COOPERATIVE EXTENSION SERVICE
University of Kentucky – College of Agriculture

Biosystems and Agricultural Engineering Update

ENVIRONMENTALLY FRIENDLY LAWN CARE

Introduction

A common site throughout urban and suburban landscapes is the lawn (Figure 1). Though individually small in size, lawns collectively account for nearly 25% of the urbanized land area in the U.S. To maintain desired appearances, U.S. households spent $29.5 billion in 2012, or about $350 per household, on lawn and garden activities. These activities include mowing, watering, as well as applying fertilizers, pesticides and herbicides.

Unless properly managed, lawn and garden activities can negatively impact the environment. Mowing lawns too often or too short can harm root development as the plant's energy is redirected to growing new leaves. When it rains, the water that does not soak into the soil becomes runoff. This runoff can carry the extra fertilizers, pesticides and herbicides that were applied to lawns but not used by the grass to local streams, rivers and lakes. Once in these waters, fertilizers can lead to increased algal growth, which reduces oxygen levels in waters. If oxygen levels become too low, fish and other aquatic life can be harmed. Improper watering not only leads to poor lawn health and appearance, but any water that runs off is wasted. The U.S. Environmental Protection Agency (USEPA) estimates one-third of residential water use (9 billion gallons per day) is used for landscape irrigation. Of that amount, around 50% of the water is wasted.

Figure 1. Lawns, which are common in the urban and suburban landscapes, receive hundreds of dollars of inputs annually. Source: GreenCare Landscape and Maintenance (used with permission).

Environmentally friendly lawn care considers the lawn as a component of a larger ecosystem. Ecosystems are communities that consist of living things such as plants and animals as well as non-living things such as rocks, soil, water and air. You can manage your lawn in an ecologically friendly manner, while using fewer inputs, and without sacrificing aesthetics.

Soil Health

Environmentally friendly lawn care starts with having a healthy lawn, and healthy lawns start with healthy soils. Before you add fertilizer to your lawn, it is important to test the soil (Figure 2). Find out how much nitrogen, phosphorus, potassium and lime your soil needs, if it needs anything at all. Applying fertilizer and lime to a lawn that does not need it is a waste of money. Your lawn can only uptake so much before the excess is carried away in runoff. Consult with your local Cooperative Extension office to find out more about soil testing.

Figure 2. Test the soil to find out what nutrients, if any, your grass needs before applying fertilizers. Source: Keith Weller, United States Department of Agriculture, Agricultural Research Service.

Another way to improve soil health is to add a thin layer, approximately ¼ inch, of compost to your lawn once or twice per year. If you are planting a new lawn, rototill about 6 inches of compost into the soil. The organic matter in the compost will improve the ability of the soil to hold water. You can make your own compost at home using yard waste.

Plant Selection

Not all types of grass are appropriate for all yards. If the health of your lawn is difficult to maintain without lots of inputs, then you likely do not have the right type of grass for your lawn. Drought-resistant grasses are appropriate for areas that receive lower amounts of rainfall. Otherwise, large amounts of water for irrigation are required. For lawns in climates that receive high amounts of rainfall, consideration should be given to the disease resistance of the grass type. Consideration should also be given to the slope of the land. If your lawn is located on a steep slope, consider deeper rooted ground covers to help reduce erosion. Consult your local Cooperative Extension office for help in selecting grasses and other plants for your yard.

Watering

Watering frequency and duration can have a great impact on the health and appearance of your lawn (Figure 3). Many people get in the habit of watering every day for a set amount of time. Frequent shallow watering, however, encourages the development of shallow roots thus making lawns more susceptible to drought-related stress. Instead, let your lawn tell you when it needs watering. Does the grass spring back up after walking on it or do the blades stay flat? If the grass does not spring back up, then it is likely in need of water. Another simple test is to press a screw driver into the ground. If it is easy to push the screwdriver into the ground, then you likely do not need to water your lawn.

Keep in mind that different sections of your yard may need different amounts of water. Parts of the lawn in shaded areas will require less water than those in sunnier areas. Also consider the type of soil in your yard. Clay soils do not allow water to easily soak into the ground. Instead, the water will run off after a short period of time. For clayey soils utilize low precipitation rate irrigation heads to reduce runoff. If clay soils prevent water from soaking into the ground, aerating the soil might be necessary. Aeration is the process of creating many small, closely-spaced holes, such as 2-3 inches deep and 4 inches apart, to better allow are and water to reach the grass roots. Aerating the soil allows water to more easily infiltrate into the ground thus encouraging deeper grass roots.

Figure 3. To promote root growth and avoid runoff, water slowly and deeply, as seen with these irrigation heads. Avoid frequent, shallow watering as it leads to shallow roots. Source: Automatic Rain Irrigation (used with permission).

Consider the time of day when watering. Watering during the day, particularly during the mid-day and afternoon, leads to larger water losses through evaporation. Water losses of 20-30% can occur when evaporation is highest. This means that for every inch of water you apply to your lawn, about ¼ of an inch is lost to the atmosphere without reaching your lawns roots. Watering during the early morning and late evening hours will minimize water losses due to evaporation. However, watering during the evening can promote fungus growth as grade blades will remain moist for a longer period of time.

Different soil types affect the ability of water to infiltrate into the ground. Sandy soils allow water to soak into the ground quickly while the opposite is true of clayey soils. For example, water can infiltrate sandy soils at a rate of 0.3 inches per hour or greater while the rate is less than 0.05 inches per hour for clayey soils. To prevent runoff, it is important not to apply water to your lawn faster than the water is able to soak into the ground. If irrigating your yard, select the appropriate type irrigation head for your soil. For example, select low precipitation rate irrigation heads if you have clayey soils. Consult your local Cooperative Extension office for assistance.

Fertilizers

Fertilizer application rates should be based on soil tests and plant requirements. Fertilizers applied in excess of plant needs will not be used by your lawn, but will instead leach into the groundwater and/or be carried away in runoff which can lead to water quality problems in streams, rivers, lakes and aquifers. If the results from the soil tests indicate your lawn needs fertilization, consider using a slow-release fertilizer. Often, nutrients in synthetic fertilizers or water soluble fertilizers that are released quickly are lost in runoff. Slow-release fertilizers, on the other hand, release nutrients over a longer period of time. This longer release period means that nutrients remain in your lawn longer thus allowing plants to continue to develop healthy and vibrant root systems. To reduce the amount of fertilizer lost in runoff, do not apply within 24 hours of expected heavy rainfall. If fertilizer falls on impervious surfaces such as driveway and sidewalks during application, sweep it up. Fertilizers left on these surfaces will be carried away in runoff. Also, don't apply fertilizers to frozen ground.

Pest Management

The USEPA defines pests as any unwanted organism that causes damage to plants, humans or other animals. Examples of pests include insects, rodents, weeds, fungi, bacteria and viruses. To combat these pests, pesticides are often used. The term pesticide includes insecticides, herbicides, fungicides, and rodenticides. Specifically, insecticides target insects, herbicides target unwanted plants (weeds), fungicides target fungal diseases, and rodenticides target rodents such as mice.

Figure 4. Praying mantis is a yard predator that helps control pests. This beneficial insect is eating a beetle. Source: Blake Newton, University of Kentucky, Department of Entomology.

Pesticide use is common. Even though about 20% of U.S. households do not have private lawns, approximately 50% of all U.S. households

use pesticides, largely in the form of insecticides and herbicides. Either through self-application or through lawn care services, homeowners apply about 8 times the amount of herbicides (active ingredients of 2, 4-D and other phenoxy herbicides) to their lawns, on a per acre basis, as compared to farmlands. Once applied, pesticides leave residues that can be carried indoors by people and pets. Like fertilizers, pesticides residues can also be carried to streams, rivers and lakes via runoff.

While pesticides combat unwanted pests, they can also harm beneficial ones such as earthworms, honey bees, praying mantis, and lady bugs (Figure 4). An alternate approach to pest control is integrated pest management (IPM).IPM is a pest management technique that considers the pest's life cycle and vulnerabilities. A combination of cultural, mechanical, and biological controls are used first; chemical controls are used last (Table 1).

Table 1. Integrated Pest Management Primary Control Types.

Control Types	Examples
Cultural	Mow grass to appropriate height; provide correct amount of water; select disease and insect resistant plants; remove diseased parts of plant; mulch planting areas
Mechanical	Hand pick insects; hand pull or hoe weeds; traps
Biological	Birds, bats, lady bugs
Chemical	Herbicides, insecticides, fungicides; horticultural oils

If you do use pesticides, be sure to read and follow the label. Always wear protective clothing such as gloves, a long-sleeved shirt, and pants. Wash all clothing separately after applying pesticides. If spraying, be sure to protect your eyes and lungs. Always keeps children and pets away from pesticides. No one should come into contact with treated areas for the prescribed amount of time. Be sure to store and dispose of pesticides according to the instructions on the label.

Mowing

How frequently you mow your lawn and to what height you mow it significantly affects the appearance and health of your lawn. A good rule of thumb is to never cut off more than 30% of the height of the grass in one cutting. Cutting more than 30% at one time can shock the grass as more energy has to be put into shoot or blade growth instead of root development. If your grass is tall, two separate cuttings may be required. By mowing frequently, grass is kept at the desired height without being shocked.

Slightly longer grass provides greater blade surface area, enabling photosynthesis to occur more readily. Photosynthesis is the process where plants convert sunlight into chemical energy.
Slightly longer grass limits the amount of sun reaching the soil. The ground is kept cooler and more moisture is retained. Plus, less sunlight can reach weed seeds thus inhibiting them from germinating and sprouting. For these reasons, grass should be kept longer in the summer time. Kentucky bluegrass and tall fescue, both popular types of lawn grass, grow best when kept at a height of at least 2 inches.

Scalping is the practice of removing a significant amount of plant height, even to the point of exposing soil, in one mowing. Only in rare cases is scalping your lawn beneficial. Bermuda grass and other warm season turfgrasses benefit from scalping, if it is done in the spring before active growth begins and after all threats of frost are over. Scalping during the growing season can shock the plants. Energy must be redirected from the growth of new shoots to root development. If scalping, use extreme caution. If improperly performed, scalping can severely damage or even kill your lawn.

When it is time to mow, be sure your mower's blades are sharp. Dull mower blades can diminish a lawn's heath and appearance. When blades are dull, grass is torn rather than cut. The ends of torn grass

does not seal easily meaning the grass loses water more readily than grass that is cut with sharp blades. Because of this, torn grass does not recover as well. After extended periods of cutting with a dull blade, lawn appearance will suffer as the ends will turn brown.

Now that you have mowed, what do you do with the clippings? When lawns are mowed frequently, you do not need to collect the clippings. The clippings should not be thick enough to smother the grass below. Lawn clippings are a good source of nutrients for your lawn. By leaving clippings on your lawn, you can reduce the amount of fertilizer you need to apply. However, if the grass is infected with a disease or if weeds are problematic, collect the clippings. Be sure to place collected clippings in a compost pile or a municipal yard waste container. Never bag clippings and place in the trash. Clippings should not be sent to the landfill.

Bare Soil

Sediment is the leading source of pollution in streams and rivers. Bare soil is particularly susceptible to erosion. The impact of rain drops loosens the soil. Runoff then carries the soil to storm drains where it is then transported to streams, rivers and lakes. Bare soil is also prone to colonization by weeds. Any bare spots in your yard should be seeded or mulched. In areas where grass is sparse, consider changing the plant type to one more suited to the specific characteristics of that area of the lawn (e.g. amount of sunlight). If the plant type is well suited to that particular area of the lawn, consider overseeding the sparse areas during the fall months in order to improve lawn health the following year.

Mulch is an organic material that is placed over the soil as a covering. Examples of mulch include aged wood chips, pine straw, compost, and shredded leaves. Mulch has many beneficial properties such as retaining moisture for plants, stabilizing soil temperatures, providing nutrients to plants, and preventing weeds.

If irrigating your yard, select the appropriate type irrigation head for your soil. For example, select low precipitation rate irrigation heads if you have clayey soils. Consult your local Cooperative Extension office for assistance.

Yard Waste

Yard waste includes grass clippings, leaves, branches, twigs, shrubbery trimmings, etc. Yard wastes should never be sent to the landfill as these materials are recyclable. Instead, compost yard wastes. Composting is a process in which bacteria, fungi and other microorganisms break down organic materials, such as yard wastes, creating compost. You can compost yard wastes at home or at a municipal facility. Also, yard wastes should not be swept into the street or into a storm drain. Doing so can clog the storm drains, which can lead to flooding.

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Resources

Composting

HO-75 Home Composting: A Guide to Managing Yard Waste
http://www2.ca.uky.edu/agc/pubs/ho/ho75/ho75.pdf

ID-192 Composting: Kentucky Master Gardener Manual Chapter 5
http://www2.ca.uky.edu/agc/pubs/id/id192/id192.pdf

General
HENV-706 Going Green: Living and Environmentally Responsible Life
http://www2.ca.uky.edu/agc/pubs/henv/henv706/henv706.pdf

Ground Covers
HO-78 Ground Covers for Kentucky Landscapes
http://www2.ca.uky.edu/agc/pubs/ho/ho78/ho78.pdf

Integrated Pest Management
ID-154 Low-Maintenance Lawn Care, Stressing Pest Avoidance and Organic Inputs
http://www2.ca.uky.edu/agc/pubs/id/id154/id154.pdf

Mowing
AGR-209 Mowing your Kentucky Lawn
http://www2.ca.uky.edu/agc/pubs/AGR/AGR209/AGR209.pdf

Stormwater Pollution
AEN-106 Reducing Stormwater Pollution
http://www2.ca.uky.edu/agc/pubs/aen/aen106/aen106.pdf

HENV-203 Stormwater
http://www2.ca.uky.edu/agc/pubs/HENV/HENV203/HENV203.pdf

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