School Garden Food Safety Guidelines

Food Safety Starts in the Garden!

http://agri.nv.gov/Plant/FTS-FSP/FTS_home/

This document was created and compiled by the Nevada Department of Agriculture and Nevada Department of Education, Office of Child Nutrition and School Health. With input from the Nevada State Health Division, University of Nevada Cooperative Extension, Washoe County Food Policy Council, and the Oregon Department of Education, Farm to School Program.

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Nevada School Garden Food Safety Guidelines

School gardens engage students by providing a dynamic environment to observe, discover, experiment, nurture and learn. They are living laboratories where interdisciplinary lessons are drawn from real life experiences, encouraging students to become active participants in the learning process. School gardens have been shown to increase self-esteem, help students develop a sense of ownership and responsibility; and promote healthy lifestyle choices, including increased fruit and vegetable consumption.

Potential food safety risks should be taken seriously. Produce grown in school gardens can be contaminated during growth, harvest, transportation, preparation or service and result in foodborne illness. When appropriate food safety precautions are taken, risks of crop contamination and foodborne illness are reduced. The following guidelines are intended to help those working in school gardens ensure proper precautions are followed throughout the gardening process to minimize the food safety risks.

Good Agricultural Practices (GAP) and Good Handling Practices (GHP) are effective food safety methods for reducing foodborne illness risks within school gardens and in commercial production. The primary goals of GAP/GHP are to prevent the introduction of pathogens into the garden and help garden leaders and students identify potential points of contamination when growing and harvesting garden produce.

This handbook provides an overview of food safety practices, based on GAP/GHP, which can be taken to reduce the risks of produce contamination in school gardens. Additional resources are also provided throughout the document to help you and your students be successful at growing and harvesting safe produce.

This document was created and compiled by the Nevada Department of Agriculture and Nevada Department of Education, with input from the Nevada State Health Division, University of Nevada Cooperative Extension, Washoe County Food Policy Council, and the Oregon Department of Education, Farm to School Program.

This document provides guidelines and resources for implementing food safety practices, however does not eliminate the risk of food borne illness from garden produce. Applying the practices outlined, however will help minimize risks.

School Garden Food Safety Guidelines

Food Safety Starts in the Garden!

Before beginning work in the garden:

- Thoroughly review the School Garden Food Safety Guidelines and School Garden Checklist. Be sure to complete weekly checklist throughout the growing season (checklist provided in Resources at end of document)
- Train all persons including - staff, students, and volunteers - on food safety and gardening safety practices. Training should review the local health department's regulations including but not limited to:
  - Hand washing and personal hygiene
  - Cleaning and sanitizing garden equipment and containers used to hold produce
  - Proper methods for handling produce
  - What to do in case of an emergency, injury, allergic reaction, etc.
- Check to ensure your school has a permitted kitchen facility. If not, pre-approval for your Standard Operating Procedure explaining how and where the produce grown could be handled and stored must be submitted to your local health authority for approval prior to beginning the program.
- Ensure that volunteers are covered by the school district insurance policy in the event of accident or injury. Check with your school regarding volunteer requirements when on school property.
- Require signed permission slips for all students involved in the garden.
  - Permission slips should list potential hazards of working in a school garden and identify any allergies the child may have.
- Do not allow anyone to work in the garden while sick, or until 24 hours after symptoms such as vomiting or diarrhea, have subsided. Food handlers must wait 48 hours, 72 hours if there's a Gastrointestinal type outbreak.
- If the harvested produce is intended for student consumption, your health authority may request a School Garden Inspection through the Nevada Department of Agriculture. Contact your local health authority or ajeppson@agri.nv.gov regarding agriculture inspections that may be required in your area.

Growing

1. **Site Selection:** Garden site selection is important and can be challenging.

a. Ensuring the site has access to approved water sources and good soil composition can help establish a successful school garden.

b. Appropriate permission for a garden must be obtained, taking into account local laws and regulations involving urban agriculture; and will include having written consent from the school administration and school district.

c. Obtaining the garden site history may provide insight into potential hazards such as previous flooding, use as gabage site, chemical storage, animal grazing, animal housing, animal feedlots, etc.

d. If official site history is unavailable, a visual site assessment may be performed to determine potential food safety risks.

   i. Look for traces of animal tracks or droppings.

   ii. Survey layout of potential site to determine risk for garden flooding.

e. Site must be positioned to protect it from runoff from industrial and agricultural areas, parking lots, roads, or other sources of potential contamination.

f. Ensure the site is properly protected from domestic and/or wild animals (examples may include fencing, predator deterrents, etc.)

Construction materials:

g. When constructing raised beds, containers, stakes and trellises, only use materials made of non-toxic and non-leaching material such as concrete and untreated wood.

h. Do not use pressure-treated wood, used tires, railroad ties, or single use plastics in the school garden. Do not use products coated with lead-based paint or other potentially contaminated coating.

2. **Soil Composition**

a. Soil nutrient tests should be conducted before the garden is built, testing for levels of plant nutrients and micronutrients, pH, and soil type.

b. Levels of contaminants such as chemicals, pesticides, lead, etc. should also be tested.

3. Plant Selection

a. Select plants that perform well in your area and that have growing cycles within the school year's schedule

b. Do not grow sprouts due to the increasing number of illnesses associated with eating raw sprouts. Growing sprouts may also be a concern when used strictly for education purposes. Students may still attempt to consume the high-risk product.

c. Be aware of potential allergens. Do not bring products with allergens into the garden in order to prevent cross-contamination.

d. Do not grow crops of well-known allergens, such as peanuts or soybeans, as well check with your school district for a student allergy policy.

*Go to http://www.washoecountyschools.net/csi/pdf_files/HEA-M600%20Food%20Allergy%20Manual.pdf to see an example of Washoe County Policy for student allergies.

e. Inform students that different vegetative parts on fruit and vegetable plants may be toxic (including leaves, roots, and unripe fruit). For example rhubarb leaves and unripe green potatoes are toxic to humans.

(1. Lupine)

(2. Morning Glory)

(3. Rhubarb)

4. Chemical and Fertilizer Use

a. Do not use any pesticides or herbicides in school gardens due to potential health hazards.

b. Secure all fertilizer in a safe and locked location when not in use.

c. Fertilizer may only be handled by an adult and not applied while children are present.

d. Do not use raw animal manure in the garden as fertilizer.

Water and Irrigation

a. Only potable (drinking) water may be used for irrigation.

b. Ensure water meets Department of Environmental Protection Drinking Water Program requirements and is not compromised by cross-contamination.

- If unable to use water from an approved and permitted public water source , a water test must be obtained from a reputable lab facility or private wells. Water tests must indicate total coliforms present, which must not exceed 126 Colony Forming Units (CFU).
- Rain water collection must not be used for irrigating edible crops. Rain water may directly contact surfaces that contain harmful metals, chemicals, bacteria, etc.
- Information on local resources available for water testing can be found under the Resources tab.
- Contact the University of Nevada Cooperative Extension program for more information.

c. Be sure that irrigation water is accessible during the entire growing season. Some schools may turn off irrigation water before the growing season is over.

- Hoses/irrigation systems must have backflow preventers or air gaps. Irrigation hoses should be made of material that won't contaminate the water running through the hose.

d. Gray water, waste water, recycled water or runoff water from any source must not be used.

e. If transporting water, only food grade containers are to be used.

Compost

a. Use only properly treated compost and do not use animal products.

- Animal manure can create a high risk of pathogen contamination in the garden when not properly treated, aged, handled, or applied.
- Have an individual trained in composting practices oversee the compost. Best composting practices include the following:

  1. Achieving temperatures of >130 degrees F plus 3 months of curing for thermal composting or >6 months curing for cold (non-thermal) composting. Additional information on time and temperature requirements can be found under the Resources tab.
  2. No harmful plants (noxious weeds) or diseased material are being used.
  3. Compost pile is properly aerated.
  4. Balance of carbon and nitrogen sources.

c. Add only plant products, such as fresh fruit and vegetable culls from food.

d. Avoid grass clippings or leaves unless you can verify that they were in a location that was free from pet waste or herbicide contamination. If grass clipping or leaf donations are received you must be able to verify that they are not contaminated. This is difficult to verify so utilizing these products on non-edible crops is optimal.

e. Locate compost pile downhill and away from the garden to prevent run-off.

Nevada Noxious Weed

(Lepidium latifolium)

Compost continued:

f. If using cafeteria waste products, have documentation showing proper training procedures have been implemented and students/staff are not incorporating animal products, refuse, etc. into the compost bins. Compost stations must be monitored by an adult or a rained student during mealtime to ensure proper items are composted.

g. Wear gloves when handling compost material. Gloves do not replace proper hand washing.

h. Locate compost piles in a secure location away from potential contamination such as garbage, water runoff, etc. Restrict access by animals as much as possible.

i. Organic matter must be fully composted before adding to garden or it will compete with plants for nitrogen.

j. Consider using worms to form vermicompost.

Vermicomposting

Fencing to keep wildlife out of the garden

Learn about vermicomposting at: http://www.bae.ncsu.edu/ topic/vermicomposting/.

Composting Requirements

Use only properly treated compost or commercially prepared compost.

Composted plant materials must be produced through processes that assure:

- For in-vessel or static aerated piles, temperatures must remain at 131 degrees or above for three consecutive days.
- For windrow compost piles, the temperature must remain at 131 degrees or above for at least 15 days.
- Windrow compost should also be turned a minimum of five times during the 15 day period after remaining at 131 degrees for three consecutive days.
- Static piles and windrows are to be probed for temperature daily at 10- to 15- foot intervals using a variety of depths to determine whether self-heating is taking place.

For more information regarding compost visit:
http://compost.css.cornell.edu/schools.html

http://urbangardencasual.com/2010/05/22/composting-for-renters/

Harvest

1. Personal Hygiene

a. Hand washing facilities must be available for all garden workers and students.

- All students must line up and wash their hands before entering the garden. Hands must be washed with soap and potable water for at least 20 seconds before entering the school garden and anytime they become contaminated or visibly dirty while working in garden.
- Hands should be washed frequently and must be washed with soap and water after eating, drinking, using the restroom (see below), or using chemicals in the gardening process.
- Hand sanitizer is <u>not</u> an acceptable substitute for proper hand washing with soap and water. Instructions on proper hand washing procedures should be given to students and all persons working in the school garden.
- Use a liquid or foam soap. Do not use bar soap.
- Hands must be dried with paper towels or air dryers. Shared cloths must not be used

b. Restrooms must be available for garden workers and students.

- Do not use the garden site as a restroom.
- When using the restroom, students and staff must wash hands when finished using the facilities and again before handling produce.

c. Any open cuts or wounds on hands, arms, or legs must be properly covered prior to entering the school garden.

d. Proper clothing suitable for gardening should be worn.

- This includes closed toed shoes to prevent cuts, stings, or other injuries.

e. Drinking, eating, and smoking are not allowed in the garden.

f. Do not allow anyone to work in the garden if they have any of the following symptoms associated with a gastrointestinal illness such as vomiting, diarrhea, sore throat with fever, jaundice, abdominal cramps, or have experienced a loss of appetite for 3 or more consecutive days. Do not allow anyone to work in the gar den or handle produce until 24 hours after last symptoms have occurred.

g. Additionally, workers must not be allowed to work in the garden or handle raw produce if they have open lesions or are diagnosed with an illness due to *Hepatitis A*, *Salmonella, E. coli, Shigella, Norovirus* or any other contagious diseases transferred through food, as required by your local health authority.

h. Remove any sick student or garden worker immediately if any signs or symptoms of illness are present that may be transferred through food (jaundice, fever with sore throat, coughing, etc.) Contact your local health authority regarding when a student or garden worker should be removed.

i. Document any removal of sick students or garden workers in the garden journal or your established record keeping system. A sample form can be found in resources

2. Preparation for Harvest

a. Before harvesting, coordinate with site staff to set a harvest time. Determine when kitchen staff is available to accept school garden produce.

b. The day of a harvest, the garden leader should check with the kitchen manager or staff to pick up the clean, sanitized food grade container.

c. The garden leader should survey the school garden for ready to pick vegetables and fruits.

d. The garden leader must prepare the record sheet for harvest-where in the garden items are harvested, date, temperature, and who harvested produce. See form in resources at the end of this document for an example.

3. Harvesting the School Garden with Students

a. The garden leader or an approved volunteer should recruit a small group of students from their classroom, ensuring none of the students have any signs of illness.

b. Signed permission slips for all student gardeners must be obtained prior to any students working in the school garden.

i. Permission slips should list potential hazards of working in a school garden.

ii. Permission slips should identify any allergies the child may have.

iii. See sample permission slip included under the Forms tab.

c. Students and garden leaders must wash their hands with liquid soap and potable water and dry hands with air dryer or paper towels.

d. Garden leader or volunteer should take students to the school garden site and show the students which foods are ready to pick.

e. If any student has not been instructed on proper garden procedure, the garden leader should give instruction to them before entering the school garden.

f. Be sure to wash, rinse, and sanitize harvesting tools (such as knives or scissors) with soap, potable water, and your approved sanitizer (bleach-water or quaternary ammonia-water) immediately before and after each harvesting session. Check with your school kitchen staff for appropriate sanitizing practices.

g. Brush, shake or rub off any excess garden soil or debris before putting produce into the harvest container or bringing produce into the kitchen.

h. Produce must be placed in clean, sanitized food grade containers. Wood or woven baskets must not be used for harvesting.

i. Students or the garden leader should record the following information:

   i. Date and time of the harvest.

   ii. Location in garden of the harvested produce.

   iii. Type and number/weight of each vegetable and fruit harvested.

   iv. Name of garden leader and students involved in the harvest.

j. Students and garden leader must take vegetables to the kitchen manager or staff immediately after harvest.

   i. All produce should be delivered to food service staff when they are present and able to receive it, by prior arrangement.

   ii. Any produce dropped off or left when staff is not present must not be used in the school cafeteria.

k. Do not harvest produce that has been noticeably contaminated by animals, body fluid, glass, chemicals or insects (eggs, leafminer damage, etc.)

i. If such contamination is noted, flag the area and remove produce to ensure that product is not consumed.

Ii. Document removal of contaminated plant/produce in journal.

iii. Anyone who handled the contaminated plant/produce must wash their hands before continuing work and clean any contaminated harvesting materials.

Additional Information Regarding Food Handling Requirements

NAC 446.211 Food handler required to report on health and diseases; presence of infected or ill food handler prohibited. (NRS 439.150**,** 439.200**,** 446.935**,** 446.940**)**

1. The holder of a permit for the operation of a food establishment shall require each food handler and each applicant to become a food handler to report verbally to the holder of the permit information about his health and activities as they relate to diseases that may be transmitted through food.

2. A person in charge shall prohibit the physical presence of a food handler in the food establishment if the food handler:

(a) Is diagnosed as carrying any of the following infectious agents:

(1) *Salmonella typhi*;

(2) *Shigella* spp.;

(3) *Escherichia coli 0157:H7*; or

(4) Hepatitis A virus infection;

(b) Has a symptom that is associated with acute gastrointestinal illness, such as abdominal cramps, diarrhea, fever, loss of appetite for 3 or more consecutive days, vomiting or jaundice; or

(c) Has a pustular lesion on any exposed part of his body, including, without limitation, a boil or an open or draining infected wound, unless the lesion is covered by a dry, durable bandage that fits tightly.

For additional information regarding food handling requirements contact your local health authority.

Post-Harvest

1. On-site food safety guidelines and procedures must be followed for all school garden items served in the cafeteria.
    a. The kitchen manager or staff must receive and inspect school garden pro duce upon delivery. Kitchen staff must:
        i. Reject suspect produce according to food safety plan standards.
        ii. Not use any produce that has been noticeably contaminated by animals, body fluid, glass, chemicals, insects-eggs, leafminer damage, etc.
        iii. Keep a record of produce that is discarded, including date, type of produce discarded, and justification.
        iv. Ensure proper disposal of rejected produce to avoid consumption by humans.
    b. Food service staff must document receipt of school garden produce.
        i. Type of produce and quantity received must be recorded.
    c. When washing produce it must be done in a clean, sanitized sink.
    d. Produce must be refrigerated immediately after washing unless the particular item is normally held at room temperature
    e. Produce must reach 40 degrees Fahrenheit within 2 hours of refrigeration.
    f. Storing produce with moisture from washing can encourage microbial growth.
        i. If produce will be stored for more than a few days you may consider storing unwashed produce in a food grade container that is labeled unwashed.
        ii. Produce must be washed with potable water immediately before be-

g. Fruits and vegetables stored at room temperature (onions, potatoes, tomatoes, and winter squash) must be kept in a cool, dry, pest-free, well-ventilated area.
h. All produce must be stored up off the ground by at least 18 inches.
i. All raw fruits and vegetables must be thoroughly washed with potable water before being cooked, prepared, processed, served or dispensed. Washing and preparation requirements can be found in the resource tab (NAC 446.130, NRS 439.150, 439.200, 446.940). For additional information contact your local health authority.
j. School garden produce must be stored and prepared separately from other produce.
k. Storage container must be clearly labeled “School Garden Produce” with a harvest date.
    i. School garden produce must be used within 3-5 days of harvesting.
    ii. Do not use produce that shows visible signs of damage or decay, or that has an off odor.
l. Bare hand contact must be minimized for ready-to-eat food. Use food handlers gloves when handling produce after it has been washed and always when cutting or preparing produce.

Contact the Food Service Department at your School District for more information.

Removal of Sick Student from School Garden

Date: _____

Student's Name: _____

Reason for Removal:

_____

_____

Location in Garden Student was Working:

_____

_____

Notes:

_____

_____

_____

Removal of Damage Produce or Plant from School Garden

Date: _____

Type of Plant/Produce Removed :

_____

Reason for Removal:

_____

_____

Garden Location of Damaged Plant or Produce:

_____

_____

Steps Take to Prevent Damage in Future:

_____

_____

_____

School Garden Harvest Log

Please use the following form to record the amount of produce harvested from the school garden. This will help us keep track of how much our school garden produces!

Date	Type of Produce Harvested	Amount of Produce Harvested	How was the harvest used?

How do I soil sample?

Soil sampling is usually done in late fall just before the soil freezes or in early spring before the growing season. Avoid taking soil samples within a month of fertilization with chemical or organic fertilizers.

Collect 10 - 15 soil samples from different locations throughout the growing area. Take each sample of soil from the soil depths where most of the plant's roots grow (usually in the top 2 - 12 inches). Mix the samples into one combined sample. If the plants in part of the area are growing differently, you need to sample and test the differing areas separately.

Follow the steps recommended by the lab to which you are sending the sample. The lab will determine the amount of soil needed (usually 1 - 2 cups) and whether to air dry the sample before it is sent. If a soil sample has gotten very hot or been through extreme temperature changes, it is best to get a new sample of soil for testing.

Bibliography

Soil Testing. www.arg.state.nc.us/cyber/kidswrld/plant/soiltest.htm

Soil Testing Guide for Home Gardens. Duane Hatch. Utah State University Extension. Horticulture Fact Sheet 05. 1990. HG/H05.

Soil Testing. University of Rhode Island Green Share Factsheets. http://www.uri.edu/ce/factsheets/prints/soiltestprint.html

Where can you get soil testing done?

Accredited soil testing labs located near Nevada:

Utah State University Extension
USU Analytical lab
Ag Science Rm166
Logan, UT 843222-4830
Phone 435-797-2217
Fax 435-797-2117
http://www.usual.usu.edu

A& L Western Laboratories Inc.
1311 Woodland Avenue Suite 1
Modesto, CA 95351
Phone: (209) 529-4080
Fax: (209) 529-4736
http://www.al-labs-west.com/

Analytical Sciences Laboratory
University of Idaho
Holm Research Center
Moscow, ID 83844-2203
Phone: 208-885-7900
Fax: 208-885-8937
http://www.mcgeehan@uidaho.edu

Western Laboratories
211 Highway 95
Parma, ID 83660
208-722-6564
http://www.westernlaboratories.com

UNCE does not endorse these or any other soil testing laboratories.

University of Nevada Cooperative Extension

Fact Sheet 09-38

Soil Testing Guide for Nevada Home Gardeners

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Thank you to USDA-CSREES for funding this project.

Why and how often to do a soil test?

A soil test can help a plant grower determine whether an area of ground has enough available nutrients for good plant growth. A soil test can also help growers determine the potential for sodium (salinity), pH, organic matter level and texture effects on plant growth.

The levels of phosphorus (P), potassium (K) and micronutrients available for plants do not change rapidly in soils. A test for these is only needed about every five years unless the soil has had substantial additions such as compost, manure or fertilizer that are likely to change the levels P, K and micronutrients.

Nitrogen (N) and sulfur (S) are critically important for plant growth but the amounts can change rapidly in the soil. Accordingly, soil tests for those nutrients are sometimes done yearly. If the plants grown use large amounts of nutrients, fertilizer can be added to the soil to address the full nutrient requirement and forego the soil test.

What is a soil test?

A soil test analyzes a representative sample of soil for specific characteristics. Most soil tests use chemical measurements and models to estimate the amount of nutrients that are available for growing plants.

A soil test can measure other chemical characteristics of a soil such as the salt levels, organic matter or decomposed plant-carbon material and the soil pH in the soil (which influences the availability of nutrients to plants). Soil texture is usually determined by hand and indicates the proportions of sand, silt and clay which influence water retention, infiltration and availability for plants.

When the soil test results are sent to the grower, the lab usually provide an interpretation of the results. The test results will indicate when soil characteristics have levels outside of normal ranges and what could be done to improve the soil.

What does a soil test not measure?

A basic soil test will not measure some variables that can adversely affect plant growth. These include chemical residues (i.e. pesticides, toxic chemicals), disease and insect infestations or poor physical characteristics of the soil. Soil tests do not measure factors such as light conditions, water quality and water quantity.

The quality of irrigation water should be tested to ensure that it is not a source of sodium or other minerals which can negatively impact plant growth.

A general soil test won't provide information on the soil biology such as the bacteria, fungi, worms, insect and other living organisms that benefit the soil. Specialty test labs can provide this analysis.

A soil test will generally not tell the total amount nutrients present in the soil since some are not in a form available for plants. The soil test estimates the amount of nutrients available for plant roots to absorb. Because the availability of nutrients varies due to environment and soil types, it is important to use a soil test that is calibrated for your growing area. Adding organic matter such as composted manure or grass and leaf litter often greatly improves desert soils and makes nutrients more available to plants.

What types of soil tests are best?

Most of the do-it-at-home soil test kits are not suitable for testing Nevada soils. These tests are inaccurate for our high pH and saline soil conditions. Many of these tests are developed for acid pH soil types found in the eastern states.

The most accurate results are provided from properly sampled soil that is sent to a quality soil test lab that is regularly testing desert soils.

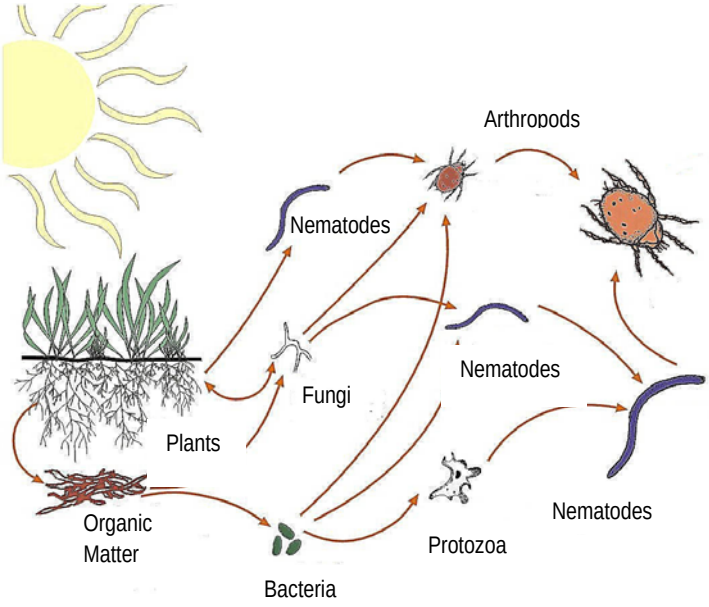
University of Nevada Cooperative Extension

Fact Sheet-09-16

Composting Yard and Vegetable Wastes

Susan Donaldson, Water Quality Education Specialist and Melody Hefner, Program Assistant, University of Nevada Cooperative Extension

Adding compost to improve the soil is an important component of successful home gardening. Making compost at home can be a cost-effective and environmentally supportive practice. All organic materials break down or decompose eventually. Composting is a method to speed up the decomposition process by providing "ideal" conditions. These conditions include the right ingredients, moisture, air and soil organisms. A variety of organisms, including bacteria, fungi, worms, sow bugs, nematodes and small arthropods, such as springtails and mites, can be active in the composting process. To compost efficiently, you must provide the proper ingredients and an environment in which these organisms can flourish.



Soil is home to many types and sizes of living organisms.
(Graphic courtesy of University of Missouri Extension)

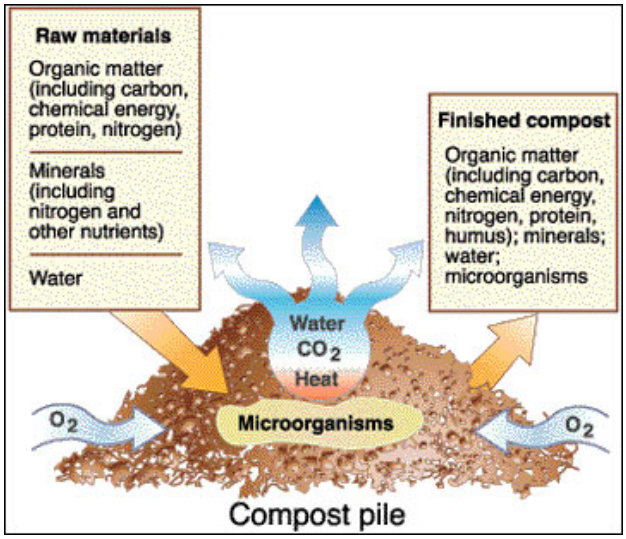
Why compost?

Compost improves the soil in a number of ways and reduces waste going to landfills. When added to soil, compost increases soil water- and nutrient-holding capacity. Compost makes all types of soil easier to work, from clay-rich to sandy soils. It also feeds soil organisms, including the bacteria, fungi, earthworms and insects living in healthy soil. It improves plant productivity and cover. Increased plant cover reduces water runoff and the potential for soil erosion and nutrient pollution.

Yard trimmings and kitchen scraps make up about 20 percent to 30 percent of household wastes. Composting these materials on your property saves landfill space and reduces auto emissions from vehicles used to transport them to the landfill. Many communities charge for garbage collection based on the size of the container. If you reduce the volume of trash hauled from your house, you may save money.

Methods of composting

Slow or cool composting, also called passive composting, is a simple but less-effective method of producing compost. To slow compost, place leaves, grass clippings and other garden wastes in a bin or pile. This method requires little to no maintenance, but it can take a year or more until the pile decomposes. Slow or cool composting is far less effective at killing weed seeds and pathogens than



In a compost pile, raw materials are transformed into a useful final product.
(Graphic courtesy of University of Missouri Extension)

other methods, but requires much less effort. If you have only small amounts of yard waste, little time, or little need for compost, this method of composting may be right for you.

Hot or active composting is a much quicker way to produce compost. The decay process is controlled and manipulated to make it proceed quickly. The increased rate of decay produces heat. Hot compost piles heat quickly to 120 degrees to 160 degrees. At these temperatures, many pathogens and weed seeds are destroyed. As the process continues, the compost pile cools and low-temperature organisms, such as earthworms and insects, add their efforts to the decay process.

Steps to creating a compost pile

1) **Site**. Pick a level, well-drained site. Build the pile on bare soil so soil bacteria and other organisms can move into it. In northern Nevada's high desert climate, a bit of shade helps maintain moisture in the pile during summer. The site should be convenient, close to a watersource, the garden or other major sources of raw materials, but not in a location where it will detract from the appearance of your landscape.
2) **Pile size**. Cool compost piles can be any size. Make hot compost piles at least one cubic yard, or 3-feet wide by 3-feet long by 3-feet high, to hold in the heat and maintain chemical processes. It is not necessary to use a bin or other structure, but it helps contain the composting materials. Bins or piles can be as large as a 5-foot cube in size. Piles or bins larger than this may lack sufficient air in the middle of the pile and are more difficult to turn. Many avid compost makers have a series of three

Okay to Compost

Green Materials

- Grass clippings
- Animal manure (from herbivores only)
- Non-animal-based kitchen wastes
- Garden trimmings

Dry or Woody ("Brown") Materials

- Fall leaves, dry cornstalks
- Wood chips or sawdust
- Hay or straw (soiled or clean)

Do Not Compost

- Yard trimmings or grass clippings treated with pesticides. They may kill the beneficial organisms in the compost pile or later in your garden.
- Weeds, if the pile will not be hot enough to kill the seeds.
- Diseased or insect-infested plant parts. The diseases or insects may be transferred to the soil with the compost.
- Parts of any plant known to contain poisons or toxins, such as black walnut.
- Too much of any plant that contains tannins or resins that inhibit decomposition, such as junipers, pine, spruce, arborvitae, oak or cottonwood.
- Charcoal ash, as this may contain substances harmful to plants.
- Fireplace ashes, since they have a very high pH, as do our native soils. High pH levels can result in nutrient deficiencies and other plant problems.
- Fats, grease, lard or oils. These do not break down quickly and may attract pests, vermin, dogs or large carnivores.
- Meat or fish bones or scraps.
- Dairy products.
- Pet wastes, such as dog or cat feces or soiled cat litter. They may contain parasites, bacteria or viruses harmful to humans.
- Swine or other omnivore wastes. They also may contain parasites, bacteria or viruses harmful to humans.

or more bins, all at different stages of decomposition.

3) **Ingredients**. By definition, cold composting does not require a specific set of ingredients. Start hot compost piles, on the other hand, as a series of layers. Maintain a ratio of 1:2 green materials to dry or woody materials. A wide variety of substances can be used, including yard wastes, manure, etc. The finer the the size of materials, the quicker they will compost. See the sidebar for materials to avoid. Sprinkle a small amount of soil or finished compost on each 8- to 12-inch layer of organic materials to start the biologic processes. Add a small amount of all-purpose fertilizer if you have less green material than dry material. Lime is not necessary and will raise the pH of the compost. Continue adding materials in layers until the pile is the desired size.

4) **Particle size**. The size of the materials you add to your compost pile plays a role in the speed of decomposition. Large particles allow air to circulate, but bacteria and other organisms can only work on the outside of large particles. Very fine particles restrict airflow and are easily compacted. Aim for materials that are one-half inch to 1.5 inches in size. Chip, chop or shred woody materials before adding them to the pile.

5) **Water**. Moisture content can often be insufficient for effective composting.The pile should be damp, not dripping wet and not dusty dry, but about as wet as a sponge that has been wrung out. Water the pile as needed to keep it damp. You may want to add the compost pile to your drip irrigation circuit. However, be cautious about over-watering. Many nutrients may be lost if water flows out of the compost pile. The excess water may also fill the air spaces. Composting is an aerobic activity that requires oxygen. Decomposition will continue without oxygen, but anaerobic decomposition produces foul odors and is a slower process. Additionally, anaerobic decomposition encourages the growth of human and plant pathogens which are especially important to avoid. Cover the pile during heavy rains so it will not get too wet.

6) **Mixing**. Once the pile is built, it should begin composting quickly. Turn the pile weekly, using a pitchfork or shovel. Turning adds air to the pile. It also mixes the material from the outside of the pile to the inside of the pile, where greater biological activity usually occurs. Check for moisture content while turning and water the pile if needed. Some hot composters do not add to the pile once it starts heating, starting a second pile instead. Others add fresh material to the middle of the pile and work it into the pile. To gauge the temperature of the pile, use a long-stemmed compost thermometer or your hand. The center of the pile should reach temperatures of 120 degrees to 160 degrees, or be uncomfortably hot to the touch.

7) **Curing**. Depending on the speed of decomposition, the pile should stay hot for several weeks to two months. The pile will decrease in size to about half the original volume. Then the pile needs to sit for another four to eight weeks to “cure.” During the curing phase, pile temperatures will decrease to about 80 degrees to 110 degrees. Turn the pile at

Bins are not required for successful composting, but they are helpful for corralling your materials and maintaining the compost pile dimensions. There are many methods and designs for compost bins or compost systems. Below is a short list of Web resources:

Building your Own Composting Bin: Designs for Your Community, California Integrated Waste Management Board, http://www.ciwmb.ca.gov/Publications/organics/44295054.pdf

Build-your-own Composting Bins, Pierce County Public Works, Washington, http://www.co.pierce.wa.us/pc/services/home/environ/waste/recycle/compost/compostbins.htm

Composting at Home, Ohio State University Extension Fact Sheet COM-0001-99, http://ohioline.osu.edu/com-fact/0001.html

How to Build a Compost Bin, University of Missouri Extension G6957, http://extension.missouri.edu/publications/DisplayPub.aspx?P=G6957

Troubleshooting Compost Problems

Symptom	Problem	Solution
Compost has a bad odor.	Not enough air.	Turn the pile to aerate. Add dry material if pile is too wet. Let the pile dry out if it is too wet.
The center of the pile is dry.	Not enough water.	Add water and turn the pile.
The compost pile is damp and warm only in the center.	Pile is too small to maintain heat.	Mix new material into the old material to create a larger mass.
The pile is damp and sweet-smelling, but the pile does not heat up.	Lack of nitrogen.	Mix a nitrogen source into the pile, such as fresh grass clippings, nitrogen fertilizer (urea, ammonium sulfate, etc.), blood meal or manure.

least weekly during the curing phase. The compost is ready to use when the material in the pile no longer heats up when turned, the pile has a pleasant, earthy smell and the material in the pile is uniform, crumbly and dark brown in color.

Preventing problems when composting

Nuisance insects and animals are common problems for the urban composter. Compost piles made entirely of yard wastes generally will not attract flies. Flies may become problems in compost piles that include food wastes. Bury food wastes in the pile, rather than placing them on the surface, to reduce the chances of attracting flies.

Food wastes may also attract larger pests, such as rats, raccoons, coyotes, dogs and bears. Burying the food wastes in the center of the pile may help reduce the attractiveness of your compost pile to these animals. Never put meat or fish scraps, fats, oils or dairy products in your compost pile. Nuisance animals may also be attracted to fruit and vegetable scraps. If they are a recurring problem, refrain from adding any food-based scraps to your compost pile. Compost these materials in vermiculture or worm-composting bins. Many Web sites with information about building compost bins also include information on constructing worm-composting bins.

Consult the table above for other common problems and solutions.

Summary

Composting is a good way to recycle garden and kitchen wastes. It improves garden soil by increasing water- and nutrient-holding capacity. Many plans are available for compost bins and systems. A cool compost pile will produce compost slowly, taking a year or more to convert the ingredients. A hot compost pile with an intensive turning and watering schedule can produce compost in as little as a few weeks to months. Compost reduces the volume of material sent to the landfill while providing a valuable soil amendment to improve your garden.

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University of Nevada Cooperative Extension

Fact Sheet-10-15

Getting Started with a Vegetable Garden

Heidi Kratsch, Western Area Horticulture Specialist; Leslie Allen, Commercial Horticulture Program Coordinator; Wendy Hanson Mazet, Master Gardener Program Coordinator

Easy to Grow Vegetable Varieties for Beginners

Bean
- Blue Lake
- Kentucky Wonder

Cucumber
- Spacemaster
- Straight 8

Lettuce
- Buttercrunch
- Red Sails

Pea
- Sugar Snap
- Wando

Pepper
- California Wonder Bell
- Early Jalapeño
- Sweet Banana Pepper

Squash (Summer)
- Early Yellow Crookneck
- Scallop Patty Pan

Squash (Winter)
- Delicata Honey Boat
- Spaghetti

Tomato
- Ace Bush
- Celebrity
- Early Girl

Tomato (Cherry)
- Jelly Bean Grape (Cherry)
- Sugar Sweetie

Planting a vegetable garden is an American pastime that is rapidly regaining popularity. Some people grow their own for economic savings and others for environmental reasons. Many people choose to grow their own for the pure satisfaction of watching their plants grow and develop, and reaping the flavorful benefits of their harvest.

If money is tight, growing some of your own produce may provide your family with tasty, nutritious food for a fraction of the cost. Most people will not have the space or the time to provide entirely for their family's vegetable needs, but growing some of their favorites that do well in our dry climate may help take the 'bite' out of the weekly food budget.

It takes a lot of energy (fuel) to manufacture, process and transport food in our present large-scale agricultural system. A trend towards more local production of fruits and vegetables is on the rise. You can contribute to that movement by growing your own and reducing the miles your food travels. Another benefit is that you will be harvesting and eating your produce at its peak of freshness and flavor.

In northern Nevada, we can grow an abundance of vegetables. We have three seasons during which we can grow food: early spring, summer and early fall. St. Patrick's Day (March 18) is the traditional start to our cool-season gardens. English peas, snow peas, sugar snap peas, sweet peas and spinach can be planted on this day. Wait another month and you can direct-seed most other cool-season crops such as lettuce, Swiss chard, beets and carrots until the end of May. After the last frost in May to early June, you can plant warm-season transplants (small plants started indoors from seed by you or a nursery) such as tomatoes, eggplant, peppers, watermelon and squash.You can plant a second season of cool-season vegetables starting in August. Many of these plants can be harvested well into autumn and will overwinter if protected. Garlic is best planted in the fall for a summer harvest.

PLANNING YOUR GARDEN

Cultivar Selection. The first consideration in planning your garden is climate. Climate affects what you can grow and which vegetable varieties are best for your area. In particular, knowing your *frost-free period* – the average number of days from the date of last spring frost to the date of the earliest fall frost – tells you the window of time you have to grow vegetables that are not frost-tolerant (warm-season vegetables). This information, combined with the *days to maturity* information for each crop you wish to plant, will help you decide on the best vegetable cultivars for your garden. The 'days to maturity' is the number of days required for a particular vegetable variety to grow from seed or transplant to the time of harvest. Different varieties of a given crop differ in 'days to maturity,' and you should choose the varieties that will be successful in your area. In general, our average last spring frost occurs May 15 and our earliest fall frost, Sept. 15. If you've lived in northern Nevada long enough, you know how variable this can be, so plan on a frost-free period of about 90 days to be safe (see sidebar, page 4).

Site Selection. The second consideration is selecting the site for your garden. Generally, choose a site that gets full sun for at least six to eight hours per day. This means planting away from buildings and shade trees. Often, the best place for a vegetable garden is the south-facing side of your property, although an east- or west-facing side can work as well. If full sun is not an option, you might consider growing your vegetables in containers and moving them around to track the sun. Another option is to rent space from a local community garden, which will have the space and light you need for growing your vegetables.

It is important that the site you select for your vegetable garden has access to water. Vegetable plants need a consistent supply of water to support their growth. Plants should never be allowed to dry out or sit in waterlogged soil – these conditions will kill your plants. The site needs to be accessible to a garden hose or, if you prefer, an automated irrigation system. Drip irrigation is commonly used in our area because it reduces water loss from evaporation and delivers waters directly to plant roots, conserving water and reducing weeds.

Vegetable Planting Dates. Planting dates depend upon the plant cold-hardiness. Some vegetables are *very hardy* and can be planted as soon as the soil can be worked in the spring. *Semi-hardy* vegetables can be planted two to four weeks before the average last killing frost date of May 15. Cole crops such as broccoli, cauliflower, Brussels sprouts and cabbage are heat-sensitive, and they grow better in cool weather than in hot weather; they should not be planted after mid-May. *Frost-tender* and *cold-sensitive* vegetables will not survive a frost without some protection; they need to be planted after the last frost date. *Frost-tender* and *cold-sensitive* vegetables can be purchased as transplants, or started from seed in the house mid-March through mid-April for transplanting after the danger of frost is past. Earlier transplanting can be done when hotcaps, row covers or other protection is used.

The dates in the table below are average planting dates for the Reno, Nev. area, and are for direct-seeding into the ground unless indicated otherwise. Since there are many microclimates in the Reno area, planting dates may differ by several days to two weeks. For example, the north valleys average five to 10 degrees F colder than Reno, and planting should be delayed by one to two weeks in these areas.

Succession planting can ensure a continuous supply of produce. For example, by planting a 10-foot row of beans on May 15 followed by another planting two to four weeks later, you can extend the harvest period over the entire season. Succession planting can be done with beans, carrots, broccoli, endive, lettuce, radishes, cabbage, turnips, corn and beets.

EARLY SPRING PLANTING

VERY HARDY VEGETABLES

Plant March 15 to May 1

- Asparagus - crowns
- Broccoli
- Brussels sprouts
- Cabbage
- Garlic - cloves (fall planting best)
- Horseradish - root sections or plants, anytime
- Kale
- Lettuce
- Parsley - plants or seeds
- Peas
- Rhubarb - plants
- Spinach
- Turnip
- Onions - seeds, plants or sets†

SEMI-HARDY VEGETABLES

Plant April 1 to May 1

- Beets - thru June
- Carrots - thru June
- Cauliflower
- Chinese cabbage (late summer planting best)
- Parsnip
- Radish - thru May
- Swiss chard - thru May

- Broccoli - plants
- Brussels sprouts - plants
- Cabbage - plants
- Cauliflower - plants
- Potato - "seed" pieces‡

LATE SPRING PLANTING

FROST-TENDER VEGETABLES

Plant after May 15

- Celery - plants
- Green beans - succession plantings thru June
- New Zealand spinach
- Sweet corn - plants or seeds, succession plantings thru mid-June

COLD-SENSITIVE VEGETABLES

Plant 1 to 2 weeks after May 15 to June 15

- Beans, lima
- Super sweet corn - plants or seeds
- Cucumber - plants or seeds
- Eggplant - plants

- Melons - plants
- Okra
- Pepper - plants
- Pumpkin
- Squash
- Sweet potato - plants
- Tomato - plants

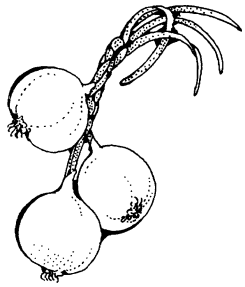
LATE SEASON PLANTING

Plant Mid-July to Sept. 1

- Beets
- Carrots (mid-July)
- Chinese cabbage (late July to mid-August)
- Collard
- Kale
- Lettuce (mid-August)
- Peas (July 1 to mid-July
- Radish (mid-August)
- Spinach (mid-August)
- Turnip (early July)

Plant in October for next summer harvest

- Garlic - cloves
- Onions - bulbs (spring planting best)



†Onion sets are small bulbs, less than 1 inch in diameter.

‡Potato seed pieces are small pieces of potato cut to include at least one “eye.”

Annual Frost-Free Days for Selected Northern Nevada Cities†

Battle Mountain	70 – 115
Carson City	90 – 120
Elko	60 – 90
Ely	55 – 85
Fallon	105 – 130
Fernley	115 – 145
Hawthorne	135 - 180
Lovelock	105 – 140
Minden	75 – 105
Nixon	85 – 115
Reno	90 - 120
Tonopah	110 – 155
Virginia City	105 -140
Wadsworth	105 – 135
Wells	40 – 70
Winnemucca	85 – 110
Yerington	80 – 120
Tahoe	65 – 90

†Based on historical data indicating 90% (first number) to 50% (second number) probability of consecutive days with temperatures above 32°F.

Source: http://www.wrcc.dri.edu/summary/Climsmnv.html

Start small. Finally, if this is your first adventure into vegetable gardening, it's good to start small. An overly enthusiastic gardener may plant more than the family can use, or underestimate the time it will take for thinning young plants, weeding the bed and harvesting the produce. Start with a small area of your yard: a strip of land on the south side of a garage or a sunny space near the patio. You can even tuck a few vegetable plants in your flower beds; just remember not to use herbicides or pesticides in these areas. By starting small, with a few easy-to-grow vegetables, you will increase your chances for success and may become a devoted lifelong gardener.

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University of Nevada Cooperative Extension

Special Publication-00-20
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Water Testing for Private Well Owners

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Water from private wells is not monitored for quality by government agencies. This means you, the homeowner, are responsible for the safety of the drinking water you and your family use. Water testing helps ensure that your water is safe. Don't depend on the results of your neighbor's water analysis to describe your well's water quality because even wells that are close together may draw water from separate aquifers.

Remember, when you take a sample of your water, you are relying on a very small amount of water to give you accurate information about the entire source of water-- for example, an aquifer. If the sample is not taken correctly, you could have either of two kinds of problems. First, if you add contaminants to the sample that weren't there, you could have a false positive, which might lead to unnecessary further sampling or treatment. Second, if you take the sample incorrectly, or do not conform with shipping and storage instructions, you could change the concentration of contaminants, possibly leading to a false negative. In this case, you would miss critical information about the presence of contaminants that could affect your health.

In either case, your sample will only provide you with useful, accurate information if you follow collection, storage and shipping instructions with great care. This publication provides some general guidelines for sample collection, but well owners should discuss collection, storage and shipping directly with the laboratory that will carry out the analysis before collecting the sample.

How often should a water test be done?

A broad range of water tests, such as the routine domestic analysis performed by the Nevada State Health Laboratory, should be done every 5 to 10 years. Additionally, test well water quality every year for nitrate, pH, total dissolved solids (TDS) and total coliform bacteria. Test more frequently if levels of these constituents are close to the drinking water standards.

You should also test your water if any of the following occur:

- Water has an undesirable taste or smell
- Water leaves scaly residues and soap scum, or stains plumbing fixtures or laundry
- Water is cloudy or colored
- Pipes show signs of corrosion
- Water supply equipment wears out rapidly, including pumps or water heaters
- You are considering the purchase of water treatment equipment
- You want to check the performance of existing water treatment equipment
- Anyone in the household has recurrent gastrointestinal illnesses
- You are purchasing a new home, and want to know if the water supply is of good quality
- You have drilled a new well, and want to know if the water is safe to drink
- You are pregnant, are planning a pregnancy or have an infant less than 6 months old
- Your well does not meet construction codes
- Your well is in or close to a livestock confinement area, such as a corral or feeding area

(Continued on page 2)

(Continued from page 1)

- You have mixed or used pesticides near the well, or have spilled pesticides or fuel near the well
- You have a heating oil tank near the well that you know has leaked
- Backsiphoning has occurred
- Your well is located near a gas station or fuel storage tank, retail chemical facility, gravel pit, mining operation, oil or gas drilling operation, dump, landfill, junkyard, factory, dry-cleaning business, road-salt storage area or heavily salted road
- Your septic system absorption field or your neighbor's is close to the well (within 100 feet)
- The area around the wellhead has been flooded or submerged

Where can I get my water tested?

Water may be analyzed by the Nevada State Health Laboratory, or by private labs. If you choose a private lab, it is recommended that only those certified by Nevada Division of Environmental Protection be used when testing water for drinking purposes. See http://ndep.nv.gov/bwqp/lab/labservice.htm for the Nevada Certified Lab List. Click on the SWDA tab to view certified drinking water labs. Cost of the routine analysis will vary with private labs, so ask for rates and turnaround times in advance.

Analysis requires completion of a form from the laboratory. Contact the Nevada State Health Laboratory at 775-688-1335 for information and a form. Water samples may either be delivered or mailed to the lab. Ask the laboratory about the best way to ship the samples so that the quality is not affected.

Sampling procedure for water chemistry analysis

The proper collection, handling and preservation of a water sample is ***crucial*** for an accurate water test. To get an accurate reading of your water's chemical make-up, follow these steps:

1. Contact the laboratory and request an appropriate sample collection bottle.
2. Label the bottle with your name, address and phone number. Use a permanent marker.
3. To ensure an accurate reading, operate your water system long enough to remove water from within the well casing prior to sampling. The length of time needed to clear the casing will vary by the depth and diameter of the well, but generally running the outside irrigation system for 2 to 4 hours is sufficient. Running water outside the house rather than inside will prevent overloading of the septic system. New wells or water systems not in use for several weeks may require longer pumping periods prior to collecting a water sample.
4. After 2 to 4 hours, shut off the outside water. Remove any aerators or screens in the kitchen faucet, and run your tap water for 5 to 6 minutes.
5. Now you're ready to take the sample. Fill the container with tap water according to the instructions from the laboratory and close it tightly.
6. Ship or bring the water sample to the lab. Be sure to include the standard form and mark the types of contaminants you want tested. Also, be sure to follow shipping and storage instructions from the laboratory exactly.

Testing for total coliform bacteria

Testing for total coliform bacteria should be done at least once annually, or:

- If there is any noticeable change in water color, odor or taste. However, don't depend on changes in color, odor or taste to indicate bacterial contamination! Water contaminated with bacteria will often smell, look and taste normal.
- If flooding occurs near a well or the wellhead has been flooded for any reason.
- If anyone who has consumed the water becomes ill from a suspected water-borne disease.
- If there has been any maintenance of the water supply system.

This test measures contamination of drinking water by fecal material from humans and other warm-blooded animals. It may also indicate the presence of soil and plant material contamination. Bacteria in water can be a serious health problem. If the test confirms the presence of coliform bacteria, it indicates the supply is unsanitary and may contain disease-causing organisms. At a minimum, you should re-test your water to be sure that the results of the test are accurate and bacteria are present. In any case, take action to decontaminate and re-test your well before drinking coliform-positive water.

(Continued from page 2)

Sampling procedures for total coliform bacteria

1. Prior to taking a sample, contact the lab and obtain a sterile sampling bottle.
2. To prepare for sampling, follow steps 3 and 4 for a routine water analysis as described above.
3. The sample vial contains a preservative. Do not open the bottle until you are ready to take the sample, and do not rinse the bottle prior to collecting the sample. Wash your hands before taking the sample.
4. When you are ready to take your sample, carefully twist off the lid of the vial, fill with water above the indented fill line on the shoulder of the bottle, but not to the very top of the bottle's lip. If you do not fill the bottle to above the indented fill line, the lab cannot run the analysis. Hold the lid by the outer surface while filling the sample container to avoid contamination.
5. Re-cap the vial tightly, label it and keep the sample refrigerated or in a cooler for transportation to the lab. Whenever possible, get samples to the lab immediately.

Interpreting your water analysis results

Congress passed the Safe Drinking Water Act in 1974. It requires the U.S. Environmental Protection Agency (EPA) to set limits or standards for contaminant concentrations that may pose a health hazard in public drinking water. There are two categories of drinking water standards: Primary or Maximum Contaminant Level and Secondary or Secondary Maximum Contaminant Level. Primary standards (**Table 1**) are the highest allowable concentrations of contaminants based on health considerations. Secondary standards (**Table 2**) regulate contaminants that cause offensive taste, odor, color, corrosivity, foaming and staining.

Primary and secondary standards do not apply to individual private wells, but serve as a guide to ensure safe drinking water for these systems. **Table 3** provides the "action" levels for lead and copper, which are guidelines to trigger preventive measures. Additional information included on the lab analysis form is shown in **Table 4**. These values are obtained during laboratory testing procedures. They provide information about the water's suitability for a particular use.

Table 1. Primary Standards Approved by the Nevada Division of Health

Contaminant	Maximum Contaminant Level
Arsenic (As)	0.01 ppm [1]
Barium (Ba)	2.0 ppm
Fluoride (F)	4.0 ppm
Mercury	0.002 ppm
Nitrate (N)	10.0 ppm
Turbidity	1.0 turbidity units
Coliform/Fecal Coliform/E.coli	cannot be present

[1] ppm = parts per million

Table 2. Secondary Standards Approved by the Nevada Division of Health

Contaminant	Maximum Contaminant Level
Chloride (Cl)	250.0 ppm [1]
Color	15.0 color units
Copper (Cu)	1.0 ppm
Fluoride (F)	2.0 ppm
Iron (Fe)	0.3 ppm
Magnesium (Mg)	150.0 ppm
Manganese (Mn)	0.05 ppm
pH	6.5 -8.5
Sulfate(SO4)	250.0 ppm
Total Dissolved Solids (TDS)	500.0 ppm
Zinc (Zn)	5.0 ppm

[1] ppm = parts per million

Table 3. Lead/Copper Action Levels

Contaminant	Action Level [1]
Copper (Cu)	1.3 ppm [2]
Lead	0.015 ppm

[1] If your first-draw sample exceeds these levels, consider the need to take preventive action.
[2] ppm = parts per million

To learn more about individual contaminants, go to the EPA's drinking water Web site at www.epa.gov/safewater/

Table 4. Additional Water Characteristics

Characteristic	Consideration
Bicarbonate (HCO3)	
Calcium (Ca)[1] [2]	High levels increase pH in water and soils
EC (Electrical Conductivity)	Measures salt concentration of water in umhos/cm 0 to 400 excellent 400-8,500 satisfactory over 8,500 objectionable
Hardness	0 to 75 ppm [3] soft 75 to 150 ppm moderately hard 150 to 300 ppm hard over 300 ppm very hard
Magnesium (Mg)[1] [2]	Laxative effect, quickly adjusted to by newcomers
Potassium (K)[2]	Plant nutrient, adds to TDS. Consult personal physician for health application
Sodium (Na)	Consult personal physician for health application

[1] Used to calculate hardness

[2] Required for plant growth. Influence on humans or livestock from concentration in water not available. No known health risk.

[3] ppm = parts per million

Finding a Certified Water Testing Laboratory

Nevada Division of Environmental Protection, Bureau of Safe Drinking Water overseas the certified drinking water laboratory certification program. A list of certified labs can be found at http://ndep.nv.gov/bsdw/labservice.htm. . Click on the Nevada Certified Lab List link or call 775-687-9507. For more information about safe drinking water, call the Bureau of Safe Drinking Water at 775-687-9520 or see http://ndep.nv.gov/bsdw/wells.htm.

When you call a laboratory, be sure to ask about proper sampling technique, including sampling containers, sample storage and shipping procedures, cost and turnaround times. For help in interpreting results, see UNR's Water Test Interpreter, http://ag.unr.edu/water/interpreter/.

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