http://vric.ucdavis.edu>

FoodSafe Program

<http://foodsafety.ucdavis.edu>

Gateway to Government Food Safety Information

<http://www.foodsafety.gov/>

Good Agricultural Practices Network for Education & Training

<http://www.gaps.cornell.edu/>

Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables

– Guidance for Industry (FDA)

<http://www.foodsafety.gov/~dms/prodguid.html>

University of California Good Agricultural Practices

<http://ucgaps.ucdavis.edu/>

In Spanish

Las prácticas agrícola buenas de la Universidad de California

http://groups.ucanr.org/UC_GAPs/Las_Publicaciones_en_Español/



Publications/Brochures

Good Agricultural Practices – A Self-Audit for Growers and Handlers

<http://ucce.ucdavis.edu/files/filelibrary/5453/4362.pdf>

Harvesting and Storing Your Home Orchard's Nut Crop: Almonds, Walnuts, Pecans

ANR Publication 8005

<http://anrcatalog.ucdavis.edu/InOrder/Shop/ItemDetails.asp?ItemNo=8005>

Hand Sanitation (ppt to pdf)

http://ucgaps.ucdavis.edu/documents/Slide_presentations2518.pdf

Key Points of Control and Management for Microbial Food Safety: Edible Landscape Plants and Home Garden Produce

ANR Publication 8101

<http://anrcatalog.ucdavis.edu/InOrder/Shop/ItemDetails.asp?ItemNo=8101>

Key Points of Control and Management of Microbial Food Safety Concerns for Edible Landscape and Home Gardening (brochure)

<http://ucce.ucdavis.edu/files/filelibrary/5453/4364.pdf>

Microbial Food Safety **IS** your Responsibility!

<http://vric.ucdavis.edu/veginfo/foodsafety/foodsafety.htm>

National GAPs Educational Materials

<http://www.gaps.cornell.edu/educationalmaterials.html>

Producing Quality Almonds: Food Safety Starts on the Farm

ANR Publication 8126

<http://anrcatalog.ucdavis.edu/InOrder/Shop/ItemDetails.asp?ItemNo=8126>

Safe Handling of Fruits and Vegetables

ANR Publication 8121

<http://anrcatalog.ucdavis.edu/InOrder/Shop/ItemDetails.asp?ItemNo=8121>

UC Postharvest Technology Research and Information Center

(Food Safety Publications)

http://postharvest.ucdavis.edu/postharvestdata/datareport.cfm?reportnumber=204&catcol=1809&categorysearch=Food_Safety

In Spanish

Extensión en español (colección de publicaciones)

<http://extensionespanol.net/publications.cfm>

REFERENCES

1. Rangarajan, A., M. Pritts, S. Reiners, and L. Pedersen. 2000. Food safety begins on the farm: Reduce microbial contamination with good agricultural practices. Ithaca, NY: Cornell University. Good Agricultural Practices (GAP) Program Web site, <http://www.gaps.cornell.edu/Educationalmaterials/Samples/PamphletEng.pdf>.

METRIC CONVERSIONS

English	Conversion factor for English to metric	Conversion factor for metric to English	Metric
teaspoon (tsp)	4.93	0.20	milliliter (ml)
cup	236.6	0.004	milliliter (ml)

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Ask a UC Master Gardener



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- Use drip irrigation to reduce wetting of leaf and fruit surfaces.
- Use tap water for any overhead irrigation or sprays on the edible parts of plants.
- Wash produce under running tap water, rather than batch-washing in a basin.



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