



YARD

Sustainable Landscaping

no. 7.243

By J. Boussetot, K. Badertscher, and M. Roll† (4/05)

Quick Facts...

When designing a garden keep in mind that if the long-term goal is to create a sustainable landscape, success is accomplished through a series of short-term goals.

The proper design will be unique to a specific site and should be based on a careful review process.

Identify what inputs are currently excessive.

Develop a budget and timeline that are realistic and celebrate the accomplishment of each short-term goal.

What does sustainable landscaping mean? There are varying definitions but sustainable landscaping should include an attractive environment that is in balance with the local climate and requires minimal resource inputs, such as fertilizer, pesticides and water. Sustainable landscaping begins with an appropriate design that includes functional, cost efficient, visually pleasing, environmentally friendly and maintainable areas. For additional information, see fact sheet 7.220, *Colorado Gardening: Challenge to Newcomers*.

There are short-term as well as long-term goals for a sustainable landscape. For example, a short-term goal may include saving water or implementing and using a compost bin. Composting locally grown crops and kitchen waste and returning it back to the garden increases the organic matter in the garden while recycling nutrients within the landscape. See 7.212, *Composting Yard Waste* for more information on composting techniques.

A long-term goal may be to create a more self-sustaining garden. This includes all aspects of total plant health care, proper plant selection, reduced inputs and maintainability.

Soils, Composting and Fertilizers

Amending soils greatly depends on what is being planted. Native plants adapt to local soil conditions and do not greatly benefit from soil amendments except in soils with high salt content, which occur frequently on the Western Slope. However, many non-native plants and natives establish quickly and develop a healthier root system with the addition of soil amendments.

Much of Colorado has heavy, clay soils due to a lack of organic material. Clay texture leads to poor water and oxygen penetration—necessities for healthy roots. Add organic material to increase soil permeability, aeration, and drainage.

Changing the structure on the top 8 to 12 inches of the soil is a slow process. Some organic material, such as grass clippings, decomposes quickly and does little to change soil structure. Other organic amendments like coarse grade sphagnum peat take years to decompose but add little nutritional value. Garden soil that offers good water retention and both oxygen and water permeability (loam texture) may take 10 or more years to create. Do not add too much organic matter too quickly or it can compound a soluble salt problem. Incorporate no more than 3 cubic yards of organic matter per 1,000 square feet per year. For more information on soils, see fact sheet 7.840, *Vegetable Garden Soil Management and Fertilization*, 0.507, *Soil, Water and Plant Testing*, 7.235, *Choosing Soil Amendments*, and 7.236, *Landscaping on Expansive Soils*.

Base fertilizer applications on a soil analysis and specific plant requirements (see 0.500, *Soil Sampling*). Many annual flowers or bedding plants and vegetables have a higher nitrogen and phosphorus requirement than herbaceous perennials,



Putting Knowledge to Work

© Colorado State University
Cooperative Extension. 3/05.
www.ext.colostate.edu

Proper Design

As part of the landscape process, answer the following questions:

- How will the space be used?
- What are the plant and landscape needs?
- What are the site conditions? Is there a need for renovation?
- What is the timeline and what is the budget?
- How much time will be needed to maintain the landscape? Is it maintainable?
- Where are inputs too high?
- Visually, what look is trying to be achieved?

Landscape design begins with an understanding of the future use of the property. Furthermore, lot size, house size, local covenants and budget all play into the design planning process. Hiring a professional landscape designer can aide with the construction process and plant selection. The design process generally includes a base plan, site inventory and analysis, construction documents, implementation, and maintenance.

Implementation sequence:

- Obtain permits and locate underground utilities.
- Clear the site of any debris, old sod, weeds, etc.
- Create a rough grade and identify major drainage issues.
- Install drainage system if needed.
- Construct masonry and wood projects.
- Incorporate soil amendments.
- Install metal or wood edging and create shrub borders and planting areas.
- Install sprinkler heads and drip irrigation.
- Plant all one gallon containers or larger including balled and burlaped or bareroot material.
- Install bedding plants, ground covers and turf areas.
- Maintain the landscape.

shrubs and trees. Some native plants can actually decline from too many applications of fertilizers. Most have lower nitrogen and phosphorus needs, having adapted to the lower fertility conditions of Colorado native soils.

Irrigation

Every year a portion of Colorado is in, or on the verge of a major drought. Average annual moisture for the Denver Metro area is approximately 12 to 14 inches or slightly more given proximity to the foothills. The Front Range is a high plains desert with the San Luis Valley, Arkansas Valley and the Western Slope offering even drier conditions. Therefore, water conservation is essential. Prevent water loss through evaporation by using mulches. Add 3 to 4 inches around flower beds and under trees but avoid mounding mulch next to the trunk.

Group plants that have similar water requirements. If the plants in a grouping have different water requirements, the tendency is to accommodate those plants with a higher need. This practice negates any water saving benefit you might have achieved by planting the low-water plants.

Using technology to reduce water loss via evaporation or even poor design is also an important rule of sustainable landscaping. The homeowner may wish to consult with a certified irrigation technician or a certified landscape irrigation auditor and request a water audit of existing systems. Irrigation specialists can create appropriate designs using appropriate technology. For difficult-to-manage situations, consider drip or subsurface irrigation. If a system has been used for more than five years, newer technology is available including evapotranspiration (ET) controllers, soil sensors and refined control panels.

Even if the system is new, irrigation heads may need realignment and adjustment to prevent overspray onto the sidewalk or street. Sprinkler layout is important and the pattern of irrigation heads should be in triangles or squares. Irregular patterns will create dry areas interspersed with overly wet areas. Sustainable landscaping means using water appropriately and avoiding waste.

Hardscape Selection

The choice of building materials within the landscape is extensive. Some materials may be reused and others should be avoided due to negative environmental fate. For example, reusing broken concrete to erect retaining walls is good because it may lend visual excitement and reduce the amount of the material going into the landfill. Also, new recycled plastic material also may be an appropriate choice. However, an example of inappropriate material may be reusing creosote impregnated railroad ties to build a raised bed. This is bad because the chemicals used to treat the wood are not safe to grow food crops near.

Plant and Turf Selection

Select the right plant for the right space in order to thrive. Plants that are not adapted to the local environment require more inputs than well-suited selections. Plants placed in environmental conditions (lighting, moisture, temperature, etc.) that do not meet their requirements become stressed. Stressed plants are more prone to pest problems. Plants suited to our environment, whether native or exotic, have a better chance of surviving our conditions. Native species are able to tolerate the local conditions where they evolved but not all Colorado natives adapt to all soils and environments found in the state. Another commonly overlooked aspect of plant selection is the mature size of the plant; again match the plant to the growing space.

Limit the amount of irrigated turf within a sustainable landscape to the recreational needs of the homeowner. Consider using drought-tolerant, slow growing turf.

Dealing with Diverse Sites

Additional information about the design sequence is available in the Rocky Mountain Landscape Design Guide. This guide was co-produced by Colorado State University Cooperative Extension, Colorado Greenhouse and Nursery Association and the Associated Landscape Contractors of Colorado. It is available at the Cooperative Extension Resource Center. Call (970) 491-6198 for ordering information.

Plant for Shade

Use deciduous plants to create shade in the summer to help cool the home, while allowing light penetration in the winter as solar heating. Avoid evergreen trees close to the home because they create shade year round and block solar radiation during the winter.

South facing parts of the house receive the most intense sunlight; east and west exposures get morning and afternoon sunlight respectively; and north facing will receive the least. Therefore, shading the south side will contribute the most for summer cooling, followed by shading on the west side for afternoon cooling and shade on the east side for morning cooling. See 7.225, *Landscape for Energy Conservation* for further information.

Often two or three large deciduous trees can provide sufficient summer shading for single family homes. Plant the trees far enough from the house foundation to avoid any problems with root watering, but close enough that the canopy hangs over the house. Because the sun is directly overhead in the summer, little shade will be cast outside of the tree canopy. Give careful consideration when selecting tree types. Avoid fast-growing species that are weak-wooded and easily break in wind or snow. See 7.419, *Large Deciduous Trees* for appropriate selections.

Finally, don't forget to shade the air conditioning unit or swamp cooler. Not only will the unit run cooler, but also the air around the unit will be several degrees lower and increase energy efficiency.

Plant for Wind Protection

Cold winds can penetrate a house in the winter and may be responsible for up to one-half the total heat loss during windy days. In Colorado, prevailing winds blow from the northwest. Landscape for wind protection should be concentrated on the north and northwest sides of the home at a distance of one to three times the mature height of the trees. Evergreens provide the most wind resistance. In areas where wildfire is a consideration, do not plant evergreens closer than 30 feet from structures unless you consider them as part of the building envelope for your defensible space. See 7.403, *Evergreen Trees* for appropriate selections.

Slopes

Understanding the nature of the soil profile within the landscape may indicate a need to address erosion and slopes. An appropriately graded site should have positive drainage away from permanent structures. Steep slopes should be terraced with a series of raised beds or planters. Use berms in conjunction with swales to encourage appropriate drainage at no greater than 5 percent grade.

Landscape Lighting

Municipalities and other government agencies are moving toward decreasing light pollution. For example, the City of Boulder approved an outdoor lighting ordinance that prevents light trespass, reduces light pollution (also known as *sky glow*), reduces excessive glare, promotes energy conservation, and improves safety and security, including addressing the special nighttime lighting needs of an aging population.

For these reasons, incorporate appropriate light schemes into the landscape. That means down lighting, rather than up lighting techniques must be used. One solution is to use solar garden lighting versus electric lighting. Solar lights are typically dimmer than other types of wired landscape lighting and they do not use consumable energy.

Maintenance of the Sustainable Landscape

Many organic yard waste materials can be composted including leaves, grass clippings, vegetable and flower plants and small amounts of woody material. Avoid material exposed to weed killers or systemic insecticides—they may not break down during the composting process. In addition, avoid plant material exposed to plant diseases unless the compost reaches a minimum temperature of 122 degrees F evenly throughout the pile. Remember, compost is a soil amendment, not a soil fertilizer. See 7.212, *Composting Yard Waste* and 7.217, *Fertilizing the Organic Garden* for additional information.

Reduce Pest Pressure

Most pest problems directly relate to the health of the plant. Pests target stressed and weakened plants; therefore, maintaining plant health will prevent most pest problems. Also, every addition or subtraction to a landscape changes the environment and leaves a possible opening for anything invasive—insects, weeds or pathogens.

Start with pest-free plant materials and supplies. If pests are brought in, they are more likely to become established. Check for diseases and insects by inspecting all plant parts including leaves, stems and especially roots, which should be firm and light in color. Don't buy a problem just because it is on sale.

Diversity within the yard and diversity within the larger community landscape will help maintain beneficial organism populations. Predators and parasites of plant pests are beneficial organisms. Some examples of beneficial organisms are specific species under the categories of birds, reptiles, small animals, insects and microorganisms.

Diversity can be increased in a yard by utilizing several different types of plants. Diversity can be increased within the larger landscape by incorporating plants that are different than others in the neighborhood. Increasing both forms of diversity will discourage plant pests. Most plant pests target a certain species or family of plants and if there isn't enough food to support a population, major pest problems are less likely to develop.

Diagnose the problem correctly. This is probably the most important step since different plant problems have different solutions. Closely evaluate the plant environment and history then take a sample to your Colorado State University Cooperative Extension county office or garden center for identification of host and problem. Be sure to provide the professional information on how the plant is cared for and where it is located to help the diagnosis process.

Once the diagnosis is made, consider the options because sometimes it is best to do nothing. Will the plant tolerate the damage? Will the homeowner? Or, will this problem stress the plant and lead to more problems? If so, does this plant have enough value to warrant treatment?

If treatment is needed, investigate all of the possibilities. Commonly, the first reaction is to opt for a pesticide but there are alternatives. In some cases, excluding the pest with physical barriers is appropriate such as floating row covers for cabbage worm. Other instances require repellents, like moth balls, to discourage animal pests in protected areas. Manage the garden environment by pruning to increase air circulation and therefore lowering the likelihood of many diseases. And of course, pesticides can be the best solution in certain situations. Organic, natural or other more innate pesticides are on the market for many pests to reduce the impacts on the environment.

If pesticides are the best option, choose one that has the host and the pest on the label. In most cases, a selective pesticide is better than a broad-spectrum pesticide because it tends to have less impact on other non-target organisms. Make sure to read and follow all the directions on the label because misuse can be detrimental to the plant or other organisms in the landscape.

Other Maintenance Tasks:

- *Annually aerate lawn areas.*
- *Reapply mulch as necessary.*
- *Fertilize as directed.*
- *Remove dead plant debris.*
- *Prune woody plants.*

¹J. Boussetot, Colorado State University, Cooperative Extension horticulture agent, Douglas County; K. Badertscher, Extension horticulture agent, Boulder County; M. Roll, Extension horticulture agent, Arapahoe County.

Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating. Cooperative Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.