Chapter 3 LANDSCAPE MANAGEMENT

Why Should I Be Concerned?

Landscaping, gardening and lawn care can improve the beauty and value of your home and be a part of a healthy lifestyle. Pesticides, fertilizers, and water play an important role in maintaining a successful lawn and garden. Pesticides control undesirable weeds, insects, diseases, and rodents; fertilizers increase the fertility of the soil to enhance the growth of plants; and of course water, is essential for the very life of the plants a homeowner is growing. However, over-application or misuse of fertilizers, pesticides, and even irrigation water can affect the quality of lake and groundwater supplies.

Most residents want to have well-kept homes with attractive landscape plants and a green lawn. These residents may spend a lot of time and money to achieve this ideal and the number of products and lawn care and landscaping services increases each year to meet the demand. Proper applications of lawn and garden products generally pose few problems. In fact, a properly maintained home landscape can help reduce soil erosion, conserve water and improve soil fertility. Alternately, poor maintenance — either through neglect or excessive chemical applications — can lead to soil problems, polluted runoff and groundwater contamination. This chapter will help you identify, evaluate and reduce the pollution risks of yard and garden care practices on your health and the environment including:

- Fertilizer needs and application
- Pesticide use and Integrated Pest Management (IPM)
- Water conservation
- Composting

Improving Lawn and Garden Management

Your lawn is something you can be proud of! For most homeowners, it is an attractive part of their land-

Assessment – Reducing Pollutants from the Landscape

Use the table below to rate your risks related to your landscape management and maintenance. For each question, check your risk level in the right-hand column. Some choices may not be exactly like your situation, so choose the response that fits best. Then look to the appropriate section for tips.

	Low Risk	Medium Risk	High Risk	Your Risk
Fertilizers	Apply <1lb. of nitrogen per 1,000 square feet, two to three times per year. Have my soil tested at least every 3 years. Only apply phosphorus based on soil test recommendations.	Soil hasn't been tested within last 5 years. Apply >1lb. of nitrogen per 1,000 square feet, and phosphorus as part of a complete fertilizer containing nitrogen, phosphor-us, and potassium, (e.g.13-13-13).	Apply unknown amounts of nitrogen and phosphorus over lawn four or more times per year. Have never had my soil tested.	❒Low ❒Medium ❒High
Pesticides	Nonchemical methods used to control pests	Low chemical methods used to control pests only when needed (IPM)	Chemicals used without regard to label instructions or conditions. Buy whatever is cheapest.	❒Low ❒Medium ❒High
Lawn (turf) type and maintenance	Turf grass suited to soil type, available sunlight and climate. Pest resistant grass preferred. Mowed to proper height.	Native unimproved grasses exist. Mowed to proper height, but not proper frequency.	Grass type not suited to available light, soil or climate. Grass type is pest-prone. Mowed to less than 1 inch in height.	❒Low ❒Medium ❒High

Groundcover and other plants	Groundcover, flowers, trees and shrubs planted to reduce soil erosion. Plants resist disease and insects.	Yard has small areas with soil erosion. Plants require chemical pest control to maintain good appearance.	Yard has large areas with soil erosion. Plants require insect and disease-fighting chemicals to survive.	❒Low ❒Medium ❒High
Composting	Compost pile well-maintained, contains yard waste and vegetable food scraps.	Compost pile poorly maintained (such as not aerated, or lacking the proper mix of materials). Dog, cat and other pet wastes added to pile.	Compost pile poorly maintained, contains excessive high- nitrogen material and located less than 50 feet from shallow well or surface water.	❒Low ❒Medium ❒High
Water requirements of plants	Grass, flowers, trees and shrubs able to survive with normal rainfall.	Landscape plants require light to moderate watering.	Heavy watering required to keep lawn and other plants alive.	❒Low ❒Medium ❒High
Watering methods	Watering done in early morning only as needed. Low water-use device used (like soaker hoses or drip irrigation). Sprinkler systems on manual control.	Watering done in the evening with hose or hose sprinkler. Some water run down drive and property.	Watering done during heat of the day. Sprinkler system used without regard to weather conditions or lawn appearance.	❒Low ❒Medium ❒High

scape. In fact, a healthy, dense turf lawn can add value to your property, help to tie together your home and other landscape plants, and improve your living environment. On a hot day, your lawn reduces the glare of the sun and keeps surrounding areas cooler. On windy days, your lawn protects the soil on your property from erosion and evaporation.

Some homeowners intensively manage their lawns and gardens by using large quantities of chemicals. But, when used incorrectly, pesticides, fertilizers, and irrigation water may adversely impact the quality of the lake. To protect the quality of water resources and the surrounding environment, you should use lawn care best management practices (BMPs) which are defined as strategies that are compatible with sound turf management and eliminate or minimize pollution.

Part 1 – Fertilizer Needs and Application

Why should homeowners be concerned about fertilizer use on lawns and gardens?

Some homeowners use a larger quantity of fertilizer on their lawns and gardens than is really needed. Fertilizer over use or misapplication may cause:

- Nutrients to wash into the lake or nearby water ways
- Excessive algal growth
- Depleted dissolved oxygen
- Loss of sportfish populations
- Increased treatment costs for drinking water supplies
- Decrease in aesthetic value of the lake

So what fertilizer does your lawn or garden need? Nitrogen (N) is the key plant nutrient for building a thick green lawn. Nitrogen is one nutrient that is extremely difficult to measure; therefore, homeowners need to use products with nitrogen judiciously. Do not apply more than 1 pound of nitrogen per 1,000 square feet and never apply more than three times a year. When applied at the right time and in the right amount, fertilizers supply the nitrogen your lawn needs. A basic fertilizer containing slow-release nitrogen and other essential nutrients is the most environmentally safe and cost-effective. At least 30 percent of the nitrogen on the fertilizer package should be listed as slow release. This fertilizer usually costs more but you apply it less often. If you apply fertilizer at the wrong time or in the wrong amount, insect and disease problems can get worse. For instance, chinch bugs, sod webworms,

nematodes and brown patch may increase if you overstimulate your lawn with soluble nitrogen. Too much nitrogen also causes excessive growth that can increase maintenance costs. If you apply too much fertilizer it can also be washed away before the grass takes it up, carrying nutrients into nearby streams, lakes and rivers.

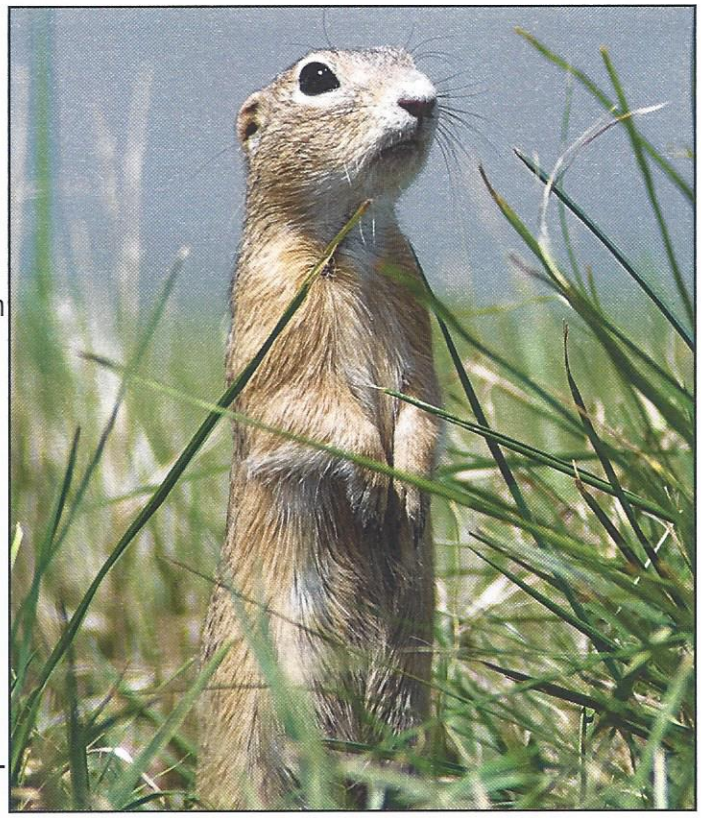
Phosphorus (P) is an important ingredient for the energy processes inside plants and grasses and for root growth during establishment, but it is needed at much lower levels than nitrogen. Based on data from the University of Arkansas Soil Test Laboratory, approximately 86 percent of lawn soils in Arkansas have enough phosphorus to sustain optimum turf growth. Therefore, fertilizers with low or no phosphorus should be used on these lawns. If excessive amounts of phosphorus are applied to lawns, excess can carried in stormwater or irrigation runoff down to the lake. However, when applied according to soil test recommendations, there is little risk of phosphorus lawn applications contaminating surface or groundwater supplies except when fertilizer is incorrectly applied onto impervious surfaces (driveways, sidewalks, etc.) or in cases where soil erodes. Before rain washes away excess fertilizer, sweep it from walks, driveways and patios back onto the lawn and remember that a dense lawn is your best defense against runoff and erosion.

If you hire a lawn and garden care service, insist that fertilizers only be applied when the weather is favorable — preferably when rain is not expected for at least 24 hours. Rainfall, however, can be tricky to predict. Be sure to keep children and pets away from treated lawns for at least 24 hours following the application. Lightly water in fertilizer applications. Nonchemical fertilizers, such as compost and fish meal, and other soil amendments also should be applied based on the needs of your lawn according to your soil test recommendation.

Fertilizer Management for Lawns, Gardens and Landscaping Beds

Fertilizer should be added only in the amounts needed, at the appropriate time, and in a form that makes the nutrients available to plants. BMPs for fertilizer management should include the following:

- Test your soil. The results of the test will help you determine what kind and how much fertilizer you need to apply to keep your lawn healthy. Soil testing is a free service offered through your county Cooperative Extension Service.
- Use fertilizers that slowly release the nutrients. By using slow release fertilizers, the lawn is fed slowly so there is no excess fertilizer to leach into groundwater that you pump for your drinking water. Also, using slow release fertilizer eliminates the risk of burning the grass.
- Most soils in Arkansas have adequate amounts of trace elements, such as copper, manganese, nickel, and zinc to meet lawn needs.
- Build a healthy soil. Add organic matter, such as compost to enhance the structure, aeration, and nutrient and water-holding capacity of the soil. Organic matter can also be added by growing winter cover crops. Also, try to supply needed nutrients using organic fertilizers, such as composted manure, cottonseed meal, bone meal, blood meal, and greensand. Most gardening shops have these types of fertilizers. If not, you can order from gardening retailers that specialize in providing organic fertilizers and pesticides.
- Apply fertilizers properly. Based on your soil test



and plant needs, apply the proper rate of nutrients and apply it at the correct growth stage of the plant. Overfeeding plants can be as detrimental as underfeeding, but this risk can be reduced if organic fertilizers are used, because the nutrients are released slowly. Synthetic fertilizers are also useful, as they can provide readily needed nutrients. Just be sure not to over-apply nutrients as they can be washed into the lake with the next rain storm event.

Integrated Pest Management (IPM) is simply a systematic, holistic approach to controlling pests in your landscape.

Part 2 - Pesticide Use and Integrated Pest Management (IPM)

Some landowners use a large quantity of pesticides on their lawns and gardens. Pesticide over use or misapplication may cause the following:

- Harm or kill beneficial insect and earthworms associated with your landscape
- Harm wildlife and pets that come in contact with your lawn or garden
- Result in chemical runoff during rainfall or irrigation into the lake and nearby water resources
- Leach through the soil directly into ground water which is used for drinking water
- Accumulate in the soil and become toxic to the plants you are growing
- Create pest resistance to the applied chemicals so that they will be very difficult to control in the future.

Your garden is a complex ecosystem of plants, animals, insects, birds, fungi, worms, and microorganisms such as bacteria. All ecosystems have three basic interacting categories of organisms:

- Producers: which are green plants that convert sunlight, carbon dioxide, and water into energy for plant growth
- Consumers: which are organisms that feed on live plant or animal material
- Decomposers: which use dead plant and animal material for energy

A healthy garden ecosystem will have a balance among producers, consumers, and decomposers. If there is an imbalance, symptoms such as plant disease or an increase of damaging pests may result. An imbalance in the ecosystem can be caused by improper applications of pesticides, fertilizers, and water or by removing organic matter, such as leaves, from the garden. By using gardening BMPs, you will reduce the potential for gardening problems and thus the need for chemical controls. By reducing the use of chemicals, the risk of contaminating your drinking water is also reduced.

Integrated Pest Management (IPM) is simply a systematic, holistic approach to controlling pests in your landscape. Although the use of nonchemical controls is preferred, chemicals may be used selectively if nothing else works. Weeds can be controlled by hand-pulling or hoeing, and bugs can be removed by picking them off vegetables and garden plants. Clean up dead leaves and debris before they become a home to pests. The lady beetle (ladybug), green lynx spider, praying mantis and green lacewing feed on other insects. Pesticides are often used on pests which, if left alone, would never have become a problem. Not killing all of the destructive insects helps maintain a food source for beneficial insects and organisms that provide natural, biological control. Planting a variety of flowering plants in the landscape may also increase the population of beneficial insects.

When you have no other choice, try to find nontoxic or low-toxic chemicals such as insecticidal soaps. Follow directions carefully and mix only the amount you need. Some pesticide labels give directions only for mixing 1 or more gallons of spray. Use the conversions in the table below for mixing smaller quantities:

Handy Conversions for Small Amounts of Pesticides

1 teaspoon (tsp)/gallon	= 1/4 tsp/quart
1 tablespoon (tbsp)/gallon	= 3/4 tsp/quart
2 tablespoons	= 1 ounce (oz.)
3 teaspoons	= 1 tablespoon

Be sure to treat just the affected plant(s). On lawns, spray the affected area and a 5-foot buffer area around it. Blanketing the lawn or landscape with pesticides is wasteful and could damage the environment. Pesticide overuse can kill beneficial organisms and insect predators. And the beneficial insects rebound slower than the pests! For IPM to work, you have to give more time and attention to your yard and garden. For instance, regular monitoring helps you detect pest problems early.

Pest Management for Lawns

Many pests attack lawns. These pests fall under four broad categories: weeds, insects, diseases and other pests.

Weeds: Weeds simply are plants growing in the wrong place. In the case of your lawn, a weed is any plant that is not the variety of grass that you've seeded or sodded to produce your lawn. There are many weeds common to lawns. Most of these weeds can be easily eliminated from your lawn by using management options that discourage the competition from weeds. These options include mowing to the proper height, not over fertilizing or watering. Chemicals are also an option and the ones that kill weeds are called herbicides.

Insects: Several dozen different insects live in your lawn at any one time. Most of these insects are harmless and in fact, many insects are actually beneficial. These beneficial insects prey on insect pests that harm your lawn. Chemicals applied to lawns to kill insects are called insecticides.

Diseases: Lawns are susceptible to several different diseases. Many of the diseases that attack lawns are caused by improper management by the property owner. Some potential management problems include improper watering and fertilization, lack of thatch removal, and choosing the wrong grass type for the climate. Chemicals that are applied to lawns to control disease problems are usually called fungicides.

Other pests: Several categories of non-insect pests can also attack lawns. These include rodents (moles and gophers), nematodes, snails, slugs, and ants. Chemicals used to kill rodents are called rodenticides, while chemicals used to kill nematodes are called nematocides.

The Principles of IPM for Lawns Include:

- Know what is in your lawn – Properly identify weeds, insects, pests, disease problems, and your grass type (bluegrass, fescue, etc.) so you can choose the proper solution to your problem.
- Use the least toxic solution to your problem. For example, consider hand-pulling weeds, changing water management practices instead of using fungicides to control diseases, and live with a low level of plant damage.
- Use pesticides carefully! Be sure to match the pesticides with the problem, follow label directions, use the correct application rates, buy only what you need, and if possible spot treat rather than treat the entire lawn.
- Store and dispose of pesticides properly. Buy pesticides in small quantities, store it in a secured area away from your water well and dispose of the material safely through a licensed household hazardous waste collection service.
- Use water wisely on lawns. Over-watering may cause pesticides to leach and contaminate the groundwater you use for drinking water.

Pest Management for Gardens

It is best to try to not use pesticides as beneficial insects may be killed along with the pests you are trying to control. The following pest management BMPs will help keep your garden ecosystem healthy:

- Create a garden with diversity. Plant a combination of different types of plants to create a balanced ecosystem and in general, rotate vegetable garden plants each year to outsmart potential pests and minimize the threat of soil borne diseases.
- Maximize conditions for healthy plant growth. Choose plants that are suited for your climate and are resistant to diseases in the area. Group plants according to water and light requirements and space them to allow ample root and top growth at maturity.
- Protect and use beneficial insects. Develop garden habitats to ensure a healthy environment for beneficial insects. Also, learn to recognize the eggs and larvae of beneficial insects so as to not harm them.
- Use the least toxic solution for your problems. Some low toxic methods to solve problems include biological controls, insect traps, or mechanical means to remove

pests. Also, learn to live with a low level of plant damage.

- If you do choose to use pesticides, use them carefully! Identify the insect and weed pests and select the appropriate chemical. Also, buy only what you need and be sure to follow label directions.
- Store and dispose of pesticides properly. Store any extra in a secured area, and if you need to dispose of these chemicals, take it to your locally organized household hazardous waste collection. Refer to Chapter 6 for more information on the proper storage and disposal of these household hazardous products.

Part 3 – Additional Landscape Management Considerations

Are You Taking Proper Care of Your Lawn?

It will be easier to keep your lawn healthy if your grass is suited to local growing conditions including rainfall, temperature, soil type and available light. Cutting the grass to the right height is important; lawns cut too short invite weeds. Mow often enough so that you remove no more than one-third of the grass blades per mowing. Keep your mower blades sharp. A dull mower blade makes a ripping cut, creating two or three large wounds on each grass blade. The larger the wounds, the greater chance of the grass becoming diseased.

Grass clippings should be left on the lawn – in many cases clippings supply enough natural fertilizer so that only minimal additional fertilizer is needed to keep your lawn green and healthy. You should collect clippings, however, if you are trying to prevent the spread of lawn diseases. Switching to a human-powered mower can cut down air and noise pollution. If you reduce your lawn size and grow plants that require little maintenance, such a mower can be practical.

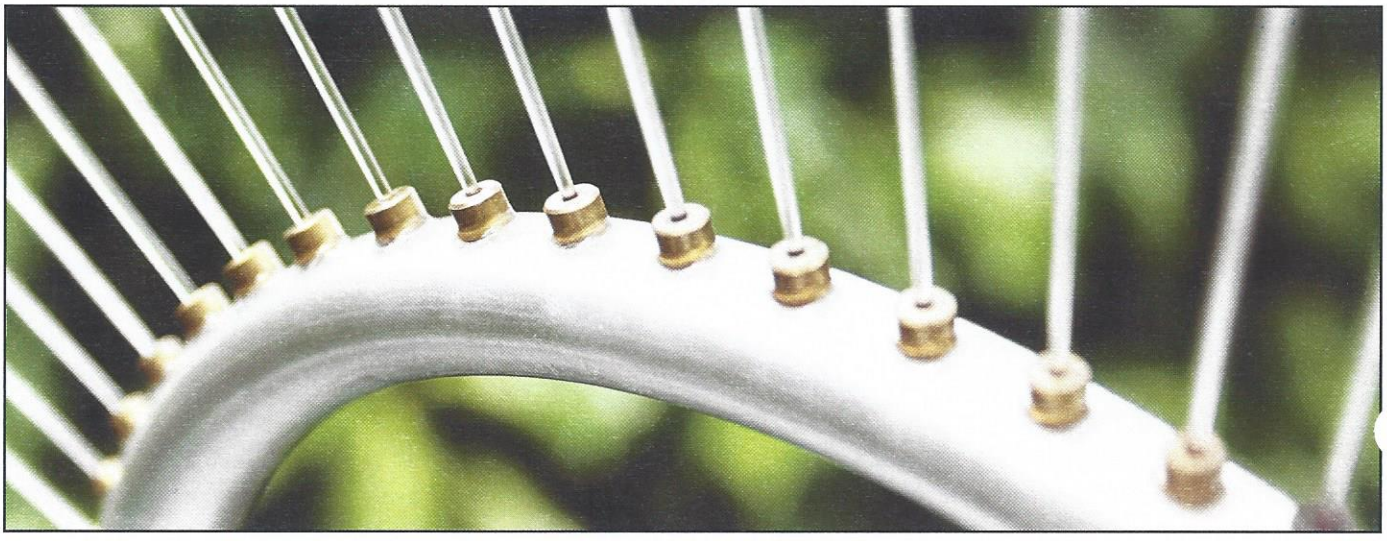
Water Consumption

The average American uses around 100 gallons of water each day. About half of that water may be used for landscaping and gardening, depending on climate and time of year. This is an immense amount of clean water — and your plants need only a small portion. Consider using rain barrels or cisterns to capture and store roof runoff. Don't let that free, valuable rainwater escape as runoff. Instead store it and meter it out slowly through drip irrigation to water your landscape beds.

Go Native!

If you convert your landscape plants to ones adapted to the local climate, you will take the biggest step in conserving water. Fortunately, Arkansas' climate supports countless plant varieties; local plant nurseries grow many of these. Once native and drought-tolerant plants are established in the right location, most require little, if any supplemental water, fertilizers and pesticides.

Perennial flowers conserve water because their roots grow deeper than annual plants and require little or no watering once established. A 2-inch layer of leaves, compost, wood or bark chip mulch over bare soil will reduce stormwater runoff and keep water from evaporating. (See the section on Landscaping and Site Management to Control Runoff in Chapter 2).



Watering Wisely

Because most plants can tolerate at least short dry periods, watering should be timed to meet the biological needs of the plants. Watering slowly and deeply (1"-1 1/2") helps develop deep roots; in the long run your plants will need less frequent watering. The plants that seem to benefit most from shallow watering are the ones you don't want—weeds. Plants can absorb only so much water. Overwatering wastes water and can injure certain plants.

Drip irrigation systems and soaker hoses deliver their water to the intended plants efficiently. By choosing and operating a watering system correctly you can reduce water bills, fungal diseases and maintenance requirements. If you have an automatic sprinkler system, install a rain shut-off device or sensor that will override the system when adequate rain has fallen.

Plants can absorb only so much water. Overwatering wastes water and can injure certain plants.

For best results, water in the early morning (4 a.m.-7 a.m.) when temperature and wind speeds are at their lowest and evaporation is reduced. Grasses will be less susceptible to fungus if you apply water at the time dew normally forms.

For grass watering, apply 1" to 1 1/2" of water when the grass shows signs of distress (bluish-gray color, folded leaf blades). Don't water anymore until the symptoms reappear. Gradually reduce watering to see if plants can tolerate less water. There is usually very little need for watering from fall through spring, and you should always turn off automatic systems if rainfall is consistent.

Irrigation Water Management for Lawns

Water is a precious, limited resource and we need to not only watch how we water lawns to prevent the leaching of chemicals into groundwater, but we also need to be sure we do not waste it by over watering. Both your lawn and water bill can benefit by using the following BMPs for lawn watering:

- Apply water only when your lawn needs it. Turf needs water when it begins to wilt from dryness (color dulls and footprints stay compressed for more than a few seconds) or about a couple times a week. When you do water, water slowly and apply about an inch of water, then let the lawn dry out before watering again. Be sure to water during times when evaporation is lowest, for example, in the early morning.
- Avoid over watering. Avoid this at all times, but especially after applying fertilizers and pesticides. Too much water will allow the chemicals and nutrients to leach past the grass root zone into groundwater or cause the applied products to runoff into the lake.

Irrigation Water Management for Gardens

Excess water use may result in nutrients leaching below the root zones into the ground water that is used for drinking water. Excess watering can also leach pesticides into ground water. Some water management BMPs are:

- Reduce the need for watering by mulching. Mulches not only show the evaporation of water from the soil surface but also can improve a soil's water-holding capacity, keep the soil cooler on hot summer days, reduce weed growth, and help prevent soil erosion. Examples of organic mulches include grass clippings, leaves, and straw. Inorganic mulches may also be used and examples are permeable sheeting and/or rock. Keep in mind that rocks can form undesirable heat sinks.
- Reduce the need for watering by improving soil structure. Each year be sure to add organic matter such as compost, grass clippings, tilled in cover crops, and other dead plant materials.
- Irrigate only when the plants need water. Check whether the soil is dry several inches below the surface. If it is dry, then water, but water slow enough so that it soaks into the root zone and does not run off the soil surface. The depth of the root zone depends on the plant, but in general this is 6 to 18 inches deep. If possible, use a drip irrigation system to conserve water.

Do You Make Compost?

From an environmental point of view, yard wastes account for up to 20 percent of the total municipal waste

generated year-round. Composting is a cost-effective, natural way to handle leaves, clippings, vegetable scraps and other yard wastes resulting in a high-quality, soil-enhancing material.

Composting takes advantage of nature's recycling system for breaking down plant and other organic materials. You can simply put yard wastes in a pile, or install homemade or store-bought bins. In addition to yard waste, you can add vegetable trimmings and fruit peels from your kitchen. Your compost pile will remain relatively odor-free if you turn and water it regularly. Composting can take as little as 4 to 6 weeks or as long as 1 to 2 years, depending on the size and type of material in the pile and the amount of attention you give it.

Finished compost is valuable. It can be mixed into garden soil or spread on lawns and landscape plants as a slow-release source of nutrients. Adding compost 1) improves soil structure, texture and aeration and increases the soil's capacity to hold water; 2) helps loosen compacted soils; 3) promotes soil fertility and stimulates root development in plants; and 4) creates a favorable environment for microorganisms and larger creatures such as earthworms and insects that are nature's "soil builders."

One word of caution: Animal manures contain high levels of nitrogen, and different types of animals have different levels. If manure is left in piles exposed to the weather, nitrogen-rich runoff may result. If you mix manure from horses, sheep, cows or other plant-eating animals with your compost, be sure to add plenty of leaves, straw, rotted sawdust or pulled weeds to keep concentrations of nitrogen and other nutrients low. This will help prevent contamination of groundwater.

Do not put pet wastes (from cats and dogs) in compost piles because of potential parasite and disease problems. Also, never place meat, animal fat or dairy products in the compost pile. Try to locate piles at least 50 feet from surface water, drainage ditches, creeks and storm drains.

In Arkansas, you can receive more information and training on composting from the Master Gardener program through Cooperative Extension Service offices. These horticulture-trained volunteers are available to consult with you on how to set up a compost bin and get you started.

This chapter was written by Marc Teffeau and Ray Bosmans, University of Maryland Cooperative Extension; Sidney Park-Brown and Susan W. Williams, University of Florida Cooperative Extension. It was adapted for Beaver Lake *LakeSmart* by Katie Teague, University of Arkansas Division of Agriculture Cooperative Extension Service.