

# Low Maintenance LANDSCAPING



*a guide for Ocean County homeowners*

## for the Barnegat Bay WATERSHED

The Ocean County Soil Conservation District  
Rutgers NJAES Cooperative Extension of Ocean County  
Barnegat Bay Partnership

2013

# Low Maintenance LANDSCAPING for the Barnegat Bay Watershed

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A GUIDE FOR OCEAN COUNTY HOMEOWNERS

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OCEAN COUNTY SOIL CONSERVATION DISTRICT  
RUTGERS NJAES COOPERATIVE EXTENSION OF OCEAN COUNTY  
BARNEGAT BAY PARTNERSHIP

2013

## A C K N O W L E D G E M E N T S



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Partnership member organizations include USDA – Natural Resources Conservation Service, Rutgers NJAES Cooperative Extension, Ocean County Soil Conservation District, Ocean County Planning Board, New Jersey Department of Environmental Protection, and the South Jersey Resource Conservation and Development Council.

The Ocean County Soil Conservation District contracted with Rutgers NJAES Cooperative Extension of Ocean County to prepare this publication. Horticulturist Albert Clericuzio and County Agent Deborah Smith-Fiola wrote the original guidebook.

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Special thanks to Charlene Costaris for her diligence, expertise and thoroughness in editing this latest edition of the guide.

**CLIMBING  
TRUMPET  
VINE**



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# PREFACE

## WHY LOW-MAINTENANCE LANDSCAPING?

Less money for fertilizer and pesticides. Less time spent on landscape and lawn care. Less time and effort mowing the lawn. Less pollution running off to Barnegat Bay. More healthy plants with less care. These are among the benefits of low-maintenance landscaping.

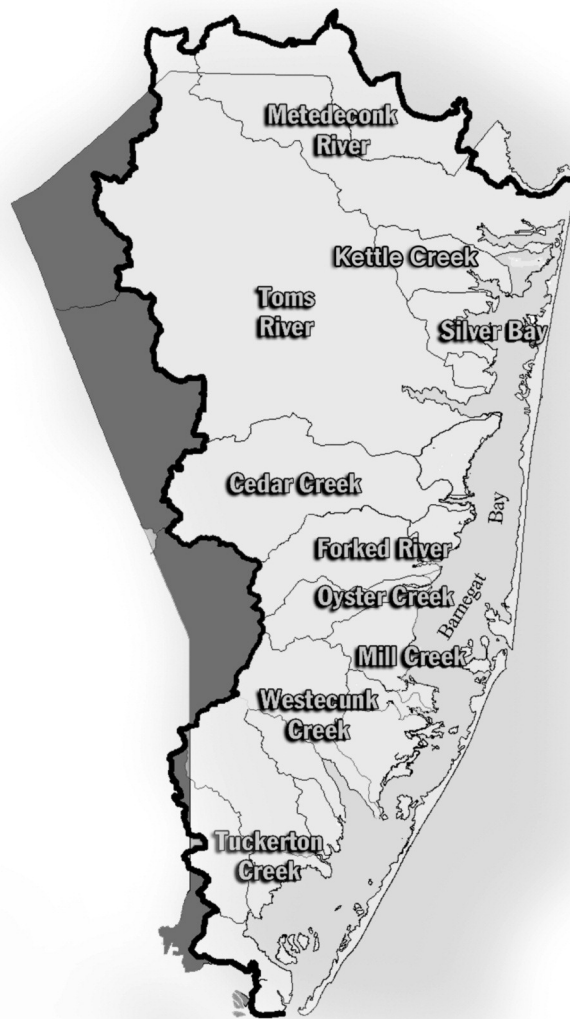
This manual is intended to help you achieve those benefits. The hardest part may be simply overcoming lifetime habit and beliefs. Is it really all right to plant different kinds of grass seed? Is it really not going to hurt my lawn; will it in fact actually help my lawn; if I stop collecting grass clippings? Is compacted soil really that big a problem? Is it really okay to fertilize less and to skip the automatic annual insecticide and herbicide application? Can native and low-maintenance plants actually create an attractive landscape? Does aerating and tilling organic matter into the soil really do that much to improve drainage and plant growth?

The answers are yes, yes, yes, and yes, all down the line. You really can have a decent lawn with low maintenance grasses that require less fertilizer. Soil compaction really does make plants suffer and die. There really is no reason to apply pesticides if no pest is present. Soil aeration and added organic matter really can make the difference in not only whether your lawn and landscape plants live or die, but also in whether runoff from your property pollutes the waterways and Barnegat Bay.

The low-maintenance landscaping techniques described in this guide offer practical and inexpensive ways to landscape in Ocean County. Selecting ornamental plants and lawn grasses suitable to your yard's soil and sunlight condition will provide an attractive landscape with minimal expense and effort. Proper soil preparation, watering, and mowing will reduce the need for expensive fertilizers and pesticides and shrink the amount of time needed to maintain your landscape.

By using low-maintenance landscaping techniques you will also reduce nonpoint source fertilizer pollutants that are transported by stormwater runoff. These pollutants enter our lakes, rivers, and streams and eventually drain into Barnegat Bay. Low-maintenance landscaping techniques also reduce water consumption, helping to preserve the aquifers that sustain Barnegat Bay and Ocean County's streams and wetlands.

For more information about preventing nonpoint source pollution, contact the Ocean County Soil Conservation District, 714 Lacey Road, Forked River, NJ 08731, 609-971-7002, or visit the web site at [www.SoilDistrict.org](http://www.SoilDistrict.org)



*Most of Ocean County is located within the 660 square mile drainage basin known as the Barnegat Bay Watershed.*





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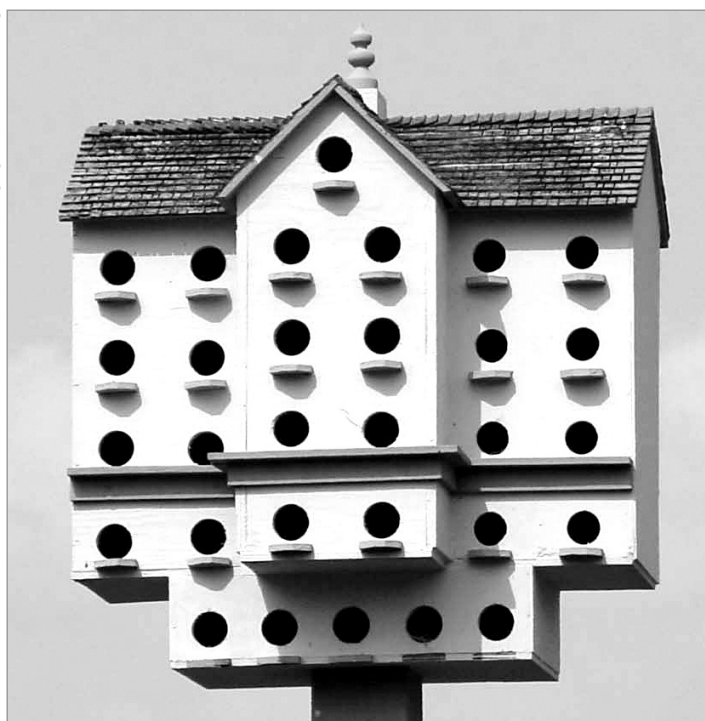
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 Invite the

## Use native plants

PHOTO CREDIT: C. MINERS







# INTRODUCTION

## WHAT IS A HEALTHY SOIL?

A healthy, fully functioning soil is balanced to provide an environment that sustains and nourishes plants, soil microbes and beneficial insects.

Soil is a living system, and healthy soil should look, smell and feel alive. Healthy soil is darker in color, crumbly and porous. It is home to worms and other organisms that squirm, creep, hop or crawl. Healthy Soil provides the right amount of air, water and organic matter for microorganisms to thrive and for plants to grow. Soil that is functioning at its' full potential is full of roots of the healthy and strong plants that it supports.

An unhealthy, poorly functioning soil, appears lighter in color, is compacted or has poor structure, and contains limited roots and living things.

Soil Health and Soil Quality are terms that are becoming increasingly familiar worldwide and are often used interchangeably.

Soil is made up of air, water, decayed plant residue, organic matter from living and dead organisms, and minerals, such as sand, silt, and clay. Increasing soil organic matter typically improves soil health since organic matter affects several critical soil functions.

*"Soil Health or Quality can be defined as the capacity of a specific kind of soil to function, within natural (inherent) or managed (dynamic) ecosystem boundaries; to sustain plant and animal productivity; maintain or enhance water and air quality; support human health and habitation."*

## WHY IS PROTECTING MY SOIL'S HEALTH IMPORTANT?

Healthy soil gives us clean air and water, bountiful crops, lush lawns, forests, productive grazing land, diverse wildlife, and beautiful landscapes. Soil does all this by performing five essential functions:

**Nutrient Cycling** - Soil stores, moderates the re- lease and cycling of nutrients and other elements. During these biogeochemical processes, analogous to the water cycle, nutrients can be transformed into plant available forms, held in the soil to be utilized by plants, or even lost to air or water.

**Water Relations** - Soil can regulate the drainage, flow and

storage of water and solutes, which include nitrogen, phosphorus, pesticides, and other nutrients and compounds dissolved in the water. With proper functioning, soil partitions water for groundwater re- charge and for use by plants and soil animals.

**Biodiversity and Habitat** - Soil supports the growth of a variety of plants, animals, and soil microorganisms, by providing a diverse physical, chemical, and biological habitat.

**Filtering and Buffering** - Soil acts as a filter to protect the quality of water, air, and other resources. Toxic compounds or excess nutrients can be degraded or otherwise made unavailable to plants and animals.

**Physical Stability and Support** - Soil has the ability to maintain its porous structure to allow passage of air and water, withstand erosive forces, and provide a medium for plant roots. Soils also provide anchoring support for human structures and protect archeological treasures.

**USING THE SOIL HEALTH ASSESSMENT GUIDE:** This Soil Health Assessment Guide is based on the integration of the physical, chemical, and biological components of the soil. It is the synergy of these components that produce a healthy functioning soil ecosystem.

Eight Soil Health Parameters are the basis of this evaluation. Each component of Soil Health is broken out into various parameters.

**Physical Components:** Surface Hardness/Soil Compaction, Structure, Friability, Consistence & Soil Tilth, Erosion and Drainage & Infiltration of Rain- water.

**Chemical Components:** Nutrient Holding Capacity and pH

**Biological Components:** Organic Matter, Soil Color & Roots, Soil Life, and Plant Growth.

Use this assessment to identify opportunities for improvement and to monitor and track changes in your soil over time. Land managers can use this information along with data from soil surveys, fertility tests, and other natural resource monitoring data to make sustainable management decisions.



# Chapter I



## THE BEGINNING: Plan before you plant

### SKETCH YOUR PROPERTY

Spend a little time planning now to save a lot of time and money later.

Take a large piece of paper and draw a rough sketch of your property. Include all buildings, large trees, and existing plantings. If your home is new and not landscaped, mark off the areas where your lawn, shrubs, vegetables, and flower gardens will be located. Don't forget to set aside areas for eating, lounging, children's play, and perhaps a fence, trellis, or windscreen for your patio or swimming pool. Why not plan for less turfgrass? Today's modern landscapes are filled with lawn alternatives.

Be sure to note the sunny and shady spots. Include problem areas such as those with standing water. These areas could have drainage problems. The *Soil Health Assessment Guide* included with this book can help you evaluate problem areas.

Your sketch will serve as your guide when you choose plants and materials. Remember, you don't have to finish the entire landscape all at once. Your drawing will remind you of your long-range plans, as well as the favorable and not so favorable places in your yard.

### EVALUATE YOUR SOIL

Soil is the most important component of any landscape. Although soils vary from site to site, most soil in Ocean County is sandy and acidic. In most cases, the good soil around your home was altered during construction. The sub-

soil at new home sites often lacks the nutrients and organic matter needed for plant growth. The *Soil Health Assessment Guide* can help you evaluate whether your soil is suitable for growing plants.

"Why plant a \$50 plant in a \$5 hole?" is an old gardener's adage that applies to your landscape. Poor soil conditions weaken plants and makes them more susceptible to drought stress and pest attack.

Grab your sketch and a shovel, head outside, and turn over a few spadefuls of soil in the different areas of the landscape. Include the lawn, shrub border, vegetable-flower gardens, and foundation areas.

- ? Are there any soil color differences? Bluish gray flecks or mottled colors may indicate poor drainage.
- ? What does your soil feel like when you try to roll a small amount of it between the fingers of your hand? Try this about three days after a rain. If it has a slippery feeling, the sample is clay; a sandy sample feels gritty.
- ? Do you smell anything strange? Unpleasant odors may indicate low oxygen levels that are the results of compacted soil or poor drainage.
- ? Did you find water or soaking wet soil? If the answer is "yes," select plants adapted to wetland areas, or consider installing a drainage system (French drains).

? On the sketch, identify the various soil areas – clay, sandy, wet, and dry. All of this has special meaning when it comes to plant choices and soil preparation.



The National Soil Survey can give you useful information about the characteristics of the soil in your area. For example, even if you garden on disturbed, compacted soil, the Soil Survey can give you an indication of the underlying drainage.

You can search the Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov/>. Directions for using the Web Soil Survey are available at <http://njaes.rutgers.edu/soiltestinglab>. Click on “More Soil Resources.”

Keep in mind that the soil survey was done with large-scale mapping of undisturbed native soils. It may not apply precisely to development soils or small lots. If you have difficult drainage problems, you may need an agronomist or soil scientist for an on-site evaluation.

## DRAINAGE AND FLOODING

How your property is graded affects the drainage. Keep in mind that when soil is flooded with water, it can't get needed oxygen from the air. Also, if your property is near Barnegat Bay and occasionally covered with brackish bay water, you may need to use salt-tolerant plants. When it rains, study the

flow of the water across your property. Note any low spots or puddles on your sketch. Mark the areas that are sloping. Steeply sloped grades are usually drier at the top, wetter at the bottom. This will influence your plant selections.

## OTHER CONSIDERATIONS

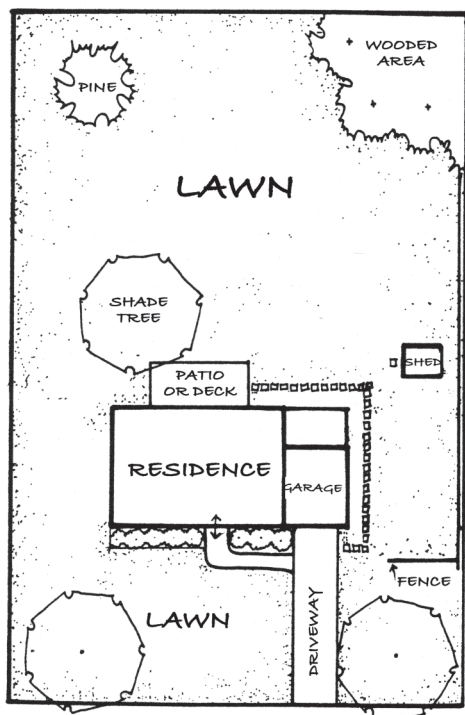
Obviously, the landscape is molded by more than just the soil. Even if a plant is rooted in good soil, the plant foliage is affected by other environmental conditions, such as sunlight, shade, wind, and salt.

### SUNLIGHT AND SHADE

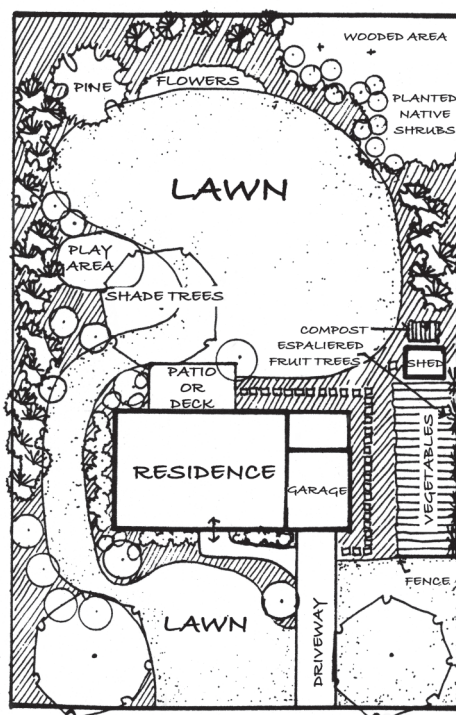
Plants need sunlight to photosynthesize food to survive. On a sunny day, note how many hours of direct sun each area of the landscape receives. Are some areas shaded all day, or only in the morning or afternoon? Some shade-loving plants will do poorly even if they get only a few hours of direct afternoon sun. On the other hand, many plants need sun for at least four hours each day. This is important information for your site sketch and will guide your plant selection.

### WIND

Open landscapes or bayside locations may have trouble with wind. The wind causes plants to lose water by evaporation from the leaves. If water evaporates faster than replacement water can come up from the roots, the plants will wilt, then burn or even die. This happens not only during the growing season but



SEE  
APPENDIX D  
page 68





also in winter and early spring when the ground is still frozen. Plants in a windy area will need extra watering, especially evergreens.



**NOTE ON YOUR SKETCH** the direction of the prevailing winds. This is easy to do. Just look at the big, older trees and see the direction of their growth. Plant trees on the northeast and northwest sides to block the wind. Shading driveways and sidewalks will lower your summer electric bills by lowering the temperature outside the house.

## SALT

Storms and winds along waterfront locations leave plants dripping with salty sea or bay water. When this spray evaporates, the plants may be left coated with salt. This causes plants to dehydrate, which could burn the foliage.

Even inland, landscapes can have salt problems. During the winter salt is spread on roads, driveways, and sidewalks and a lot of this salt ends up in your soil. Consider this when selecting plants. Make sure that the plants you choose can survive these harsh conditions. The plant list, Appendix B, notes salt-tolerant plants.

## TEST YOUR SOIL

*Soil testing is one of the most important tasks in landscape management.* Have the soil tested before you buy landscape plants, seed a lawn, or add lime and fertilizer. The soil test will tell you exactly what is needed for your site. Don't add supplements just because everyone else does it.

The best time to test soil is at the end of the growing season or during the winter when the ground is not frozen. You will have the results ready for the following growing season. Homeowners can have their soil tested by a professional landscaper or purchase a soil test kit from Rutgers NJAES Cooperative Extension or a local garden center. Rutgers NJAES Cooperative Extension's soil test will evaluate pH and nutrient levels (phosphorus, potassium, calcium, magnesium, copper, manganese, zinc, and boron). Tests for soil texture, soluble salts, and organic matter content are available for an extra fee. Rutgers NJAES Cooperative Extension of Ocean County also offers a soil pH test to determine the soil's acidity or alkalinity. See Appendix A for addresses and test kit ordering information.



**TO PREPARE A SOIL SAMPLE** for the RCE test kit, follow these instructions. For each test, gather five or six random samples of 1 cup of soil, taken from the soil surface to a depth of six inches. Place all samples in a single container and mix thoroughly. Remove one representative sample from the container (about two cups) for the test kit. Mail according to directions. Garden and lawn soil should be tested separately. The same method can also be used to prepare a sample for a soil test kit purchased from a local garden center.

PHOTO CREDIT: C. MINERS



## WHAT IS pH and HOW DOES IT AFFECT YOUR SOIL?

It's important to maintain the proper soil pH for the plants you wish to grow. Each plant has a soil acidity range necessary for its proper growth and development. When the soil doesn't have the proper pH, plants will develop problems and need extra maintenance. In Ocean County, the soils are generally acidic. Your choice is to use plants tolerant of your soil pH or to add lime or sulfur to adjust the pH. Liming recommendations are found on page 17.

The proper pH for the plant is very important. Soil pH helps control how nutrients are absorbed into the plant. There are 17 nutrients that are essential for the health of the plant. Plants must get these elements from their surroundings. Nitrogen (N), phosphorus (P), and potassium (K) (sometimes called potash), are the nutrients needed in the largest quantities.

Commercial fertilizers list the N-P-K values. Nitrogen (N) maintains the above-ground growth and the green color. Phosphorus (P) regulates the roots and shoots. Potassium (K) produces hardy plant tissue and offers protection from the stress of cold

and heat. Other nutrients are only needed in small trace amounts. A bag of 10-6-4 fertilizer, for example, contains 10% nitrogen, 6% phosphorus, and 4% potassium.

The pH scale runs from 0 to 14		
0	7	14
ACIDIC	NEUTRAL	ALKALINE (OR BASIC)

A pH rating of 1 is very acidic. A pH of 7 is the neutral point. This is the pH of pure water. Numbers above 7 indicate alkaline materials. A pH of 4 is ten times more acidic than a pH of 5. Keep this in mind when you add supplements like lime to your soil.

Some plants have a narrow pH range; others are more tolerant. Appendix B lists the pH range in which the plants will grow well. Generally, native or naturalized plants prefer acid soils with a pH of about 5.0 – 5.5. If you want to grow natives and your pH is above 5.5, you need to acidify your soil by tilling in sulfur. Many flowers, introduced ornamentals, and turfgrasses grow well in less acid soils that have pH values between 5.5 and 6.8.

Once you know the soil pH, you can select plants that are adapted to that soil, or correct your soil's pH to suit the plants you want. When the soil has the proper pH, the lawn and plants can use the nutrients from the soil. If the soil pH is unsuitable, you must correct it *before* you do anything else. Proper soil pH will help you to have a low-maintenance landscape.

## SOIL ADJUSTMENT

Healthy soil contains lots of microorganisms and earthworms. While the worms wiggle through the ground, their paths open the subsoil to oxygen and water. This helps the plant roots. Worm castings become great fertilizer and help maintain a neutral pH.

Undisturbed Ocean County soils tend to be sandy, acidic, and low in nutrients. They are perfect for growing native plants. See Appendix B, Plants for the Low-Maintenance Landscape, where native plants are indicated.

If you garden on disturbed development soils or if you wish to extend your plant palette, you will need to adjust the soil's characteristics. A simple way to improve the soil is to mix in organic materials. This enables sandy soil to hold more water and nutrients while it adds carbon and other vital plant nutri-

ents and improves the drainage of compacted soils. Leaf compost is the most common organic additive. Composted (not fresh) animal manure may also be used. The best time to apply organic matter is the fall or early spring. The recommended amount is two to four inches, thoroughly mixed into the top six to nine inches of the soil, and not just placed on the top. For large areas, use six cubic yards per 1000 square feet.

Organic matter usually takes a year or two to break down. The soil will be receiving slowly released nutrients during this time. To make your own organic matter, try composting. It's a great way to get the whole family involved in recycling and conservation. Garden compost adds nutrients to the soil, improves drainage and pH, and can be used as mulch or top-dressing. Contact Rutgers NJAES Cooperative Extension for more information about composting.

Unless you are sure of its source, avoid the temptation to buy "topsoil." There are no regulatory standards for topsoil, and you can't be sure what kind of soil you are getting. If you do purchase topsoil, make sure it's free of unsuitable materials such as broken glass, concrete, plastic, and excessive amounts of gravel and wood chips. Call Rutgers NJAES Cooperative Extension and request a copy of the fact sheet entitled, "Topsoils Suitable for Landscape Use," or download the publication from <http://njaes.rutgers.edu/pubs/>.

Remember that healthy soil is the foundation of a healthy landscape. Proper soil preparation will make your plants more attractive and reduce your landscaping costs.

## YOUR FINAL LANDSCAPE PLAN

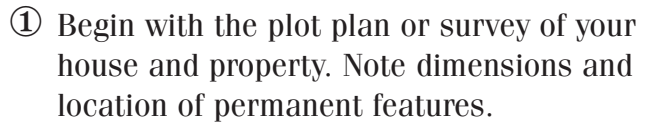
It's time to finish your landscape plan. Decide how much lawn you really want to maintain and mow. What uses will your family make of the different landscape areas? When summer droughts occur, the lawn will quickly become parched. Do you want to spend a lot of time and money watering your lawn?

Consider having a smaller lawn by planting shrub beds, groundcovers, wildflowers, or ornamental grasses. Consider decorative stone, patios, vegetable and flower gardens, decks, or small trees. All are great alternatives to lawns. Refer to Chapter IV for complete information on lawn alternatives.



Now that your landscape plan is finished, it's time to put it into action.

Credit: Texas A & M University

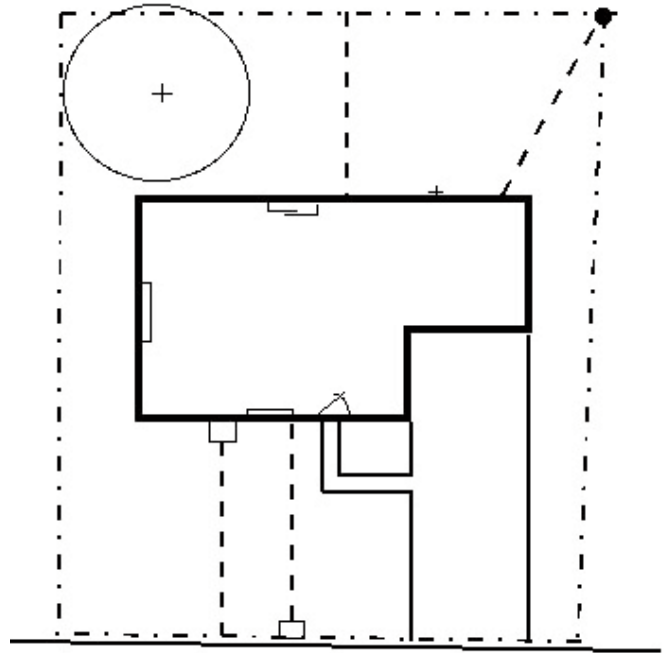


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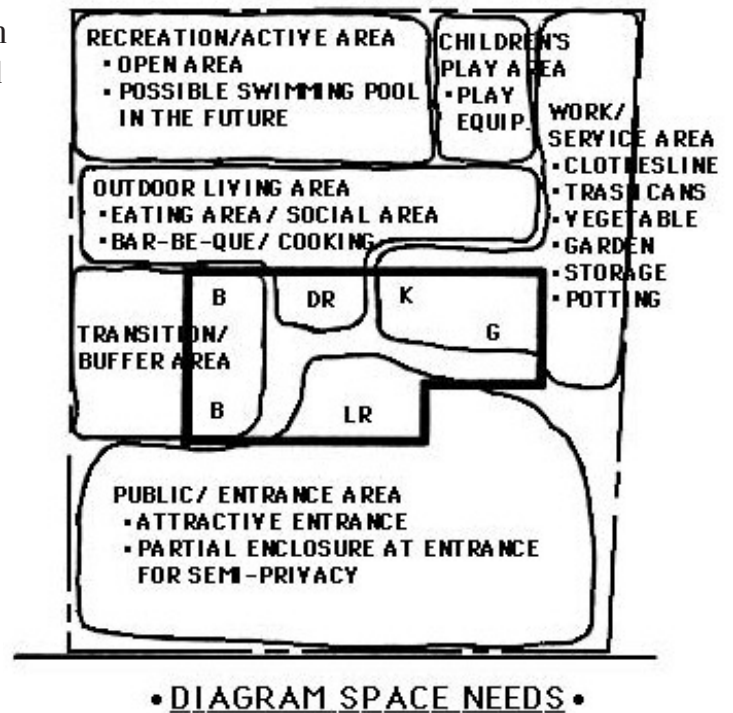
**\*NOTE ON SOIL TYPE\*** SOIL IS MAINLY CLAY WITH SOME SAND IN IT, FAIR TO POOR DRAINAGE. CHECK WITH COUNTY EXTENSION OFFICE TO HAVE SOIL TESTED.



- ③ Draw a plot plan to the correct dimensions based on your survey. Note only permanent features. This will be the basis for multiple sketches. You won't draw directly on this paper.



- ④ Use tracing paper overlays, available from an art store, to begin sketching areas and proposed plantings. Don't worry about specific plants at this stage.



- ⑤ Finally, draw overlays that show plants that provide the features you need – shade, view blocking, concealment, flowers.

# Chapter II



## LOW MAINTENANCE LAWNS: Using Turfgrass Wisely

IF YOUR YARD HAS ACIDIC PINELANDS SOIL you have a decision to make. You can plant only grasses and ornamentals that are adapted to acid soil; or you can lime the soil to the pH needed to support the growth of turf. There may be a compromise in order. Perhaps you want a patch of turf as a play area for the children or as a front lawn. If so, follow your soil test recommendations carefully. Excess lime and fertilizer do no good at all: no good for your lawn and no good for the ecology of the streams into which the nutrients leach. And, of course, no good for the Barnegat Bay.

Turfgrass has some advantages as residential vegetation. Turfgrass is first and foremost an efficient groundcover. It is the only living ground cover that will tolerate regular foot traffic. A well-grown lawn minimizes soil erosion; reducing the sediment load to the Barnegat Bay and reducing the loss of nitrogen and phosphorus into the Bay. Lawns also provide recreational space and have a cooling effect on the atmosphere. An attractive lawn can add value to your home.

However, an overly lush green lawn has a price: a price to your pocketbook, your time, and your effort; as well as a price to the waterways of Ocean County and Barnegat Bay. The excessively fertilized lawn will leach nutrients into our streams, contributing to negative changes in the ecology of our waters. How we establish and care for our lawns has a lasting impact on the environment.

Furthermore, that deep green turf may even be more susceptible to insects and diseases than the leaner lawn. Each year, Americans spend an estimated \$950 million on fertilizers and another \$1.5 billion on pesticides for home use. However, a healthy lawn is its own best defense against weeds, insects, and disease. Using the proper seed varieties and horticultural practices, you can have a healthy lawn with minimal weeds or brown spots and with minimal investment of time and money.

Rutgers University and other land-grant universities in surrounding states produce fact sheets that are very useful. You can find information on turfgrass varieties, lawn renovation, seed selection, and lawn maintenance on websites such as <http://njaes.rutgers.edu/pubs/>.

### CHOOSING THE PROPER GRASSES

The first task is the selection of turfgrass. For Ocean County, good low-maintenance choices are the fescues — tall fescue and fineleaf fescues. These are cool-season grasses that grow better in the cooler weather of the spring and fall. The sandy, droughty soils of Ocean County also support zoysiagrass, a warm-season grass that grows during the summer. Low-maintenance grasses like these resist disease and insect attacks and don't need as much water or fertilizer as other types.

Limit the use of ryegrass and most varieties of Kentucky bluegrass. Annual ryegrass dies at the end of the season. Perennial ryegrass is a weaker perennial grass under hot stressful summer conditions, and it should be minimized in low-maintenance lawns. Many varieties of Kentucky bluegrass need a lot of water, fertilizer, pesticides, and dethatching. Bentgrasses are for golf course putting greens and croquet courts, not for home lawns. See Appendix B, page 64, for variety and seeding recommendations.



PHOTO CREDIT: IOWA STATE UNIVERSITY

*Turf-type tall fescue is a useful,  
low-maintenance turfgrass.*

## ENDOPHYTES

Choose grass varieties that contain endophytes. Endophytes are beneficial fungi or bacteria that live within plants and are transferred through seed. They help control webworms and chinch bugs and other leaf-eating insects, and seem to make lawns more drought-resistant. Endophytes help produce higher quality lawns. Endophytes in seed can die in hot, humid storage. Buy only the amount of grass seed that you will use soon.

## THE FESCUES

Fescue mixes are among the best choices for a low-maintenance lawn. Don't mow them too low during the summer or overfeed them. Close mowing and excessive nitrogen fertilization will thin out fescue lawns.

### TALL FESCUE

Tall fescue makes a great low-maintenance lawn. Tall fescue varieties for lawns are labeled "turf-type." These have been bred to have a thinner, more attractive leaf blade than older, wide-bladed varieties. Tall fescue has a deep root system, so it needs less frequent watering. It also tolerates low fertilization and can handle heat and drought. Although fescues prefer well-drained soils, they grow in a wide range of soil conditions.

Tall fescues thrive in open, sunny areas and tolerate moderate shade. Tall fescues are tough and can tolerate foot traffic once the turf is mature, after it is six months old. Tall fescue lawns do not need dethatching. Most varieties contain a beneficial endophyte, which reduces foliar-feeding insect attacks. Clearly, tall fescue varieties are a good choice for low-maintenance lawns in the Barnegat Bay watershed.

### FINELEAF FESCUES

Fineleaf fescues are another great choice for a low-maintenance lawn. These fine-textured grasses can grow in poor soil, albeit very slowly. They require little water and thrive in the shade. They need no more than one half as much nitrogen (N) fertilizer as other turfgrasses. In fact, too much N fertilizer will make them more prone to disease. Fineleaf fescues don't take wear and tear as well as tall fescues and are subject to chinch bug attack. Some varieties contain an endophyte that can reduce insect attacks on the leaf blades.

There are three types of fineleaf fescues recommended for low-maintenance lawns in Ocean County — hard fescue, Chewing's fescue, and creeping red fescue.

HARD FESCUE is preferred by many homeowners for its deep green color, low fertilizer needs, and heat tolerance. This fine, dense, low-growing turf grows especially well in dry, droughty soils without much fertilizer. Although it is slower to get started, hard fescue is an excellent choice for low-maintenance lawns.

CHEWING'S FESCUE can produce a good-looking lawn, with a bright medium green color. It forms a fine, dense, short-growing turf that can tolerate lower mowing.

CREEPING RED FESCUE has strong, slender leaf blades. It is good for shaded areas, but not for wet sites. This fescue spreads easily, making it useful for filling in thin turf areas. It also recovers more quickly from injury than other fineleaf fescues.

### ZOYSIAGRASS

Zoysiagrass has some disadvantages, but it also has advantages that makes it useful for lawns, particularly in poor or sandy soils or at summer homes. As a warm-season grass, it grows well and stays green during the hot summer months. The thick summer growth prevents and controls crabgrass and summer weed growth. Zoysiagrass can survive hot weather and requires less water than most cool-season grasses. Once established, it tolerates low fertility and withstands low mowing.

Zoysiagrass also has some disadvantages. Zoysiagrass can be invasive. It will move into flower and shrub beds and your neighbors' lawns. Because it is a warm-season plant, zoysiagrass will lose its green color and become dormant and straw colored by mid-October. The lawn will stay brown until about mid-May of the following spring. Thus, the decision to use zoysiagrass requires a personal acceptance of its brown color during winter. Zoysiagrass does not grow well in shady areas and may take several years to establish itself. Not all zoysiagrass varieties are hardy here, but 'Meyer' and 'Emerald' can survive New Jersey's winters.

### PERENNIAL RYEGRASS

Perennial ryegrass is a narrow-bladed turfgrass that is used in seed mixes because it germinates quickly. It is often used to overseed thin lawns, yet continually doing so may result in a lawn dominated by ryegrass. Older varieties are prone to insect attack and gray leaf spot disease. Perennial ryegrass often fails to survive a droughty summer without irrigation. It needs too much water and fertilizer for a high quality, low-maintenance lawn. See Appendix B, page 64, for recommendations on using perennial ryegrass.



## KENTUCKY BLUEGRASS

Kentucky bluegrass is popular for its color, durability, and carpet-like texture. However, most varieties require high maintenance, including more fertilizer and more water in hot, dry weather. In a summer drought, traditional bluegrass varieties go dormant and turn straw color if not watered. Many homeowners don't like this look, so they use a lot of water to keep the bluegrass lawn green throughout the drought. This isn't necessary since bluegrass recovers by the fall.

There are varieties of Kentucky bluegrass that are adapted to lower watering and less fertilizer, but you must be aware of what you are buying. If you are going to include Kentucky bluegrass in your low-maintenance lawn, check current university recommendations and the package label for low-maintenance varieties.

See <http://njaes.rutgers.edu/pubs/>.

Kentucky bluegrass germinates slowly, in about three weeks versus about ten days for the fescues, and its resistance to insects and disease depends upon the variety. If using Kentucky bluegrass, mix a number of low-maintenance varieties with fescues to minimize the need for pesticides, fertilizer, and water.

## CLOVER

Clover can be useful in low-maintenance lawns. Clover is fairly drought tolerant, so it works well in lawns receiving minimal irrigation. Clover takes nitrogen from the air, which means the nitrogen becomes available to the grass as clippings return to the soil and plant roots naturally die and decay. Clover can help your low-maintenance lawn stay healthy and green with minimal added fertilizer.

There are some down sides to clover in the lawn. Clover has flowers that attract bees. There is the possibility of being stung by a bee, which can be an issue for small children or allergic people. Clover also stains the clothes of playing children. In addition, some people don't like the appearance of a broadleaf plant mixed with their turfgrass. Clover may also winter kill and create bare patches in the lawn.

There is no specific seeding rate for adding clover to grass seed. Clover is a spreading plant, and it is likely that a low percentage of clover seed in the planting mix will give you enough clover to spread and establish in the lawn.

## GENERAL SEEDING RECOMMENDATIONS

In Appendix B, there is a table that lists turfgrass seed mix recommendations for low-maintenance lawns. If you cannot find the packaged seed blend or mixture that you want, buy packages of the varieties separately and make your own blend or mixture. Keep these points in mind:

- Read the seed label very carefully.
- Look for grass varieties with endophyte protection.
- Buy fresh seed with a germination test date less than nine months old.
- Make sure that the seed is low in weed seeds. A high-quality mix should contain no undesirable grasses or agricultural crop seeds.
- Buy what you need now. Don't buy large amounts of bargain seeds that lose their viability and endophyte protection during storage.



## SHOULD YOU START OVER OR RENOVATE YOUR LAWN?

When your turfgrass becomes unattractive, sparse, and weed infested, you must decide whether to renovate or to plant a new lawn. **BEFORE DOING ANYTHING START BY TAKING A SOIL TEST.** The soil test will help you understand how good or bad existing soil conditions are. You can never grow a decent lawn unless you correct the underlying conditions. As a rule of thumb, you should start from scratch when 50% or more of the lawn appears undesirable. If more than half of your turfgrass is intact, you can renovate your existing lawn. Making the right decision will save you time and money and make the difference in the quality of your lawn.

## Starting a new lawn

If you've decided to completely re-establish your lawn, use the *Soil Health Assessment Guide* to evaluate your soil for compaction and suitability for plant growth. If the soil is compacted be sure you till in plenty of compost as deeply as possible. Test your soil and decide which type of seed is right for you. Remember, you don't have to cover every bit of ground with grass. Leave the trouble spots for mulches, shrubs, ground-covers, ornamental grasses, wildflowers, or rain gardens. Plan the lawn to make future mowing as easy as possible.

### WHEN IS THE BEST TIME TO SEED?

For best results, seed from late August through September. In the fall, soil temperatures are ideal for good deep root growth. Fall planting allows the grass to become established before the challenges of summer heat and drought.

Seeding can also be done in April, but there will be greater competition from growing weeds and less available moisture in May.

### HOW TO PREPARE THE SOIL FOR SEEDING

Along with turfgrass seed selection, proper soil preparation is the most important step to a successful lawn. Here's how to prepare your soil:

■ **CLEAN UP** - Eliminate any existing vegetation at the site. You can dig it out, cultivate, rototill it under, or use a broad-spectrum herbicide that kills both grass and broadleaf plants. Look for an herbicide that leaves no or only short-term residue in the soil. These products kill the plant roots as well as the foliage. As always, read labels carefully and follow the directions.

■ **GRADE** - Grade the soil to slope away from your house to avoid getting water in your basement. Make sure there are no low places for puddles to form. Remove all large stones and any debris.

■ **LIME** - Soil pH values under 5.5 or over 7.0 limit the availability of certain nutrients. Have a soil test done and apply the amount of lime recommended by the soil test (see Chapter I). Till the lime into the top four to six inches of the soil along with organic matter. Use dolomite, pelletized, or crushed limestone. Less lime is necessary for the low-maintenance lawn. The fescues will grow in a soil pH of 6.0 to 6.5, whereas the higher-maintenance bluegrasses have an ideal pH range of between 6.5 and 6.7.

■ **ADD ORGANIC MATTER** - Till two to four inches of leaf compost or composted manure into the upper four to six inches of the soil. Organic matter adds carbon and other essential plant nutrients to the soil while it improves drainage and water- and nutrient-holding ability.

■ **SPADE OR ROTOTILL** - Work in lime and organic materials to a depth of four to six inches.

■ **RAKE SMOOTH AND LEVEL THE SEEDBED** - Remove any clumps and large stones.

■ **FERTILIZE** - Grass seed needs about 1/2 lb. of nitrogen for every 1000 square feet of lawn. The nitrogen will get the germinating seed off to a good start. Apply the amount of fertilizer indicated by the soil test, and lightly rake this into the soil. See Appendix C, page 65 for conversion tables that help you convert the percentage on the bag into pounds of fertilizer to apply.

### HOW TO READ A BAG OF FERTILIZER

The numbers on a fertilizer bag refer to the percentage of nitrogen (N), phosphate ( $P_2O_5$ ), and potash ( $K_2O$ ) in the product. This is often called the NPK ratio. Your soil test will tell you what ratio of nutrients is needed in a fertilizer for your soil.

The percentage of nutrients in a bag of fertilizer is some multiple of the ratio of nutrients. Check the labels

and find a similar ratio. For example, the analyses 20-0-15 and 8-0-6 are both a 4-0-3 ratio. Confusing? In Appendix C, there is a chart and directions to help you figure out the correct amounts of fertilizer to apply. Rutgers NJAES Cooperative Extension soil test reports also help you calculate how much to apply and a fertilizer calculator is on the web at

<http://snyderfarm.rutgers.edu/njfertilizerlawguide.html>

## APPLYING SEED

For best results, use a drop spreader and seed the amounts indicated on the table in Appendix B. Overlap the seeding in two directions, at right angles to each other, using half the seed each time. Too much seed causes overly dense turf and can lead to disease. Too little seed causes thin turf that is prone to weeds.

## FIRM THE SOIL SURFACE

After you finish seeding, lightly “feather” rake the area. Then, press the seed into the soil lightly with a drum roller, or tamp the soil with a rake or shovel. You can even firm the soil with your feet. This ensures good seed to soil contact and speeds up the growth process.

## MULCH

Use a thin cover of salt hay or clean straw (not hay) to conserve moisture, control erosion, and speed up seedling emergence. Floating row cover materials (fabrics that let water and sunlight through) are good alternatives to straw but must be staked down and removed after germination. Biodegradable mats can be used to hold the soil and increase surface moisture while seed germinates. They are especially useful on erosion-prone slopes, although they can get expensive on large areas. Make sure the mat is guaranteed weed-free. A thin application of compost can be used to help hold moisture and add to the organic matter of the soil.

## WATER

Water your seed lightly until it germinates — twice a day, if possible. Keep the top two inches of the new lawn moist (not soaked) until the grass is tall enough for its first mowing.



## AFTER GROWTH HAS BEGUN...

### Fertilize again

Two to four weeks after new grass appears, apply another half pound of nitrogen. Appendix C, your soil test, and the fertilizer calculator mentioned above all can help calculate the amount of fertilizer to use. Water in the fertilizer unless rain is expected soon.

## CONTROL WEEDS

Treat for weeds only if necessary. Weed control may be needed for spring seeded lawns with past weed problems. Use a pre-emergence herbicide that is labeled as safe on new lawns. Apply herbicide only to the weedy parts (spot treating), not to the entire lawn. Be sure to read the label to ensure proper use.

## MOWING

Don't mow a new lawn too soon but don't let it get tall and lanky. Let it grow 3 to 3-1/2 inches high. Then, cut it back to 2-1/2 inches.

## ZOYSIAGRASS

A zoysiagrass lawn is usually plugged, not seeded, from mid-May through June. Small pieces (one- to two-inch squares) of zoysiagrass are planted in a grid pattern at 8- to 12-inch intervals. Press pieces into a similar size hole to obtain good soil contact. A steel plug cutter (or bulb planter) can be used to cut holes in the lawn before planting. Do not allow the pieces to remain elevated. Press them into the soil and water thoroughly. Until the zoysiagrass is established, water it daily for two to three weeks. Fertilize zoysiagrass according to soil test recommendations. One to two weeks after planting, apply more fertilizer and water it in well. It takes a few years before zoysiagrass spreads to fill in an area and you may need to use herbicides to control weeds in the interim. See the Rutgers Fact Sheet FS521 on zoysiagrass at <http://njaes.rutgers.edu/pubs/>.



## SOD

There are many producers of sod in central and southern New Jersey. Fescue sod is sometimes hard to find. Check the Yellow Pages under “sod” to identify growers in your area.

## LAYING SOD

■ Prepare the soil for sod the same as for seed. There are no shortcuts.

■ Make sure that the soil is moist but not wet.

■ Don't let the sod sit around and dry out. If stacked too long, it will heat up and kill the sod. Lay the sod down as soon as possible. If sod needs to wait a few hours, place it in the shade.

■ Unfold or unroll the sod strips in place. Lay the sod in a staggered, brick-like design. Don't let it overlap, and don't leave space between pieces.

■ Roll the sod to make contact with the soil. *This is very important.* Stake down the edges if they roll up.

■ After a good-sized portion of the sod is applied, water it thoroughly. Continue to water daily until the sod has knitted to the soil (usually after the second mowing). Give extra attention to the edges around the driveway and walkways, as these areas tend to dry out quickly.

■ Mow sod as you would a seeded lawn.

## Lawn renovation

Sometimes older lawns become thin and bare. You might want to thicken your lawn by “overseeding,” new grass seed over the existing turf.

■ Between mid-August and mid-October, lower your mower blade to the lowest setting and scalp the old lawn.

■ Rake or dethatch the area thoroughly, and then aerate to expose and loosen the soil that will be seeded.



**AVOID USING SEED MATS**, which are lightweight mulches filled with seed and fertilizers. Seed mats are supposed to produce “instant lawns,” but they typically use turfgrass species that are unsuitable for low-maintenance lawns.

■ Use the *Soil Health Assessment Guide* included in this manual to determine if you have compacted soil. If so, your lawn will benefit from core aeration and the addition of compost. Use a piston-driven deep tined aerator that extracts 6-inch-deep cores. You may be able to rent the aerator or hire a lawn service to aerate. You don't need to remove the cores; they will dissolve with rain.

■ Aeration alone is helpful, but for the best, most long-lasting effect on increasing water and nutrient penetration to the grass roots, follow the aeration with a 3/4-inch deep layer of compost spread over the lawn, then spread your grass seed. Rake the lawn to mix the compost and seed and move compost into the aeration holes. The lawn will look brown and unsightly at first, but the grass will grow nicely. The compost will provide a good seedbed and will increase the water- and nutrient-holding ability of your soil.

■ Sow the grass seed at 1/2 the normal rate (full rate if the soil is bare). Roll or tamp down the seeded area so that the seeds contact the soil.

### *Use The Following Directions To Calculate Compost Needed To Spread A Certain Depth.*

#### HOW MUCH COMPOST DO YOU NEED?

- Measure your yard (excluding the house and other hard surfaces) and multiply length times width to calculate the square feet to be treated.
- Multiply the square feet to be treated, times the depth of compost to be spread, times 0.0031 to get the cubic yards of compost needed.

**For Example:**  
**To apply a half inch of compost over**  
**a 5,000 square foot yard:**

$$5,000 \times 0.5 \text{ inches} \times 0.0031 \\ = 7.8 \text{ cubic yards of compost}$$

■ Cover the seeded area with a very thin layer of compost, straw, or floating row cover materials to help hold moisture in the soil surface. Remove floating row cover after germination.

■ Water the area to keep it moist for about a month, or until the new lawn takes hold. On extremely hot or windy days, water the area lightly at least twice a day.

For more details, call Rutgers NJAES Cooperative Extension of Ocean County and request the free Fact Sheet, “Renovating Your Lawn.”

PHOTO CREDIT: SUSTAINABLE-GARDENING.COM



*Careful preparation and regular care will get your new lawn off to a good start.*



# Maintaining your low-maintenance lawn

A low-maintenance lawn saves you money, time and effort. At the same time, a low-maintenance lawn reduces or eliminates your contribution to the pollution of Barnegat Bay. Here are the guidelines for keeping the lawn looking good.

## WATERING

Some households waste 40 percent of their monthly water usage outdoors in order to produce a lush green lawn and landscape. Yet, an overly lush green lawn is not always a healthy lawn. Realize that when you water the lawn you are also watering nearby trees and shrubs, which grow feeder roots into the lawn. Daily watering can cause shallow rooting of grass, trees, and shrubs that could die during water restrictions or pest attacks. Excess watering can also cause thatch buildup in the lawn and contribute to groundwater pollution.

A healthy lawn has deep, well-established roots. The deeper the roots, the healthier the lawn. A deep root system comes from a healthy soil and proper watering techniques. The amount of water needed by the lawn varies from season to season. Spring rains cause the growing grass to burst into green. Properly rooted lawns don't need extra water at this time. Toward the end of May, the top of the soil dries out with the summer heat. When

the grass begins to wilt, it's time to start to water the lawn, if you choose. The lawn has wilted when you can see your footprints in the grass and the leaves take on a gray-blue color.

**YOU DON'T HAVE TO WATER YOUR LOW-MAINTENANCE LAWN.** You can let it go dormant, which is perfectly natural. In most cases, a healthy lawn will recover with the late summer rains. However, if you don't wish your lawn to turn a dormant straw color, follow these watering directions.

**ONLY WATER A THIRSTY LAWN.** If the shape of your footprint remains in grass that has a gray-blue color, it's time to water.

**DO NOT WATER THE LAWN LIGHTLY EVERY DAY.** This will only encourage the growth of shallow roots, thatch, and weeds such as crabgrass.

**IF YOU WATER, WATER DEEPLY.** A green summer lawn in Ocean County requires at least one inch of water weekly. Apply 1/2 inch of water twice a week if it hasn't rained at least an inch that week. If it rains one inch or more, there is no need to water that week.

**USE THE RIGHT KIND OF SPRINKLER.** There are many different types on the market. The best sprinklers are impact or impulse types with a coarse spray. Avoid sprinklers that spray

## REGULATING A SPRINKLER SYSTEM

### HOW LONG DOES IT TAKE YOUR SPRINKLING SYSTEM TO DELIVER ONE-HALF INCH OF WATER?

A simple way to determine this is to place five same-size containers on the lawn. Coffee cans will do, or cut-off milk cartons or inexpensive rain gauges. The containers should be placed in the landing pattern of the water from the sprinkler and should be no farther than five feet apart. Turn on the sprinkler for exactly one-half hour. Then collect the containers and pour all the water into one. (If the levels in the containers vary much, your sprinkler coverage is not uniform and should be adjusted.)

Measure the depth of the water and divide by the number of containers. That number is the inches of water your sprinkler applies in one-half hour. Double the number to get the hourly rate.

Then divide the inches to be applied by the inches per hour and multiply that decimal times sixty minutes. This gives you the time to run the sprinklers each time you apply water.

#### AS AN EXAMPLE:

You set out five cans and run the sprinkler system for one-half hour. When you pour all five cans into one, you measure 3.3/4 inches of water.

3.75 inches of water divided by 5 cans means you caught an average of 0.75 inches of water per can in one-half hour. You multiply by two and see that your irrigation applies 1.5 inches of water per hour.

You want to put on 1/2-inch at each watering, so you divide 0.5 inches per application by 1.5 inches per hour and find that you need to run the sprinklers for 0.33 hours. Multiply 0.33 times 60 minutes in an hour to find that you should run the sprinkler 20 minutes to apply the 1/2-inch of water.

a fine mist that evaporates before it hits the ground. On the other hand, don't blast the soil with heavy streams of water.

**WATER LAWNS BETWEEN MIDNIGHT AND 8 A.M.** Watering after 8 a.m. is not desirable because up to 25 percent of the water evaporates in the heat of the sun. Watering late in the day, leading up to dusk, increases the risk of disease.

**WATER SLOWLY.** Remember, you want to get the water to reach the deep roots. Slow, steady watering allows the water to trickle through the soil to the root zone. Move portable sprinklers around to get even watering.

**USE A SENSOR.** Rain and soil moisture sensors are available for home lawns. A sensor can regulate your irrigation system to apply water only when it is needed.

**USE A TIMER.** Purchase an inexpensive timer which turns the sprinkler off after the allotted time. Even better, purchase a battery-operated timer that turns sprinklers both off *and* on. Homeowners with an automatic underground watering system should adjust the automatic timer based on the temperature and the likelihood of rain. **CAUTION:** Using an automatic timer often results in overwatering because water is applied even when the lawn doesn't need it. Learn how to shut off your irrigation system.



**ZOYSIAGRASS LAWNS** do not require as much water as most cool-season lawn grasses. Water zoysiagrass only during extended drought, when the green color fades.

## MOWING

**DON'T SCALP THE LAWN.** Cool-season turfgrasses should be mowed to a height of between 2-1/2 to 3 inches. A low cutting height increases the risk of weeds and injury from drought and heat. Scalping the lawn by setting the mower at a lower height inhibits root growth and increases the growth of weeds such as crabgrass. Maintaining a mowing height of three inches can reduce crabgrass by 50 to 80%. Zoysiagrass is an exception. It should be mowed between 1/2 and 1-1/4 inches tall.

**MOW REGULARLY.** Don't wait until the grass is high before cutting it. Never clip off more than one-third to one-half of the grass blade. Infrequent mowing hinders root growth and stress tolerance.

**USE SHARP BLADES.** Dull blades cause jagged tears and wounds. The lawn looks bad and is more susceptible to disease. Professionals sharpen mower blades as frequently as every other mowing.

**RETURN CLIPPINGS TO THE LAWN.** Grass clippings decay rapidly and do not produce thatch in the lawn. Clippings return a lot of free nitrogen (N) to the soil, saving you the cost and effort of buying and spreading fertilizer. Grass clippings can supply one lb. or more of N per 1000 square feet per year. Depending on your irrigation and mowing habits, that may be all the N your lawn needs. (Adjust the annual fertilizer schedule to allow for the N from the clippings. See Appendix C.)

You might decide to remove long clippings from overgrown grass. If long clippings lay in brown windrows, they can yellow the grass under them until they are dispersed by the next mowing.

**MULCHING MOWERS** are useful because they produce finely cut clippings that decay quickly. Mulching mowers work well if the lawn is cut when the grass is dry and the turf is maintained at the proper height.

**NEVER CUT A WET LAWN.** Wet clippings will clump and not disperse. A wet lawn also cannot be cut properly.

**PERIODICALLY CLEAN YOUR MOWER.** A clean mower will minimize lawn diseases, which may be carried by fungal or bacterial spores on the mower. When you have finished mowing, hose off the lawnmower deck on both the upper and underneath parts.

## MOWING ZOYSIAGRASS

Zoysiagrass requires mowing during its active growth period, mid-May through August. It is slow-growing and more attractive when mowed low at 1/2 to 1-1/4 inches.

A five-bladed reel mower will provide the best cut for a zoysiagrass lawn. A close mowing in late April will remove brown tips and encourage earlier greening of a zoysiagrass lawn.

## AVOID THATCH

Grasses that produce runners (e.g., Chewing's fescue, zoysiagrass and bluegrass) can produce thatch, a mat of living and dead turf stems and roots that forms a spongy layer on top of the soil. A thin layer of thatch (1/2 inch) is beneficial, but too much watering and excessive nitrogen fertilization can cause an excess of thatch. Thick thatch can prevent water, air, and fertilizer from reaching the soil. It also makes a great home for some harmful lawn pests. The grass roots may even begin to grow within the dense thatch. This shallow-rooted grass will thin and eventually die because the thatch can't hold enough water. Thatch makes mowing harder, too.



*A Beautiful, Healthy, Dense Fescue Lawn*

Dethatching is best done in September. The second-best time is in the early spring. Dethatching works better when you thoroughly water the lawn the night before.

Rake up all the loose thatch (greater than 1/2 inch). Better yet, rent a power rake dethatcher or verticutter, or call a lawn care professional. Dethatching takes time. After you're done, discard or compost the excess thatch brought to the surface.

If thatch growth is somewhat heavy, you (and your neighbors) may want to rent a core-aerating machine from the local garden center. An aerator will pull soil cores from the lawn. Use a rake to break up the soil cores that the aerator throws on the lawn. (Professional landscapers drag a small piece of chain link fence to break up these cores.) These broken-up cores help decay the thatch into a topdressing without harming the grass. Core aeration also reduces soil compaction.

## FERTILIZING

Pay careful attention to your fertilizer regimen. Your fertilization practices can bring you into direct conflict with the laws of New Jersey while undermining the health of Barnegat Bay. In addition, your low-maintenance fescues simply don't want a lot of fertilizer. You can kill them with kindness.

The trick is to have nutrients available to the turf when it is actively growing, but not in a form or quantity that will leach to the groundwater. If leaching occurs, you have wasted your money and added to the pollution of Barnegat Bay. If it has been two or three years since you had your soil tested, now is the

time to do it. Sandy Ocean County soils tend to be acid, so lime is often needed for turfgrasses. However, don't lime or fertilize just because your neighbors do. Add lime as recommended by a soil test. Nitrogen is needed each year at the rate of zero to 3.0 lbs. per 1000 square feet, depending on the soil conditions, lawn type and age, your management style, and your desired turf quality. A soil test will help you sort all that out.

## WHEN IS THE BEST TIME TO FERTILIZE A COOL SEASON LAWN?

Rutgers University turfgrass specialists recommend two to three lawn fertilizations per year for Ocean County: early September, mid-October, and mid-May. An optional fertilization can be made in mid-April, depending on the condition of the grass. (See Appendix C for schedule.)

**SLOW-RELEASE FERTILIZERS** are applied less frequently. Also, returning grass clippings to the lawn could eliminate one of the fertilizations. More information on fertilizers is included in Appendix C.

**APPLY THE BULK OF THE FERTILIZER IN THE FALL.** This produces a dense, drought-resistant grass the following year that has deeper roots and fewer problems from weeds and disease. The fall-fertilized lawn will show adequate spring greenup without excessive growth. Apply fertilizer when the turf is actively growing. Don't apply too early in the spring. Let the turf use its own stored nutrients first. Excess fertilizer in early spring may overstimulate the grass, increase the need to mow, and make the grass more susceptible to disease and summer stress.

# WHAT TYPE OF FERTILIZER SHOULD I USE?

Nitrogen (N) is essential to most plants. Nitrogen fertilizers come in two general kinds—water-soluble and water-insoluble. Water-soluble N fertilizers (WSN) are “quick-release” fertilizers that provide available N as soon as they get wet. They are easy and inexpensive to apply, but they must be used properly to avoid problems.

Examples of WSN fertilizers include urea, ammonium sulfate, and ammonium nitrate. Unfortunately, large amounts of WSN can leach away quickly in sandy soil and may run off into nearby streams and lakes, ending up in Barnegat Bay. Excess WSN may cause grass to grow too fast or lawns to burn. If you use these fertilizers, apply small amounts at regular intervals. This strategy reduces fertilizer waste and pollution.

Water-insoluble nitrogen (WIN), slowly-available water-soluble nitrogen, and controlled-release nitrogen are terms used on a fertilizer label to designate that the fertilizer contains “slow-release” nitrogen. These provide a continuous supply of N over a period of weeks or months. The growth of the lawn is more gradual and nitrogen is less likely to be leached from the soil before the grass can use it. They also protect the lawn against fertilizer salt injury, leaching, and over-stimulated growth. Slow-release fertilizers include sulfur- or polymer-coated urea, IBDU, ureaformaldehyde, methylene urea, and natural organics. Be sure to check the fertilizer bag for percentage of WIN or slow-release nitrogen. The New Jersey Fertilizer Law requires that the N content of lawn fertilizers be at least 20% slow-release nitrogen.

Natural organic products such as blood meal, fishmeal, cottonseed meal, poultry litter, and composted materials vary in the amount of slow-release N. They are sources of micronutrients and organic matter as well as major nutrients, and they improve the carbon-to-nitrogen ratio of the soil. Carbon is a vital nutrient for plants and soil bacteria. Considered simply as organic matter, the use of natural organic fertilizers makes a contribution to soil health.

Organic fertilizers are generally lower in nitrogen, and therefore require heavier applications than conventional fertilizers. Some organics will take longer to produce a growth response, but the response will last longer than water-soluble fertilizers. Like any fertilizer, organic fertilizers can be over-applied. They also should be applied according to soil test results and the New Jersey fertilizer law.

**NEVER FERTILIZE COOL SEASON GRASSES DURING THE HOT SUMMER MONTHS.** This overstimulates lawn growth and water use, depleting plant energy when the lawn would naturally go dormant. Excess summer fertilization can also increase insect and disease damage. Remember, more is *not* better. Never apply too much fertilizer. Carefully follow your soil test recommendations or those found on the chart in Appendix C.

Zoysiagrass is an exception to the above rule. Zoysiagrass should *only* be fertilized during the summer, when it is actively growing. Late May and mid to late July fertilization is best. Established zoysiagrass requires less fertilizer than most grasses and will endure long periods without fertilization.

## HOW TO APPLY FERTILIZER

Avoid burns or yellow streaks from unequal distribution of fertilizer. After you figure out the total amount of fertilizer needed, divide the amount in half. Put this half into the spreader and cover the whole lawn. Follow manufacturer's directions for the desired rate and proper overlap. Now put the other half of the

fertilizer into the spreader and apply at right angles to the first application. Your lawn will be uniformly green.

## LIMING THE LAWN

Low-maintenance fescue turf grows best with soil pH values between 6.0-6.5. Higher maintenance bluegrasses prefer a pH of 6.5-6.7. When the pH is lower, liming will raise the pH. Be patient. Surface-applied lime takes a long time to change the soil pH. Lime can be applied any time that the ground is not frozen. However, liming in late summer or early fall allows time for the lime to begin to work before the grass grows next spring. Use your spreader and split the lime into two applications, with the second applied at right angles to the first.



Do not add more than 50 lbs. per 1000 square feet at one time to an established lawn. If your soil test recommendations call for more than this amount, you can spread one-half of the lime at one time, and add the remainder the following season.



# The New Jersey Fertilizer Law and You

The following information is based on an article published in the Winter 2011-2012 *Barnegat Bay Beat*, a publication of the Barnegat Bay Partnership.

While various nutrients are necessary for plant growth, certain nutrients in fertilizer are undoubtedly leaching and running off into aquatic ecosystems throughout New Jersey, including the Barnegat Bay. Excess nutrients are affecting the quality of water in our streams, rivers, and the bay. When it rains, fertilizer on the ground can be carried by runoff water into storm drains that empty into local waterways throughout the Barnegat Bay watershed. From the Metedeconk River in the north to the Tuckerton Creek in the south, these waterways, and the fertilizer nutrients that they carry, eventually flow into the bay.

The U.S. Geological Survey estimates that more than 1.4 million pounds of nitrogen are entering the bay each year from the groundwater, surface water and the air. Nitrogen and phosphorus input into the bay is the main factor in a process called eutrophication, which is an increase in the rate of supply of organic matter into an ecosystem. The nutrients in fertilizer promote the growth of algae, phytoplankton, and plants. This increased growth can negatively impact the ecosystem in many ways, such as creating low dissolved oxygen conditions, making the water more turbid, and even changing the types of plants and animals that normally inhabit the bay.

Signed on January 5, 2011, the New Jersey Fertilizer Law (PL2010, c.112) establishes statewide fertilizer standards in an effort to protect our waterways from nutrient pollution. This law supersedes municipal ordinances, although towns can widen the buffers around waterways. The law sets limits for when and where lawn fertilizer can be applied, restricts the amount of nitrogen used for each application and for the year, restricts fertilizer content, and requires professional applicators to become certified or trained.

How does the law affect the consumer who uses lawn fertilizer? The law says fertilizer should not be applied to saturated or frozen ground, or between November 15 and March 1, the time of year when grass is not actively growing and does not need fertilizer. The law also prohibits any application of fertilizer during or before a heavy rainfall, which could cause runoff of fertilizer from the lawn to storm drains and local waterways. Any fertilizer inadvertently applied to an impervious surface, such as a driveway, sidewalk or street, must be swept or blown

back to the lawn, or returned to an appropriate container for reuse.

Another important lawn practice required by the law is the establishment of a buffer along a body of water. Fertilizer should not be applied to lawns within 25 feet of any waterbody; this distance can be reduced to 10 feet if certain equipment is used. These distances are the minimum requirements – the wider the buffer, the better the protection for the waterbody.

Restrictions on the types and amounts of fertilizer that can be applied to lawns are included in the law. In New Jersey many soils have adequate amounts of phosphorus. The use of phosphorus fertilizers are prohibited, except in certain situations, such as during the establishment of a new lawn, when a soil test indicates a need for phosphorus, or when using fertilizer derived from sewage sludge or animal or vegetable manures. When consumers apply nitrogen-containing fertilizers, they will be required to use one that contains at least 20% slow-release nitrogen, a form that is released over time and is not water-soluble. Slow-release nitrogen is less likely to leach into groundwater or get washed away by stormwater. The 20% requirement is the minimum – using higher percentages of slow-release nitrogen would be even better for reducing nitrogen inputs into the bay while providing an even, long-lasting supply of nutrients to the lawn.

Consumers should not use more than 0.9 pounds of nitrogen per 1000 square feet of lawn for each application, and not more than a total of 3.2 pounds of nitrogen per 1000 square feet of lawn each year. After January 5, 2013, all turf fertilizers sold in New Jersey must meet the content standards for nitrogen and phosphorus and be labeled for appropriate application amounts pursuant to the law. As fertilizer manufacturers reformulate their products to meet these requirements, homeowners will be able to comply with the nitrogen and phosphorus limits by simply following the label directions on the fertilizer bag.

By following the common sense application practices required by the law and using fertilizer products that meet the law's content standards, consumers will not only have a good-looking lawn, but also will be doing their part to take care of the Barnegat Bay.



## NJ FERTILIZER LAW HIGHLIGHTS FOR HOMEOWNERS

### *WHEN Not to Apply*

- Between November 15th and March 1st.
- When the ground is frozen or saturated with water.
- During or just before a heavy rain.

### *WHERE Not to Apply*

- To impervious surfaces, such as driveways or sidewalks. Sweep up or blow onto turf any fertilizer that inadvertently lands on impervious surfaces.
- Within 25 feet of a waterbody.



Buffer can be reduced to 10 feet if using the following:

- Drop spreader
- Rotary spreader with a deflector
- Targeted spray liquid fertilizer

### *WHAT Fertilizer Content*

- Use fertilizers containing at least 20% slow-release nitrogen.
- Do not use fertilizers that contain phosphorus. Use of phosphorus is permitted in certain cases such as when a soil test indicates a need, or when repairing or establishing a lawn. See the professional highlights for other instances.

### *HOW MUCH Nitrogen*

- For each application, do not apply more than 0.9 pounds of Nitrogen per 1000 square feet of lawn.
- For each year, do not apply a total of more than 3.2 pounds of N per 1000 square feet of lawn.



## NJ FERTILIZER LAW HIGHLIGHTS FOR PROFESSIONAL LAWN CARE CONTRACTORS

### *Certification*

Professionals must go through training and become certified or go through approved training and be supervised by a certified applicator. Both training and certification are done online at <http://profact.rutgers.edu/>.

### *Golf Courses and Farms*

Golf courses and farms are exempted from the law, except that anyone professionally applying fertilizer to golf course turf or grounds must be certified.

### *Nitrogen Amounts Allowed*

Professionals can apply no more than 0.7 lb. of water-soluble nitrogen per 1000 sq. ft. per application. The total nitrogen applied cannot exceed 1.0 lb. per 1000 sq. ft. per application. The annual total for all applications should not exceed 4.25 lb. nitrogen per 1,000 sq. ft.

### *Phosphorus*

Phosphate may be applied to lawns under the following conditions:

- If recommended by a soil test that is less than three years old.
- In establishing vegetation for the first time, such as after land disturbance in accordance with the N. J. "Soil Erosion and Sediment Control Act", usually called Chapter 251.
- When re-establishing or repairing a turf area.
- When delivering liquid or granular fertilizer under the soil surface directly to the feeder roots of trees and shrubs.
- When fertilizer is a Class A biosolid.
- If the phosphate contained in the fertilizer is solely derived from a natural organic source and only 0.25 lbs. of phosphate per 1,000 square feet is applied.

### *Buffer Areas*

Once a year a professional may apply a rescue treatment to turf in a buffer area. The nitrogen applied must conform to the standards of the law.

### *Penalties*

Professionals are subject to violation penalties of \$500 for the first offense and up to \$1000 for subsequent offenses.

### *TIPS*

Try Rutgers' easy-to-use Fertilizer Calculator (<http://rutgersnifertilizerapp.blogspot.com>) to figure out the amount of your particular fertilizer to apply to be within the nitrogen limits. By January 5, 2013, all lawn fertilizers sold in New Jersey must meet the new content requirements, and it will be even easier to comply with the nitrogen limits – just follow the fertilizer bag's label directions.

Get a soil test to determine the nutrient needs of your soil. Contact your local Rutgers NJAES Cooperative Extension office for a soil testing kit. Visit <http://njaes.rutgers.edu/soiltestinglab> for more information.

Resources for more information and fuller discussion of the New Jersey Fertilizer Law:

New Jersey Department of Environmental Protection: <http://www.nj.gov/dep/healthylawnshealthywater>.

Rutgers New Jersey Agricultural Experiment Station: <http://snyderfarm.rutgers.edu/>. Click on "NJ Turf Fertilizer Law."

Professional Fertilizer Applicator Certification and Training (ProFACT) <http://profact.rutgers.edu/>.



*Excess fertilizer spread on the lawn becomes nutrient pollution in Barnegat Bay.*

# Chapter III CONTROLLING LAWN PESTS: Insects, Diseases, and Weeds

## INTEGRATED PEST MANAGEMENT (IPM) AND LAWNS

OCEAN COUNTY SOIL CONSERVATION DISTRICT AND RUTGERS NJAES COOPERATIVE EXTENSION RECOMMEND INTEGRATED PEST MANAGEMENT (IPM) METHODS TO CONTROL HARMFUL LAWN PESTS. Horticulturists not only define damaging insects as “pests,” but weeds and plant disease as well. IPM is the use of environmentally friendly landscaping methods to prevent and control pest damage. IPM methods seek to prevent pest attacks. If pests reach damaging levels, they can be managed in a variety of ways. Pesticides are only used if necessary, and the least toxic product is chosen. Many Rutgers NJAES Cooperative Extension publications are available to help you follow IPM methods in controlling pests. Please go to <http://njaes.rutgers.edu/pubs/>.

TWO IMPORTANT IPM LAWN CARE METHODS are planting the right type of grass seed, and properly preparing the soil. There is a discussion of other IPM methods in the chapter entitled “IPM Landscape Pest Control” on page 44. Some lawn care professionals use IPM methods but call it something different, such as “Plant Health Care.” Below is a short summary of IPM methods for maintaining your lawn.

The most important step in IPM is monitoring. Monitoring, by performing a regular inspection of your lawn, allows you to locate pests early, when they are easier to control and haven’t caused as much damage. Check the lawn for signs of problems every time you mow. With bi-weekly inspections of your lawn, you can see if the problem is getting worse or if your control method is working.

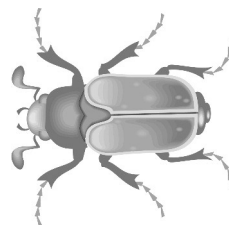
Make sure you correctly identify your lawn problem. Don’t guess, and don’t just spray the pesticide you have in the garage to see if it will stop the problem. Often the cause is cultural, and no amount of pesticide will help. You may need to adjust the soil pH or your fertilization or watering habits, or improve the soil drainage. Rutgers NJAES Cooperative Extension publications on lawn care can help. See your local RCE office or visit <http://njaes.rutgers.edu/pubs/>.

Your local office of Rutgers NJAES Cooperative Extension may be able to help with diagnosing the problem. For more difficult cases, the Rutgers Plant Diagnostic Laboratory offers fee-based diagnostic and identification services. Information about the Diagnostic Lab is available from your local RCE office or online at <http://njaes.rutgers.edu/plantdiagnosticlab/>.

### ABOUT LAWN SAMPLES

For diagnosis of problems, the best lawn sample is a square foot of turf that shows the line where bad grass meets good grass. It is along that front that insects and diseases are the most active. Scalp out the square foot, including only the surface soil. After analysis, the sample can be placed back in the lawn or you may decide to send it to the Plant Diagnostic Laboratory.

Decide whether you can live with the disease or insect infestation. How much trouble is it going to cause? For example, by late summer, the pest may finish its life cycle and go away without causing too much damage. It may be better to tolerate some damage that is not life threatening to the lawn. Then, you can repair the lawn at the proper time.





## IPM ALTERNATIVES TO PESTICIDES

**PHYSICAL AND HORTICULTURAL CONTROLS:** These controls improve turf health so the grass can better withstand pest attacks. For example, the addition of a little fertilizer will curtail certain diseases, such as dollar spot and red thread. Mowing three inches high minimizes other diseases and reduces crabgrass.

**BIOLOGICAL CONTROLS:** These are nature's natural checks and balances. "Beneficial" insects, such as spiders and beetles, kill the pest insects and eat their eggs. Beneficial fungi, nematodes, and bacteria, such as Milky Spore and Bt, are also commercially available.

**BIORATIONAL PESTICIDES:** Biorational pesticides are low toxicity products considered environmentally safe. Horticultural oil, insecticidal soap, neem oil, and other products are biorational. These products work best on small, immature pests. Follow label instructions for best results. Many biorationals have little residual action, so multiple applications may be necessary.

*Professional landscapers have access to some fast-acting, low toxicity pesticides that are unavailable to the*

*public. Some of these products prevent insects from molting. Other pesticides are absorbed by the foliage and kill after being ingested by the pest. Call a qualified landscaper to assist with severe pest problems.*



Please see Chapter V, "IPM Landscape Pest Control," for a more complete description of biological and biorational pesticides.

**DIAGNOSIS:** Determine what caused the pest outbreak in the first place. Often, several causes (weather, water, mowing, fertility) work together to cause the pest population to build up. Target those causes and correct the situation in order to prevent pest attacks (and pesticide use) in the future.

## CONVENTIONAL PESTICIDES

Sometimes, conventional pesticides are needed to control pests. Many pesticide labels may state that they control a particular pest, but some pesticides are more effective than others. Check with Rutgers NJAES Cooperative Extension to determine the best product to control your pest. Pesticides should not be applied to the entire lawn "just in case." This is not an ecologically sound practice.

Figure 1

### ENVIRONMENTAL CONDITIONS PREFERRED BY SPECIFIC WEEDS

WEED	CONDITIONS PREFERRED
common chickweed	shade, poor drainage, light and frequent watering
knotweed	compacted soils
black medic	dry soil, high P
henbit	moist, fertile soil
violets	shade; cool, moist soil

(Source: Shultz, W., *The Chemical Free Lawn*)

After the weed is identified, determine if there are too many weeds to live with. Before treating weeds, determine the best time of the year to control them. For example, dandelion is best controlled in the fall when the plant is immature, not in the spring when it flowers. (See Figure 2.) Weeds can be killed more efficiently when they are small and less herbicide is needed.

Figure 2

## BEST TIMING TO CONTROL CERTAIN BROADLEAF WEEDS

<u>WEED</u>	<u>CLASSIFICATION*</u>	<u>TREATMENT TIMING</u>
black medic	A,B,P	April-May
buttercup	WA,B,P	October-November
chickweed	WA, P	October-November
white clover	P	October-November
dandelion	P	October-November
wild garlic	P	October-November; February-March
ground Ivy	P	April-May
henbit	WA	October-November
knotweed	SA	March-April
lambsquarter	SA	April-May
plantains	P	October-November
purslane	SA	May-June
red sorrel	P	October-November
spotted spurge	SA	May-June
violet	P	April

\*A=annual; B=biennial; P= perennial; SA= summer annual; WA= winter annual

(Source: J. Derr, VPI & SU, 1998)

PHOTO CREDIT: C. MINERS



*Never spray just because you did at the same time last year.* Make sure that the pest is present and properly identified before you spray. Spray only the infected area, not the entire yard. This saves time, pesticides, and money.

## CONTROLLING WEEDS IN THE LAWN

Weeds in a lawn are a symptom of poor soil conditions. Turf may be sparse as a result of acidity, low nutrients, low organic matter, or poor soil structure. Under these conditions, the turf cannot develop a deep root system and weeds invade. Applying herbicides and fertilizer does not get rid of the weeds long-term if the soil is in poor health. Use the *Soil Health Assessment Guide* to evaluate the soil in your lawn, and consider whether you need to go back to basics by correcting the underlying poor soil conditions. See Chapter II to decide whether to renovate or replace your lawn if weeds are a problem.

Lawn weeds are either “broadleaf” or “grassy.” Broadleaf weeds have broad leaf blades. Dandelion, clover, spurge, and plantain are examples of broadleaf weeds. Grassy weeds have thin leaf blades. Goosegrass and crabgrass are grassy weeds. Different controls are needed for these two different types of weeds.

Your mowing height influences turf density and therefore weeds. Encourage dense turf and discourage weeds by mowing high (3 inches). High mowing will shade low-growing weeds to keep them from developing. Dormant weed seeds that are shaded under a high mowing regimen tend not to germinate. Frequent high mowing may also cut off seed heads and growth points of certain weeds, slowly reducing their numbers.

**HERBICIDES ARE PESTICIDES USED TO CONTROL WEEDS.** Herbicides may kill the weeds but will not correct the underlying problem. Individual weeds take advantage of unhealthy site conditions that impair turfgrass growth. (See Figure 1.) These unhealthy site conditions include soil compaction, improper fertilization, drought, and improper mowing.

After the weed is identified, decide if there are too many weeds to live with. Before treating weeds, determine the best time of the year to control them. For example, dandelion is best controlled in the fall when the plant is immature, rather than in the spring when it flowers. (See Figure 2.) Weeds can be killed more efficiently when they are small and less herbicide is needed.

## USING HERBICIDES

Herbicides are compounds designed to kill weeds. There are two types.

Preemergent herbicides kill weeds as the seeds sprout. These are often used for grassy weeds. For example, crabgrass is a weed that germinates in the early spring. Therefore, the right time to use a crabgrass preemergent herbicide would be late March.

Postemergent herbicides kill weeds *after* they come up. These are best used when the weed plant is small and immature. The weed is easier to kill at this point, and it takes less herbicide to do so. Postemergent herbicides are primarily used for broadleaf weeds. They are usually not as effective in killing grassy weeds. Postemergent herbicides kill actively growing weeds.



For perennial weeds, use non-residual broad-spectrum herbicides. Be careful. These chemicals are non-selective herbicides that kill any plants they touch. Read the label and target your treatment to avoid spraying lawn grasses and ornamentals.

Preemergent herbicides prevent weed seed germination. They control annual grasses and/or broadleaf (perennial and biennial) weeds in shrub plantings, lawns, vegetable gardens, and flower beds. When applied according to label directions, they are safe on nearly all ornamental plants.

### USE ONLY RECOMMENDED HERBICIDES

Before you buy any herbicides, you must identify the weed. Although an herbicide label may state that it controls a particular weed, some herbicides are more effective than others. Rutgers NJAES Cooperative Extension recommendations discuss the proper herbicides for common lawn weeds.

- Spot treat only the weeds. Treat with the least toxic herbicide that will control the specific weed.
- Make sure that the herbicide you buy is labeled for the weed you want to kill. Some weeds are resistant to common herbicides.
- Use as little herbicide as possible to treat the problem. It is very important to carefully read and follow the instructions on the bag or bottle of herbicide. Mix only the amount needed to treat the problem.
- Different diseases and pests require the use of different chemical pesticides.





**The pesticide label is a legal document. You are required to use the pesticide only as directed on the label. In addition, the label is useful in understanding application rates and handling precautions. Always read and follow the label directions.**

**LEAST-TOXIC HERBICIDES** include herbicidal soaps and corn gluten meal. Herbicidal soaps are potassium-based soaps that dry up the weeds. Unfortunately, they are non-selective, so they will kill desirable plants as well as weeds. Use herbicidal soap for spot treatments, applying it carefully with a spray bottle. You may need more than one application to do the job.

**CORN GLUTEN MEAL** is sold as a preemergence herbicide to control grassy and broadleafed weeds. However, corn gluten meal is a source of nitrogen and at the preemergence rate (20 lb/1000 sq. ft.), the nitrogen content exceeds the limit allowed under the New Jersey fertilizer law.

**SPOT TREAT INDIVIDUAL WEEDS, IF POSSIBLE.** You may not have to treat the entire lawn with the herbicide. When treating a grassy weed problem, treat only the infested area. This saves time, money, and herbicide. Use only the amount sug-

gested on the label. More never works better and more is never better for your lawn, your health, or the environment.

#### **REMEMBER THESE RULES:**

- **DON'T APPLY PESTICIDES** if the temperature is higher than 85 degrees or if it is windy. Weather conditions and time of day affect pesticide effectiveness. Read the label.
- **WEAR PROPER PROTECTIVE CLOTHING** and eye covering when applying pesticides. The label tells you what protection is needed.
- **PURCHASE ONLY THE AMOUNTS NEEDED** for one season. Don't store pesticides for years.
- **DISPOSE OF OUTDATED CHEMICALS** during Ocean County's household hazardous waste collection days. Call the Ocean County Department of Solid Waste Management for more information, (732) 506-5047.
- **PESTICIDES SHOULD BE LOCKED UP** and out of reach of children, pets, and unauthorized persons, to avoid possible poisoning.

PHOTO CREDIT: USDA, NRCS PHOTO GALLERY



*Spot spray weeds to minimize herbicide use.*



# Chapter IV

## ALTERNATIVES TO THE HOME LAWN: Flowers, Trees and Shrubs, Groundcovers, and Ornamental Grasses

### REDUCE YOUR LANDSCAPE'S WATER REQUIREMENTS

You can reduce your costs for water, fertilizer, and mowing and at the same time protect our surface waters by landscaping with ornamentals that require little water or added nutrients. Low-maintenance landscaping focuses on the selection of drought-tolerant plants and encourages the reduction of turf area. Turfgrass is your landscape's greatest consumer of water. If you want to reduce your landscape's water requirements, plant more ornamental plants and less turfgrass.

### PREPARE THE SOIL

Soil evaluation and preparation needs to be carefully done before planting ornamentals. The trees, shrubs, flowering perennials and ornamental grasses will be in place for a long time. They can never grow and thrive if the soil is not correctly prepared. Use the *Soil Health Assessment Guide* to evaluate compaction and the general state of the soil, and check the area's underlying soil type and drainage on the Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov/>.

Get a soil test done at the Rutgers Soil Laboratory or another testing facility. If you are reserving some areas for native, acid-loving plants, sample those areas separately from areas where you plan to use plants that need a less-acid soil. You will need to lime the two areas differently.

Your best shot at correcting soil compaction is before you plant. Spread two or three inches of leaf compost or other organic material and till it in as deeply as possible. A six-inch depth is good, and eight inches is even better. You can till lime and recommended fertilizer in along with the compost. All these materials need to be thoroughly mixed with the soil to have the best effect on plant growth.

USE MULCH TO CONSERVE WATER AND REGULATE SOIL TEMPERATURES. Mulch defines a planting bed and separates the lawn from plantings in landscape design. Use two to three inches of organic mulch, such as wood chips, shredded bark, or conifer needles. Lawn clippings can be used in thin layers if they are free of herbicide. Avoid peat moss, which tends to shed water and which often dries up and blows away. Straw and pine needles may be flammable, a concern especially in Pinelands areas where fire is a constant threat. Non-organic mulches include crushed stone and landscape fabrics.

## CHOOSING PLANTS

### TIPS ON PLANT CHOICE

- Remember that native plants prefer an acid soil. Group plants with similar pH requirements so that they all grow their best.
- The lists in Appendix B are a starting place for choosing plants suitable for a low-maintenance landscape. These include both native and non-native plants that are adapted to our local climate and soil conditions. The lists include the pH and moisture tolerance of the plants. These adapted plants require minimal maintenance and tolerate drought after they are established.

- Remove invasive plants. Invasive plants grow rapidly and drive out native plants when they spread from the garden to other locations. Common invasive plants include butterfly bush, mint, some bamboos, and Japanese barberry. As they replace native plants, invasives change the food and cover available to birds and animals and cause disruption to the local ecosystem.
- Choose the right plant for the site. Determine the plant's sun and shade requirements. For example, don't plant a mountain laurel in full sun. It is native to the forest understory and placement in full sun will make it more susceptible to pest problems.

■ Know how big the plant will grow. Don't be fooled by the cute little plant in the pot. For example, spruce trees will get 40 to 60 feet tall and 20 to 30 feet wide and shrubby junipers may get 12 feet tall and as wide. Don't plant either three feet from the house under the picture window, or right next to the sidewalk or driveway. Select plants that won't outgrow the available space.

#### OAKLEAF HYDRANGEA

PHOTO CREDIT:  
USDA, NRCS. 2004.  
The PLANTS Database,  
Version 3.5  
<http://plants.usda.gov>.  
National Plant  
Data Center,  
Baton Rouge, LA  
70874-4490 USA.



## PRACTICAL & SHOWY FLOWERS

Flowering plants are a good alternative to lawns. Not only will they beautify your landscape, but also flowers attract the beneficial insects that control harmful insect pests.

### Flowering Perennials

Perennials are plants that live for more than two years. Well-selected perennial flowers can be attractive, low-maintenance plants. Some perennials spread quickly to form a dense, weed-controlling groundcover. Others need more maintenance, especially for control of perennial weeds. A good layer of mulch helps immensely.

Select perennials that are suitable for your site, sunlight, shade, and watering conditions. Plant a variety of perennials that bloom in different seasons so that you will have continuous bloom and color. Plant perennials in groups of three or six. Many perennials need to be divided every three to four years to keep them uncrowded and blooming freely.

### Flowering Annuals

Annual flowers are plants that live only one season. They require more water than established perennials. Restrict them to small grouped areas in front of the house where they can be watered efficiently. For the best show, plant annuals in masses of one color. Select only those which can withstand the extremes of summer's heat.

## Plan flowerbeds for annuals and perennials.

■ Draw out bed lines using a line of lime or rope, a flexible garden hose, or even twine. Bed lines can be straight, curved, or circular. Long, flowing curves are more interesting and pleasing than straight lines, and are easier to mow along than tight, fussy curves. Group flowers together in beds according to their watering requirements, height, and blooming season. For example, separate drought-tolerant perennials from water-hungry annuals.

■ Place the smaller flowers with a height of 12-18 inches in front. Place the flowers that grow 18-30 inches high farther back, the tallest being placed along the back of the border. To prolong the blooming season and spur new flower growth, remove any dead flowers (deadheading). Some annuals, such as begonia and torenia, do not require deadheading for season-long bloom.

## Fertilizing Annuals and Perennials

Perform a soil test on the area and follow the recommendations.

### ANNUALS AND NEW PERENNIALS

■ Soil test recommended fertilizer that is broadcast before planting should be tilled lightly into the soil immediately before planting. Use slow-release nitrogen sources to minimize nutrient loss before the roots spread.

■ Water plants in with a half-strength solution of water-soluble fertilizer to settle soil around the roots and get the plants off to a fast start.

■ A surface application of high-nitrogen fertilizer can be used in mid-summer if plants look undersized and yellow. If your annuals are booming along, save your money and effort and spare Barnegat Bay the fertilizer load.

### ESTABLISHED PERENNIALS

■ Plant perennials as recommended for annuals. In the second and subsequent years, fertilize with slow-release nitrogen fertilizer as necessary when the plants are in active growth, and not after mid-July. Perennials vary widely in their fertility needs. Learn the individual plant's requirements and avoid fertilizing by formula. As organic mulch breaks down over time, it may supply enough nutrients for some perennials.

Avoid getting fertilizer on the flower leaves. Don't apply fertilizer during times of extreme temperatures, drought, or heavy rain.



 Ornamental  
grasses and blue-  
berry bushes  
are ideal for  
Ocean County.



## Wildflowers

Wildflowers are perfect for sunny places at the rear of the property, along fences, and next to streams. Wildflowers require less care than more traditional plantings. Besides reducing lawn area and water use, you'll have a colorful landscape that is a habitat for many beneficial insects, birds, and small animals.

It takes about three years to establish a wildflower garden. The annual wildflowers will dominate the first season, and the others will catch up in a couple of years.

### Planting and maintenance of wildflowers

#### ■ SEED SELECTION: Choose fresh seed.

If there are no hard or sheep fescues in the seed package, mix in about 1/2 ounce of fescue seed for every 1000 square feet of wildflower seed. The fescue acts as a "nurse crop" to help keep out weeds. Wildflower seed mixtures should contain a large assortment of annuals, biennials, and perennials. This will ensure that your garden will bloom from spring through autumn. Wildflower mixtures typically contain seeds for 40 to 60 different types

of plants. After a couple of years, those best suited will dominate the landscape, growing almost wild and needing only limited maintenance.

■ **PREPARE THE SITE:** Test the pH to be sure it is suitable for wildflowers, and adjust as recommended. Test areas for wildflowers separately from areas for cultivated flowers. Avoid tilling the soil, which brings fresh weed seeds to the surface. In weedy spots or in existing turf, you may need to use a broad-spectrum herbicide to remove existing vegetation. Select an herbicide that has a short soil residual, and be aware that it will kill all plants on which you spray it. Herbicide treatment is best done in the fall before spring planting of wildflower seeds.

■ **PLANTING:** Plant wildflowers as soon as the soil can be worked in the spring. Rake the soil lightly. After planting, tamp the seedbed lightly to ensure seed contact with the soil.

■ **MAINTENANCE:** Mulch wildflower seeds lightly with salt hay, straw, or a floating row cover. Water the flow-



ers thoroughly, keeping the soil moist for the first six weeks. Weed control can be tricky, especially during establishment. Remove only those plants that you are sure are weeds. If you are not certain, leave the plants alone until they are more mature.

■ **ANNUAL MAINTENANCE:** In November, cut wildflower plantings to a height of four to six inches. This is not a job for the lawn mower. Use a scythe or hedge clipper. Leave the clippings wherever they fall. This will replenish the supply of nutrients and seeds. Reseeding is recommended during the first three years. In March or September, rake the bare spots, sprinkle the new seeds, tamp lightly, and keep the area moist. If you wish to extend the blooming season, remove any dead flowers so that new ones can bloom, but be sure to leave flowers to set seed for next year as each plant's bloom season draws to a close.

■ **FERTILIZING WILDFLOWERS.** In properly prepared soils, most wildflowers don't need fertilizer. These plants are adapted to low-nutrient soils. If plants are stunted and yellow, they may simply need water, or they may benefit from a very light nitrogen fertilizer application. Use caution with fertilizers. Wildflowers are not tolerant of high-fertility soil. Beside polluting the groundwater, excess nutrients may damage or kill the wildflowers. The clippings you return to the soil should supply enough nutrients.

## TREES and SHRUBS

Tree and shrub borders are another great alternative to turfgrass. Native trees and shrubs, or those plants that are adapted to Ocean County's sandy soil, are the best choices. These plants will have minimal insect and disease problems because they are growing in a suitable site. Natives have the advantage of having evolved along with local insects and diseases, and are adapted to common pests. The trees and shrubs listed in Appendix B are a beginning point for selecting adapted, low-maintenance plants.

## PLANNING & PREPARATION

This is the most important part of planting. You can start in the spring or wait until the early fall. Soil preparation for planting ornamental trees and shrubs is the same as for a lawn; testing and adjusting the soil is just as important (please see the opening page of this chapter and earlier section on soil preparation). With permanent woody plantings, your one chance to get the soil right is before you plant.

■ Look up before you plant a tree. It makes no sense to plant an eventually-tall tree under overhead wires. Take a moment to consider the mature size of the tree versus the height, and also the width, of the space available.

■ Call before you dig. It's the law, and it makes sense. You can dig up and sever utility lines even when planting a tree or shrub. Call 811 before you dig. The utility companies will come out and mark the location of underground pipes and wires.

## SPACING

The classic recommendation is that large shade trees, such as pin oak or maple, should be placed about 50 feet from one another. Medium-sized trees such as river birch should be spaced 35 feet apart. Smaller trees such as flowering dogwood should be placed 15 feet apart. These spacings work well for street trees and more formal settings. In naturalized landscapes, trees and shrubs should be spaced irregularly in imitation of nature. Look at the woods for guidance on spacing and grouping of woody plants.

■ To reduce mowing, place trees, shrubs, and flowers in mulched, contiguous beds. Avoid narrow strips of turfgrass between beds. Don't place trees and shrubs where you might someday build a deck, patio, or pool.

■ A good rule of thumb is to plant trees about 20 to 30 feet from the foundation of the house.

■ Locate large trees at least eight feet away from curbs and sidewalks.

■ Overall in the border, allow at least a 12 x 12-foot soil area for each tree's growth.

■ Do not place shrubs and hedges too close to each other or to buildings. Find out how high and wide the shrub will grow. Try to leave at least three feet between the house and the planting at its mature size. If your bed size is limited, use dwarf varieties of your favorite trees and shrubs.

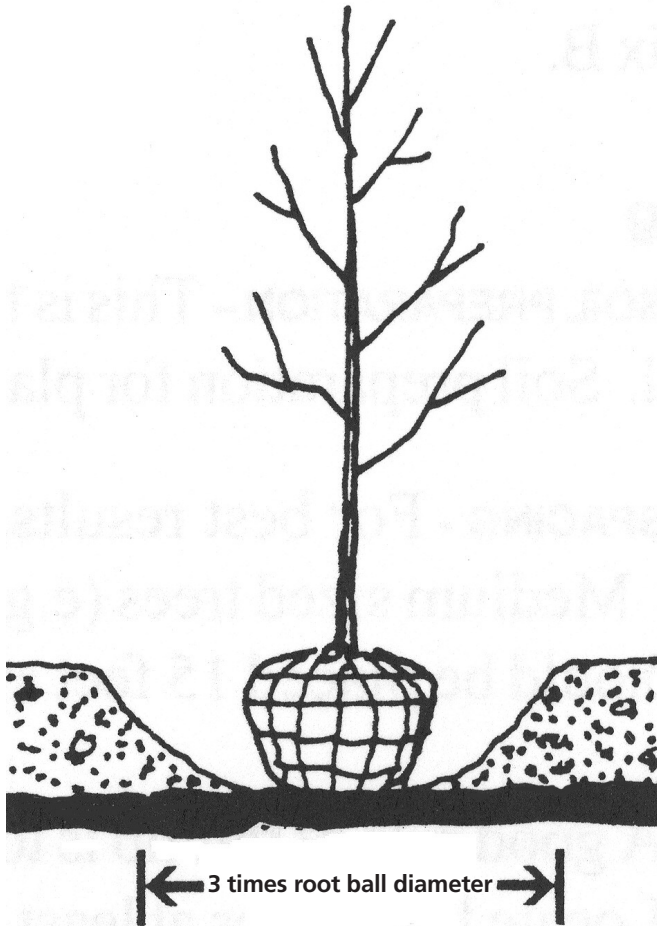


If you only have room for one large tree, place it on the south or southwestern side to protect your home from the heat of the late afternoon sun. The sun's rays will be lower in the sky than at midday, so set the tree about 20 to 30 feet from the house. On more roomy landscapes, try three large trees on the southern exposure. One or two evergreen trees in the northwest exposure can block winter winds.

Figure 3

## THE PLANTING HOLE

Dig the planting hole as deep or slightly less deep than the height of the root ball.



Adapted from The National Arbor Day Foundation

## WHEN TO PLANT

■ **DECIDUOUS TREES** (those which drop their leaves): Plant these either in the early fall or early spring before the leaves bud out. Some trees have lower survival rates when they are dug in the fall. They can be planted in the fall, but they should be dug only in the spring. These species include black gum, sweet gum, birches, dogwood, oak, ash, American holly, and magnolia.

■ **NEEDED EVERGREENS** (narrow-leaf evergreens like juniper, pine and cypress). Plant these in the early spring.

■ **BROAD-LEAF EVERGREENS** (holly, azalea, laurel, etc.). Plant these in the early spring.

■ **BARE ROOT PLANTS** (roses or other shrubs and small trees). Plant these during the dormant season in late winter or early spring.

## HOW TO PLANT

■ Never use the trunk of a tree or shrub as a handle to drag the plant around. This abuse breaks the soil ball and tears off tiny, very important, water-absorbing roots. Move the tree or shrub by grasping the root ball.

■ Plant the tree or shrub no deeper than it was growing in the nursery. Find the top root emerging from the trunk. Dig the planting hole slightly less deep than the height of the root ball measured from the top root. The width of the hole should be at least three times the diameter of the root ball. (See Figure 3.) In compacted soil, dig the hole even wider to help the roots spread and grow. Soil amendments (compost, manure, or other organic material) aren't usually necessary, but may be helpful in really poor soil. If used, no more than one-third of the backfill should be organic matter.

■ Remove all turf at least as far as the branches will extend. Not only does turf gobble water and nutrients before they can reach tree roots, but turf also tempts the use of string trimmers and lawn mowers. The water-conducting tissue of a tree is right under the bark. Damaging and outright stripping the bark will kill young trees. Keep turf away from tree trunks.

■ Place the tree or shrub in the planting hole. Lay a shovel handle or flat board across the hole opening. Use this as a guide for soil height. If the plant is balled and wrapped in burlap, cut the burlap off below soil level and roll the rest of it down and bury it under the soil. Completely remove plastic, synthetic, or treated burlap and properly discard it.

■ If the tree is in a wire basket, scrape gently at the top of the soil ball to find the point where the highest roots flare from the trunk. This point should be at or slightly above the soil level. Remove and discard the wire basket after the tree is settled in the planting hole.

■ Plants in pots or containers should be watered thoroughly the day before planting.

■ For bare-root plants, follow the label planting directions. Form a cone of soil in the planting hole, then place the roots around the cone before filling the hole.



■ Look for roots that kink or circle around the root ball. These roots will eventually girdle the trunk of the tree, killing the tissue that transports water and nutrients inside the tree. Use hand pruners to cut off any circling or kinked roots. On containerized plants, you can use a sharp knife such as a linoleum knife to cut down the sides of the rootball in three or four places and to cut an “X” on the bottom of the root ball. No root should go around the stem or across the root ball, even at a distance from the trunk. Nor should the roots bend up or down. Strive to get the roots spread straight out from the stem. For the long-term health of the plant, it is better to trim a root than to wind it in the hole.

■ After planting, fill the hole about half full with the soil. You might firm the soil to hold the rootball upright, but do not stomp the soil down. Stomping may tear roots off, as well as create compacted soil, which stops root growth. To reduce air pockets, fill the remaining hole with water. After the water has drained, add the remaining soil and water again. Around the edge of the hole, construct a two- to four-inch high ring of soil to hold in irrigation water.

■ Apply organic mulch around the trees or shrub. Border plantings should be mulched to a depth of two to three inches over the entire soil surface. Around isolated plants, spread mulch several inches from the trunk to the drip line (the length of the branches). Do not allow the mulch to touch the tree or shrub bark, and do not cover the soil ball. Excess mulch can stop water from reaching the tree’s roots.

■ Do not add fertilizer at planting. Too much fertilizer can harm the tree or shrub.

■ Prune only dead, damaged, or diseased branches. Prune back to a branch or bud. Never leave stubs.

■ Water at least twice a week for the first two months and during hot weather.



Water to keep the soil moist to the depth of the root ball for the first three growing seasons. Lack of water is the leading cause of death among new trees and shrubs.

AVOID STAKING TREES AND SHRUBS, if possible. Attaching a stake to straighten a plant can weaken the trunk or damage the bark. However, if a tree is too tall to stand alone, or has a weak root system (e.g., a bare root tree), it should be staked. Staking may also be necessary

in very windy areas. Remove the stakes after one year. Wrapping the tree trunk is not recommended.

For more information about planting trees, see “Planting and Establishing Trees” at <http://hort.ufl.edu/woody/documents/EP314.pdf> and Rutgers Fact Sheets such as FS376, “Transplanting Trees and Shrubs” and FS 786 “Six Ways to Keep Your Newly Planted Tree Alive and Healthy.” Available at your local office of Rutgers NJAES Cooperative Extension or online at <http://njaes.rutgers.edu/pubs/>.

## FERTILIZING

### established trees and shrubs

As indicated earlier, you may never need to fertilize your trees and shrubs. If you have tested the soil before planting and corrected nutrient deficiencies and pH levels and added organic matter to the soil, your organic mulch may supply adequate nutrients as it breaks down over time. If your plants grow well, have good color, and flower regularly, added fertilizer will waste your money and may harm the plant. Unnecessary fertilizer, in addition to leaching through the soil to add to pollution of our surface water and groundwater, may actually encourage soft growth on your trees and shrubs and make them more attractive to damaging insects and more susceptible to disease invasion. Never fertilize your plants without a reason.

■ Avoid fertilizing new plantings during the first year. If plants are off-color or are not growing well, first test the soil to see if pH or nutrient adjustments are needed. Also consider whether there might be some problem in the plant’s environment, such as excessive shade or root competition from other plants. Ask for or download Rutgers NJAES Cooperative Extension publications on landscape plant problems. See the Rutgers Publications website <http://njaes.rutgers.edu/pubs>.

■ Fertilizer is not required if the trees or shrubs grow six inches or more per season.

■ Turf is an avid competitor for nutrients with trees isolated in lawns. As the tree grows, remove turf and increase the size of the mulch circle to maintain a ratio of one foot of mulched circle for every inch of trunk diameter.

■ If soil testing shows fertilizer is required, you can spread fertilizer on the surface soil around plants (topdressing). Use a spreader to cover the entire root zone, the circular area that extends several feet beyond the branch spread (drip line) of the tree or shrub. Lightly scratch the fertilizer into the soil. Water thoroughly.

When fertilization is necessary, apply nutrients when plants are in active growth. Probably the best time is late spring to early summer, when the plants have the whole growing season ahead of them.

Use a fertilizer that is at least 30-60% slow-release nitrogen. Your soil test will tell you how much to apply.

For further information on fertilizing trees, see Rutgers NJAES Cooperative Extension Fact Sheet FS031, "How to Fertilize Shade Trees", available at: <http://njaes.rutgers.edu/pubs/>. Search for "fertilize trees."

Soil pH that is too high can limit the growth of broad-leaf evergreens. The high pH causes a condition called chlorosis, in which the new leaves turn yellow with bright green veins. Your soil test will probably tell you to use a fertilizer that contains iron sulfate or iron chelates to lower the soil pH.

## Specialty Fertilizers

Water-soluble fertilizers are quick-release products that are mixed with water and can be applied directly to the foliage. These foliar applications offer only temporary relief of nutrient deficiencies. If it rains, or if the plants are watered within 48 hours of application, unabsorbed nutrients are washed off the plant and may end up in Barnegat Bay.

The best use for water-soluble fertilizers is as starter solutions for vegetable and flower transplants. Fertilizer solutions also temporarily correct nitrogen and iron deficiencies, especially during the high nutrient demand times of the flowering-fruit stages of some vegetables and flowers. See page 23 for a discussion of water-insoluble versus water-soluble nitrogen.



*A mulched planting bed requires little additional fertilizer. Groundcover junipers, ornamental grasses and blueberries are featured here.*



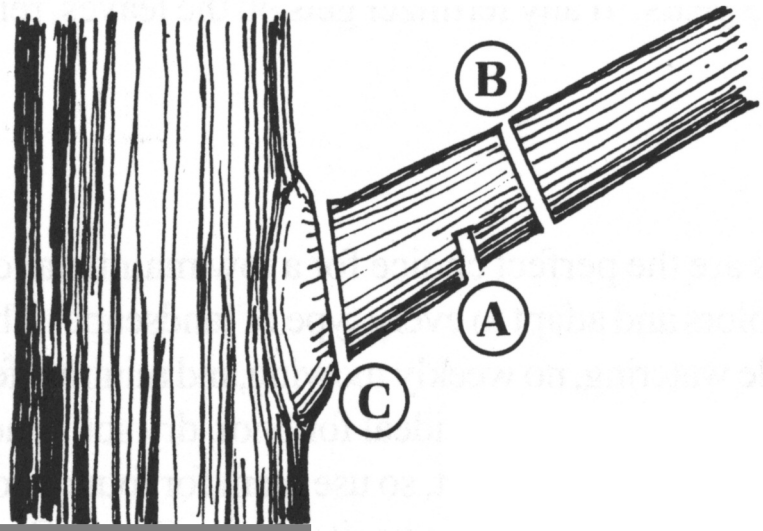
Figure 4

## HOW TO MAKE A PRUNING CUT

### PRUNING LARGE LIMBS

Large, heavy limbs could tear loose during pruning, stripping bark and creating jagged edges which invites insects and disease. That won't happen if you follow these steps:

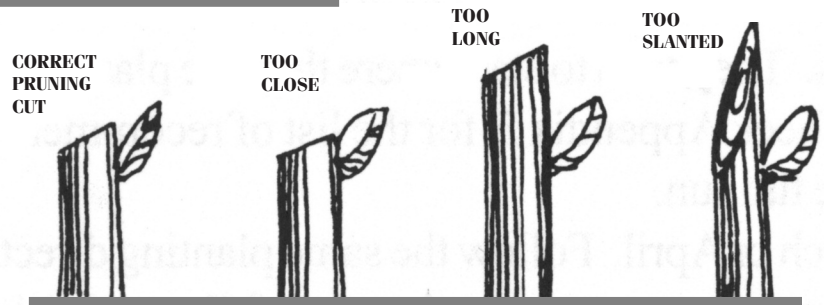
- A:** Cut part-way through the branch from beneath, at a point one or two feet from the trunk.
- B:** Make a second cut on the top of the branch, several inches out from the first cut. This should allow the length of the limb to fall from its own weight and be safely removed.
- C:** Complete the job by making a final cut next to the trunk, just outside the branch collar, with the lower edge farther away from the trunk than at the top.



### PRUNING SMALLER LIMBS

Smaller branches should be cut just beyond a lateral bud or another small lateral branch. The ideal cut is sharp and clean and made on a slight angle.

ADAPTED FROM THE NATIONAL ARBOR DAY FOUNDATION



## PRUNING TREES and SHRUBS

Pruning stimulates the growth of new wood and flowers on shrubs, and trains new hedge plants to develop their special shapes. Tree pruning should be done judiciously and only when there is a reason. Some of the reasons for tree pruning include to remove low branches, to direct growth, to cut back a competing leader and to remove damaged or diseased wood. A pruning cut is a wound to the tree that requires the plant to use energy to seal off the wound. This is energy that would be better used for growth. A tree that requires constant pruning is a tree in the wrong place.

### WHEN TO PRUNE

The best time to do major pruning on most trees and shrubs is late winter or early spring, before new growth begins. Don't prune in late summer. The following exceptions should be noted:

- Spring flowering shrubs (e.g., lilacs, azaleas) are pruned either in late winter or just after blooming occurs.
- Broad-leaf evergreens (e.g., holly, inkberry, boxwood) and narrow-leaf evergreen shrubs (e.g., junipers, false cypress, yew) are pruned after spring growth in late May or early June.

■ If pruning narrow-leaf evergreen trees (e.g., fir, pine, spruce) to control growth, remove half of the current season's growth in late June. Be aware that you can't keep full-size evergreen trees small forever. Better to remove the tree or move it to a site where it can fulfill its genetic potential, and plant a shrub or tree that won't outgrow the site.

## HOW TO PRUNE

- When pruning tree branches, cuts should be on an angle. Never cut the branch flush with the trunk. To avoid tearing bark tissue, use three cuts to remove a large branch. (See Figure 4.)
- Wound paint is unnecessary except in some special circumstances. A thick coat of wound paint can actually trap water and encourage fungi to grow.
- Hedges should be pruned the first year after planting. That year, cut hedges back to 10 inches above the ground. Over time, shear a hedge so that the base is wider than the top. Otherwise, the bottom branches won't get enough light, resulting in a twiggy, sparse base. Every three or four years, remove old wood from the center of the hedge.

## GROUNDCOVERS

Groundcovers are another good choice for the low-maintenance landscape. There are groundcovers suitable for every condition — full sun, partial sun, full shade, wet, or dry. (See the plant list in Appendix B.)

### PLANTING AND MAINTENANCE

- Prepare the entire area to be planted as if you were planting a lawn. Soil testing, tilling, organic matter—the whole careful preparation. Please refer to page 32 in this chapter for soil preparation tips.
- Do not crowd the plants together. Groundcover plants that are individually small, such as bearberry, are spaced fairly closely, perhaps a foot or less apart. Larger woody groundcovers, such as the junipers, should be spaced based on their eventual size.
- Make planting holes two to three times the width of the plant's container, but slightly shallower than the depth of the roots. Loosen the roots and spread them apart before planting. Apply a starter solution of half-strength water-soluble fertilizer. Shape a little trench around each plant to retain water.
- Water thoroughly at regular intervals. Use a drip system or soaker hoses for best results. Follow the directions in the lawn watering section on page 20.

■ Mulching will help control weeds and keep moisture from evaporating during the establishment period. Spread two to three inches of organic mulch over the soil between the plants. Keep the mulch away from the plant stems. Mulch steep banks with straw or salt hay before you plant. Do not use plastic mulch or landscape fabric, which will prevent the spread of groundcovers.

■ To kill weeds, use a post-emergent herbicide suitable for those weeds. Call Rutgers NJAES Cooperative Extension for an herbicide recommendation.

■ Your soil test may tell you that the new planting should be fertilized for the first two or three years to help it spread and get established. Fertilize in the spring as the plants are going into active growth. If any fertilizer gets on the leaves, remove it with a broom or wash it off with water.

## ORNAMENTAL GRASSES

Ornamental grasses are the perfect choice for a low-maintenance landscape. They come in a dazzling array of sizes, shapes, and colors, and adapt to every type of landscape. The seed plumes are especially attractive.

There are many ornamental grasses suitable for Ocean County and the Barnegat Bay watershed. They need little watering, no weekly mowing, and minimal fertilizer. These grasses flourish in a wide variety of soil types, pH, and drainage. Many are ideal for poor, dry soils. They are also largely free of insects and disease. Some ornamental grasses grow as high as seven feet, so they can be used for foundation plantings, color accents, windbreaks, or screens.

### PLANTING AND MAINTENANCE

Select clumping (bunch) grasses. They tend to stay where they are planted. Running (creeping) grasses need room and should be avoided. Check Appendix B for a list of suitable ornamental grasses.

■ Most ornamental grasses will not tolerate shade. They need to grow in the full sun.

■ Plant ornamental grasses in March or April. Follow the same planting directions for groundcovers and perennials. Most ornamental grasses need two seasons to become fully established.



- The space between plants should match their mature height. Prepare the soil by working organic matter into the top six to eight inches of the soil.

*Once established, ornamental grasses need little care. Follow these guidelines:*

- Water only in times of extreme drought.
- Fertilization is probably not necessary. Applying too much nitrogen fertilizer produces weak foliage and sus-

ceptibility to pests. If the plants are growing well, don't fertilize. If they're not growing well, soil test before fertilizing. The problem may be excessive shade or wet soil. In that case, fertilizer won't help.

- Cut back the grasses in early March, before the new growth begins. Cut back to two-thirds of the full size (e.g., cut a three-foot grass back to two feet).

- Eventually, you may want to divide the clumps. Do this in early spring.



*Whirligigs and other lightweight objects that blow in the breeze keep birds from harvesting your berry crop.*



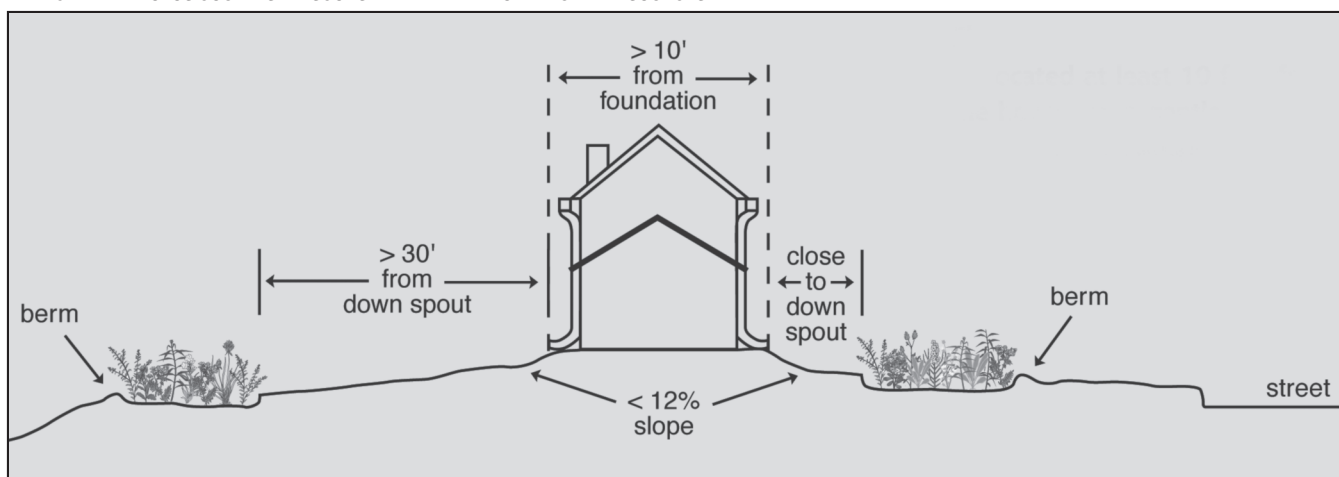
PHOTO CREDIT: CARL VON CANSTEIN



PHOTO CREDIT: C. MINERS

Blueberry is the state fruit of New Jersey. In acid soil, blueberries can add color to your native plant landscape and provide fruit for you or for wildlife.





Rain gardens should be located at least 10 feet from the house on a gentle slope that catches downspout water.

## CONSIDER A RAIN GARDEN

As our countryside has been urbanized, less and less rainfall filters through the soil to recharge the groundwater and feed our streams and Barnegat Bay. Too much of the rain water runs off our rooftops, streets and parking lots into storm sewers. This unnatural runoff starves streams of water in between rains, and creates eroding flash floods in streams when it does rain. The runoff flood carries fertilizer, soil, pet waste, petrochemicals and other pollutants into the storm drains and into our watershed.

Your own yard may be contributing to this polluted runoff. A rain garden can capture runoff from your property and filter the water back into the groundwater, removing pollutants and reducing the swirl of floodwater that enters the storm sewers.

A rain garden is a shallow depression in your yard, sized to handle the runoff your property generates. A rain gar-

den landscaped with native plants also functions as an attractive, low maintenance landscape feature. A rain garden can be located near the house to capture rain from downspouts, further out to collect water running off the lawn, or along driveways or sidewalks.

Not all landscapes are suitable for rain gardens. Areas with high water tables can't infiltrate the water properly, nor can compacted soil, unless you can dig through the compacted layer and reach well-drained soil below. The Web Soil Survey will tell you the depth to high water for your soil type and the soil's suitability for various purpose. Visit

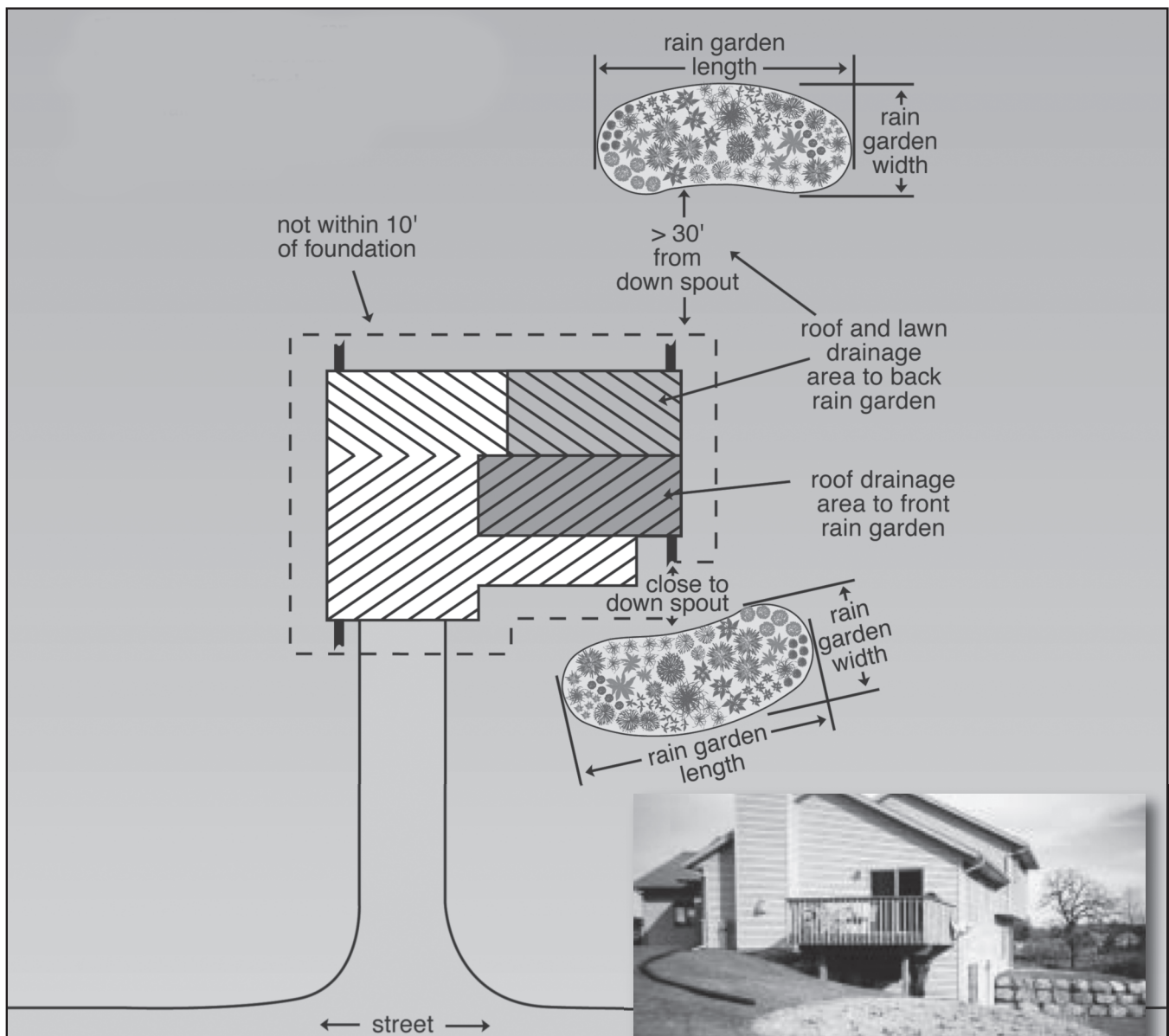
<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>. Instructions for using the Web Soil Survey are found at <http://njaes.rutgers.edu/soiltestinglab/>

### Helpful Links:

Native Plant Society of New Jersey. Download or purchase *Rain Garden Manual of New Jersey*. Information on designing and building a rain garden. <http://www.npsnj.org/>

Rutgers Water Resources Program. NJAES Cooperative Extension research and education. Rain gardens and rain barrels, download or purchase *Rain Garden Manual of New Jersey* <http://water.rutgers.edu/>

Ocean County Soil Conservation District for links to resources to help you evaluate your property for a rain garden and to help you plan and build the garden. <http://soildistrict.org>



A rain garden can be built in the front or back yard. Pick a pleasing shape for the rain garden. Crescent, kidney, and teardrop shapes seem to work well.



This new rain garden will grow to become a pleasing landscape feature as it returns runoff to the groundwater

# MAKE YOUR YARD A SPONGE



PHOTO CREDIT: GILLES SAN MARTIN

Lady beetle adult

# Chapter V

## INTEGRATED PEST MANAGEMENT: LANDSCAPE PEST CONTROL

### ABOUT PLANT SAMPLES

The best plant sample is usually a branch that has several leaves and any insects that are on the plant. Ideally, the sample will include healthy and affected parts. One leaf may not show the problem and usually is not an adequate sample.

The local office of Rutgers NJAES Cooperative Extension (RCE) usually can identify the problem. For certain analysis and recommendations, the Rutgers Plant Diagnostic Laboratory provides a fee-based plant and pest identification service. Information about the Diagnostic Lab is available from your local RCE office or online at <http://njaes.rutgers.edu/plantdiagnosticlab/>.

## INTEGRATED PEST MANAGEMENT (IPM)

Traditionally, many homeowners and landscapers apply certain pesticides at specific times of the year, whether or not any pests are present. This unnecessary pesticide wastes time and money, and may lead to environmental problems. Some herbicides, insecticides, and fungicides can leach into our groundwater or run off into the bay. Pesticides can also kill “beneficial” insects that normally feed upon harmful insects. To make matters worse, insect pests often develop resistances to certain pesticides.

### HOW, THEN SHOULD WE MANAGE PESTS?

The Ocean County Soil Conservation District and Rutgers NJAES Cooperative Extension recommend using Integrated Pest Management (IPM), the environmentally friendly alternative to conventional insect and disease control. IPM includes an assortment of pest control practices linked together (integrated) to manage various landscape problems. Instead of relying only on chemical pesticides to control pests, IPM uses physical, mechanical, biological, and cultural control methods first. Pesticides are used as a last resort. Even then, the pesticides initially selected are biorational, the least toxic to the environment, people, and pets. By controlling pests early, IPM methods prevent unsightly plant damage.

### IPM THEORY

IPM begins when you initially plan your landscape. Choosing the right plants and locating them in the right place keeps them healthy and able to withstand pest attacks. IPM also stresses efficient horticultural practices that keep plants healthy – proper watering, fertilizing, mowing, and pruning. If you follow the plant establishment and maintenance guidelines in this guide, you will have a healthy lawn and landscape that is less susceptible to pest problems.

## IPM PRACTICE

The heart of IPM is the early detection and prevention of pests. Horticulturists not only define harmful insects as “pests,” but weeds and diseases, as well. At least twice a month, walk through your landscape and monitor your plants for trouble spots. Observe which plants appear healthy and which do not. Write down your observations. If you have a site plan, make notations on it. Collect representative plant samples and any insects that seem to be causing damage. These can be diagnosed at Rutgers NJAES Cooperative Extension. You might want to note the population levels of both beneficial insects and pests, the weather conditions, and sun/shade patterns.

Identify the *key plants* that have the most pest problems.

■ Key plants in Ocean County include azalea, crabapple, dwarf Alberta spruce, rhododendron, Japanese euonymus, rose, flowering cherry, white birch, mugo pine, dogwood, juniper, and hemlock. If these plants are weakened by environmental stress, or if large numbers are planted in one area, they are more susceptible to pest attacks. If you have other plants that always have problems, add them to your list.

Pests that are a continual problem are called *key pests*.

■ These pests often have no natural enemies and account for the majority of pest problems. (See page 51 for key pest monitoring and control recommendations.)

At some point, you will have an insect, disease, or weed problem. What should you do?

■ Correctly identify the pest. Take a sample to Rutgers NJAES Cooperative Extension or a landscape professional to find out exactly what the pest is. If the pest will cause little damage, you should be able to live with it. Just because a pest is a nuisance doesn't mean it is a real threat to your landscape.

The goal of an IPM program is to limit the number of pest insects, disease, weeds, and fungi in your lawn and garden. By restricting insect pests to low levels — not exterminating every single pest with chemical pesticides — naturally occurring beneficial organisms will have something to eat, and will stay in your landscape.



It is not realistic to expect to have a landscape always totally free of insects, disease, and weeds. Instead, use simple IPM practices to minimize these problems. If you need help with these instructions, or help locating suppliers, call or visit Rutgers NJAES Cooperative Extension (see Appendix A). IPM-trained professional landscapers have access to additional biological controls not available to the homeowner.

## BEFORE YOU ATTEMPT ANY PEST CONTROLS, MAKE SURE THAT YOU HAVE OBSERVED ENOUGH TO KNOW THE FOLLOWING:

Is the problem caused by an insect or disease?

Which pests are present?

Can you estimate how many?

Where on the plant are the pests?

Are beneficial insects present (lady beetles, spiders, lacewings, praying mantis, etc.)?

At what life stage is the pest?

Is it susceptible to controls at this time?

How many plants are infested?

What is the least toxic method of controlling this pest?

Is the underlying cause a cultural problem?  
See the next page.



PHOTO CREDIT: GILLES SAN MARTIN

*Learn to know the beneficial insects.  
This lady beetle larva is not  
beautiful, but it eats a lot of aphids.*

## CULTURAL CONTROLS

It is important to start with healthy, vigorous plants and turf. This is a perfect example of the old adage, “an ounce of prevention is worth a pound of cure.” Use these horticultural practices to keep your lawn and landscape healthy:

■ **MOW YOUR LAWN THREE INCHES HIGH** and leave clippings on the lawn. Measure the turf thatch height and dethatch if greater than 1/2 inch. Aerate the soil if it is compacted. This minimizes crabgrass, other weeds, and some diseases.

■ **ADD TWO TO THREE INCHES OF MULCH** around your plants. This reduces weeds and helps retain water.

■ **CONSIDER REPLACING A PROBLEM PLANT** with a pest-resistant variety. This may cost more initially, but you will save time and money in the long run.

■ **PLANT OR OVERSEED A THIN LAWN** with low-maintenance endophyte-enriched turfgrasses. These help prevent future pest attacks.

■ **USE LOW-MAINTENANCE NATIVE PLANTS** or those that are adapted to our area. Plant drought-tolerant and pest-resistant varieties.

■ **DON'T OVER-FERTILIZE PLANTS.** Too little fertilizer is usually better than too much.

■ **IF POSSIBLE, AVOID WETTING THE FOLIAGE** during watering, especially late in the day. Water the roots and the surrounding soil.

■ **WATER NEWLY PLANTED TREES AND SHRUBS** to keep the roots consistently moist for the first three growing seasons. Most roots are in the top 8-12 inches of soil. Drip irrigation is the most efficient watering method.

■ **AVOID INVASIVE PLANTS** such as purple loosestrife, Japanese honeysuckle, Norway maple, reedgrass, Russian olive, multiflora rose, and running bamboo.

■ **DON'T LANDSCAPE LARGE AREAS** with the same plant. Monocultures are banquet tables for insects and diseases.

■ **SPACE PLANTINGS** so that light and air can circulate. This will help prevent fungal diseases.

■ **SAVE ENERGY** by planting shrubs on the western and southern sides to shade the walls of your home. Deciduous trees on the south side help cool your home in the summer and warm your home in the winter. Evergreens on north-west exposures protect your home from cold winter winds.

■ **WATER PROPERLY** and at the right time. Place your landscape plants in groups based on watering requirements.

■ **ADHERE TO THE LOW-MAINTENANCE LANDSCAPE** practices outlined in this guide.

## PHYSICAL CONTROLS

■ **USE A HARD SPRAY OF WATER** with the garden hose to wash pests off infested plants. This will knock off and kill pests like spider mites and aphids. Especially spray the undersides of leaves, where many insects hide.

■ **BAND TREES WITH BURLAP TREE SKIRTS.** Gypsy moth and elm leaf beetles hide under the burlap during the day. You can see them and pick them off. Sticky bands that trap pests can be purchased at garden centers.

■ **PRUNE DEAD BRANCHES** on trees and shrubs. Remove diseased cankers and sucker growth from branches.

■ **REMOVE NESTS OF INSECTS** when they are small (e.g., tent caterpillars, fall webworm).

■ **REMOVE LEAVES WITH DISEASE SPOTS.** This gets rid of the source of infection. Don't compost the infected leaves.

■ **PLACE A DROP CLOTH UNDER INFESTED PLANTS** and shake the plants. This will catch black vine weevils and Japanese beetles if you do it at dawn or dusk.

■ **USE INSECT TRAPS.** Yellow sticky traps capture adult leafminers and whiteflies. Place them six inches above foliage. Sticky traps are also used to determine when scale insects are reproducing and thus controllable. Pheromone traps contain synthetic female sex scents that attract male insects, who then get caught in the sticky trap. This helps to establish the proper time to treat specific insect pests, such as borers (on dogwood and flowering cherry) and tip moth (on pine).



■ **HAND COLLECT AND DESTROY** caterpillars, bagworms, weevils, etc.

■ **USE FLOATING ROW COVERS**, made of a fabric that lets sunlight and water come through. The covers are placed over vegetables and fruits to keep pests out. Floating row covers can also help turfgrass germination.

■ **DO A GOOD CLEAN UP IN THE FALL**. Remove spotted and diseased leaves that have fallen to the ground. Remove nearby weeds or overgrown areas where pests may overwinter.

■ **REMOVE** the alternate plant host for the pest. These are plants that insects or diseases need to complete their life cycle. For example, cedar apple rust causes disease on apple trees, but it spends the winter on the alternate host, Eastern red cedar.



## BIOLOGICAL CONTROLS

### BENEFICIAL INSECTS

Only a small percentage of the world's insects (5-10%) are pests. Natural enemies of pests have evolved as beneficial insects to control these pests. Don't try to eliminate all the insects from your landscape. Learn to live with some of them. A non-damaging level of insect pests is a source of food for beneficial insects. The beneficial insects help control the numbers of insect pests and cut down on pesticide use.

Nature offsets insect pests by providing some other insect that destroys it. Some beneficial insects are predators that simply eat the pests. Others are parasitoids that actually lay their eggs in or on the pests. When the eggs hatch, the new beneficials feed on the pest hosts.

**TO ATTRACT MORE BENEFICIAL INSECTS**, such as green lacewings, spiders, lady beetles, parasitic wasps, big-eyed bugs, lightning bugs, soldier beetles, and dragonflies, grow flowers to provide them a pollen/nectar food source.

■ Perennial flowers that attract beneficial insects include daisies, Queen Anne's lace, caraway, coriander, blazing star, coreopsis, cosmos, fennel, golden marguerite, goldenrod, sunflowers, tansy, and yarrow.

■ Beneficials such as ladybeetles and lacewings can also be purchased from catalogs or garden centers. It is best to release immature beneficials because adults may fly away once released. Make sure there is a pest present for them to eat before release. If they don't have food, the beneficial will die or go elsewhere.



Contact Rutgers NJAES Cooperative Extension for a copy of the free brochure, "Natural Pest Control: Using Beneficial Insects to Control Landscape Pests." This and other information on beneficials can be found at <http://njaes.rutgers.edu/pubs/>. Search for "beneficial insects."

Remember that conventional pesticide spraying kills beneficial insects as well as pests. Sometimes, pests become a problem because the site has been sprayed repeatedly, disturbing the natural balance. For example, research shows that euonymus scale populations explode following most pesticide sprays (except those in late June and late August, when it reproduces). Poorly timed sprays kill beneficials, so there is no competition to keep pests from proliferating.



**AVOID USING "BUG ZAPPERS" OR BLACK LIGHT UNITS.** These kill more beneficial insects than insect pests. Least toxic biorational pesticides, such as insecticidal soap, horticultural oil, neem oil, or systemic products, have only a minimal impact on beneficial insects.

*Lacewings and their larvae are beneficial consumers of insect pests.*



PHOTO CREDIT: POLLINATOR  
WIKIMEDIA COMMONS

 Invite  
the birds



## BENEFICIAL ANIMALS

Birds, bats, frogs, toads, and even snakes feed on insects. Put out birdhouses to attract purple martins and bluebirds that eat mosquitoes and other insects.

■ **Bt (*Bacillus thuringiensis*)** Scientists have produced biological controls for certain pests. A very useful product is *Bacillus thuringiensis* (Bt for short), an insect disease that kills caterpillars, such as gypsy moths, tent caterpillars, and bagworms, when they are young. The toxic spores are eaten by the pests, which then develop paralysis, stop eating, and die. Bt doesn't last long in the environment, and it doesn't harm beneficial or non-caterpillar insects, people, or pets. For best results, use Bt when caterpillars are smaller than 1/2 inch. Bt is usually sold as a soluble powder that is mixed with water for sprays. BT is available under a variety of trade names. There is also a form of Bt that controls mosquitoes.

■ **Parasitic nematodes** are microscopic roundworms that infect insects. They are safe for humans and pets. Nematodes can be used against white grubs in lawns in July

and August. They also control black vine weevils and borers such as peach tree borer and iris borer. There are different kinds of nematodes, so be sure the nematode you use is effective against the pest you wish to control. Nematodes require moisture and they don't like sunlight. Apply them to moist soil on a cloudy day or in the evening, and keep the soil moist. Nematodes are living creatures, and they won't work if they are dead. After mixing, but before applying, you can check with a 20-power hand lens to see that they are slightly curved and moving. A straight, still nematode is a dead, useless nematode.

## CHEMICAL CONTROLS

Pest populations vary in size from year to year, depending on the weather and the abundance of natural predators. An IPM strategy seeks to bolster natural controls and avoid unnecessary pesticide sprays.

A mix of two or more pest control methods will achieve more thorough and lasting results than any single method. Pesticides, therefore, should be used after, or in conjunction with, other control methods.

Pesticides should be used only after monitoring has pinpointed exactly where the problem is located and when the problem is serious enough to warrant spraying. Confining the spray to only infected plants or plant parts (spot treatment) can significantly reduce pesticide use and conserve beneficial insects.

## ALTERNATIVE PESTICIDES

Some alternative pesticides are less toxic to humans and animals and are considered “biorational.” These pesticides are safer for people and the environment. Common examples include horticultural oil and insecticidal soaps, as well as botanical products that are derived from plants, such as neem oil, corn gluten meal, and pyrethrum. You can see a full discussion of biorational pesticides at University websites, such as University of Illinois “Alternatives in Insect Management: Biological and Biorational Approaches” at <http://aces.illinois.edu/>. Search for “biorational.”

INSECT GROWTH REGULATORS (IGR) interfere with the insect’s life cycle by keeping it from reaching the adult stage. Currently available IGRs control fleas, caterpillars, and grubs. IGRs are usually applied by professional pesticide applicators.

- *Neem oil* is an IGR available for homeowner use. It comes from the seeds of the neem tree. This concentrated oil has been found to control over 100 different insect pests. Studies indicate that neem oil provides more than 80% control of aphids and leafminers and over 90% control of Japanese beetles. Neem oil also acts as a fungicide and insect repellent.

## HORTICULTURAL OILS

New refining techniques have produced oils that are safe for insect and mite control during both the dormant and active plant growing seasons. These oils provide excellent control against many insect eggs and immature insects, especially scale crawlers, aphids, adelgids, mites, sawflies, non-hairy caterpillars, whiteflies, and beetle larvae. Oils are not effective against adult beetles. Oils work by coating and suffocating the insect. Once they dry, oils break down and become ineffective. Thus, there is little residue, which helps protect beneficial insects.

- Horticultural oils are applied as either dormant or summer treatments. Read the labels carefully for the proper mixing rates. Dormant oils (3-4 % oil) are heavier, slower drying oils. These oils kill insects in their dormant stage, but they can burn growing leaves. Apply dormant oils in early spring before new leaves emerge from the buds, usually in late March. Summer oils (1-2% oil) are more highly refined oils that kill by direct contact with the pest. Use these from June through September.
- Be careful when using horticultural oils. Read the label to find out which plants shouldn’t be sprayed, such as Colorado blue spruce. Don’t spray oil on drought-stressed plants, especially hemlock. Don’t spray on hot, humid days, on wet foliage, or if rain is expected. Don’t mix oils with a fungicide. Follow mixing directions carefully.



If you have any questions, contact Rutgers Cooperative Extension for a free fact sheet on horticultural oils. The fact sheet can be downloaded at <http://njaes.rutgers.edu/pubs/>. Search for FS866.

## INSECTICIDAL SOAPS

Potassium soaps kill the adult or immature stage of certain insect pests on contact. They provide good control of aphids, mites, immature scale insects, non-hairy caterpillars, adelgids, thrips, whiteflies, sawflies, spittlebugs, mealy bugs, and lacebugs. Repeat applications are necessary since there is no residual action. Follow the directions on the package carefully. Be sure to cover vegetation completely with the spray. Two applications are often needed. Don’t spray insecticidal soap on hot, humid days or on drought-stressed plants. Don’t spray on cloudless, sunny days.

## IPM VERSUS CONVENTIONAL SYNTHETIC PESTICIDES

Conventional synthetic pesticides (fungicides, insecticides, herbicides) can be used in an IPM program. However, they are usually applied only if the pest problem becomes serious, damage occurs, and alternative controls are not available or don’t work. In that case, a well-timed application of the recommended pesticide is appropriate.

- Remember, before using pesticides, properly identify the pest, and avoid spraying beneficial insects.
- Apply the recommended amount of pesticide to only the infested parts of the plant.



Contact Rutgers NJAES Cooperative Extension for pesticide control recommendations. These recommendations are updated to include the proper timing of the application and the selection of the most appropriate pesticide for the specific pest. Many publications on pest management are available at the Rutgers Publications website, including “Pest Management for Trees, Shrubs, and Flowers on Homegrounds.” <http://njaes.rutgers.edu/pubs/>. Search for E014.

Surroundings states also provide pest control publications. See Appendix A for a listing of Extension publication website in nearby states.

### *Follow these rules when using pesticides:*

1. READ THE LABELS CAREFULLY. Chemicals can be toxic to people and the environment. If pests are not present in sufficient numbers to cause damage, don’t spray.



**2. SPOT TREAT** only the infested plants or plant parts. Don't spread unneeded pesticides over every plant in the landscape. To protect beneficial insects, first spray every other infested plant. Then, a week later, spray the other half if the plants are still infested.

**3. USE THE LEAST TOXIC PESTICIDE** that does the job.

**4. TIMING IS THE KEY** when spraying pesticides. Target the spray for the most vulnerable time in the life of the pest. Usually, this is the immature stage.

**5. BE SAFE.** Follow all the label safety directions. Don't spray on windy days. Dress appropriately, as recommended by the pesticide label.

**6. MORE IS NOT BETTER.** Use only the recommended amounts of the chemical. Mix only the amount you need.

**7. CLEAN UP SPILLS** to keep pesticides out of the water supply.

**8. STORE PESTICIDES** in a cool, dry place, locked safely away from children and pets.

## IPM WEED CONTROL

Weeds are just plants growing where they are not wanted. They come in three types: annuals (e.g., sorrel, chickweed, crabgrass), biennials (e.g., Queen Anne's lace and dock weed), and perennials (e.g., dandelions, goldenrod, pokeweed).

**WEEDS THRIVE** in bare spots, acid soil, droughty sites, and other poor conditions. Once weeds gain a foothold, they eventually replace desired plants. Wind, water, birds, and animals all carry weed seeds.

**THE TROUBLE WITH ANNUAL WEEDS** is that each plant produces 25,000 to 250,000 seeds. A few annual weeds can cause big trouble the following year.

**PERENNIAL WEEDS** produce seeds as well as tough underground parts (tubers, rhizomes, bulbs, stems, etc.), which sprout new plants the following year.

**BIENNIAL WEEDS** produce seeds and then die in their second year.

**TO PREVENT WEED GROWTH, USE MULCH.** Mulch also helps to conserve soil moisture, buffer soil temperatures, and replenish nutrients to the soil. Organic mulches, such as shredded bark, are best. Maintain the mulch layer at two to three inches.

Do not pile mulch around the base of trees or other plants, and do not allow mulch to become deep over the years.. For newly planted trees, mulch an area three times the diameter of the root ball, expanding this area as the tree grows. Maintain one foot of mulch diameter for every inch of trunk diameter.

**SHEETS OF POROUS FABRIC WEED BARRIERS** (weed control mats) or newspaper can be used under mulch. These materials block light, discouraging weed germination, while allowing water and air to enter the soil. Do not use plastic, which causes roots to grow near the soil surface. Place no more than one inch of mulch on a fabric barrier. Over time, the mulch breaks down to form soil in which weeds can grow. The fabric will need to be pulled up and replaced as this happens.

## BIORATIONAL WEED CONTROL

**HERBICIDAL SOAPS** are potassium-based soaps that dry up weeds. Unfortunately, they are non-selective, so they will kill turfgrasses as well as weeds. Use herbicidal soap as spot treatments, applying carefully with a spray bottle. You may need more than one application to do the job.



Before using herbicides, identify the weed to determine the best time of year for control. Refer to Chapter 3, figure 2 for guidelines. Rutgers NJAES Cooperative Extension and the Plant Diagnostic Laboratory can help with weed identification and specific herbicide recommendations. See the list of help resources in Appendix A or the Rutgers publications website at <http://njaes.rutgers.edu/pubs/>.



PHOTO CREDIT: C. MINERS





## KEY INSECT PESTS FOR KEY PLANTS

In IPM, plants are called “key” plants because they are particularly susceptible to attacks by insects and diseases.

A basic way to minimize pest problems is to avoid planting key plants. If your landscape contains these plants, consider replacing them with plants having fewer problems. See Appendix B for plant ideas.



The following chart lists some of the key plants commonly planted in the Barnegat Bay watershed.

These are the plants and pests to watch for. Monitor weekly. Dates given are generalized expectations.

Some least-toxic control measures are given below. Check with Rutgers NJAES Cooperative Extension for current recommendations. See Appendix A or <http://www.njaes.rutgers.edu/pubs/>.

KEY PLANT	KEY PEST	SYMPTOMS	CONTROL
azalea	lacebug	<ul style="list-style-type: none"> <li>- yellow-speckled leaves</li> <li>- tar spots on leaf undersides</li> <li>- present through growing season</li> <li>- worse in full sun</li> </ul>	<ul style="list-style-type: none"> <li>- grow azaleas in partial shade</li> <li>- use organic mulch and water</li> <li>- spray undersides of leaves with insecticidal soap or oil or neem oil in spring through summer when pest is active</li> </ul>
crabapple, cherry	eastern tent caterpillar	<ul style="list-style-type: none"> <li>- webs in branch crotches</li> <li>- black “styrofoam” egg masses in dormant season</li> </ul>	<ul style="list-style-type: none"> <li>- remove egg masses in winter</li> <li>- prune and destroy small webs when nests are first noticed in early May</li> </ul>
arborvitae, juniper	bagworm	<ul style="list-style-type: none"> <li>- cone-like 2-inch-long bags</li> <li>- defoliation by mid-July</li> </ul>	<ul style="list-style-type: none"> <li>- hand-pick bags in winter</li> <li>- apply Bt by mid-June</li> <li>- apply pesticides by July</li> </ul>
rose, grape	Japanese beetle	<ul style="list-style-type: none"> <li>- tree and shrub leaves eaten to vein skeletons</li> <li>- grass roots eaten by grubs</li> <li>- dead grass rolls like carpet</li> </ul>	<ul style="list-style-type: none"> <li>- mid-July to mid-September, hand-pick and destroy adults</li> <li>- on turf, treat soil with insecticide, IGR or nematodes for grubs. Timing varies. Read the pesticide label.</li> </ul>
mugo pine	pine sawfly	<ul style="list-style-type: none"> <li>- in mid- to late May, small caterpillars feeding and defoliating</li> <li>- feeding as a group for two generations (June)</li> </ul>	<ul style="list-style-type: none"> <li>- prune out affected branches</li> <li>- when pests are seen, use horticultural oil or soap</li> </ul>
Japanese euonymus	euonymus scale	<ul style="list-style-type: none"> <li>- loss of leaves, scale on bark or leaves</li> <li>- look for tiny yellow crawlers from early June to mid-August</li> </ul>	<ul style="list-style-type: none"> <li>- prune out</li> <li>- apply horticultural soap or oil to crawlers</li> <li>- late winter, dormant oil</li> </ul>

KEY PLANT	KEY PEST	SYMPTOMS	CONTROL
dogwood	dogwood borer	<ul style="list-style-type: none"> <li>- holes in bark, sawdust near holes</li> <li>- small cocoons near holes</li> <li>- trees in decline</li> </ul>	<ul style="list-style-type: none"> <li>- 2-3" organic mulch to drip line</li> <li>- remove declining trees</li> <li>- use traps to monitor adult flight</li> <li>- apply insecticides to bark late May and mid-June</li> <li>- irrigate tree during dry spells</li> </ul>
rhododendron	black vine weevil	<ul style="list-style-type: none"> <li>- adults cause "c" notching on new leaves</li> <li>- larvae eat plant roots</li> </ul>	<ul style="list-style-type: none"> <li>- monitor in June at night for adults</li> <li>- insecticide spray on leaves</li> <li>- drench soil with nematodes or insecticide</li> </ul>
hemlock	woolly adelgid	<ul style="list-style-type: none"> <li>- yellow needles, entire branches die back</li> <li>- cottony substance at base of needles</li> </ul>	<ul style="list-style-type: none"> <li>- treat terminals thoroughly with 2% horticultural oil or soap in March-April and September - October</li> <li>- consult a professional</li> </ul>
white birch	birch leafminer	<ul style="list-style-type: none"> <li>- in May and June, wiggly lines (mines) appear in leaves</li> <li>- in late June, leaves turn brown and scorched</li> </ul>	<ul style="list-style-type: none"> <li>- plant resistant species</li> <li>- yellow sticky trap monitor for adults in mid-May</li> <li>- use insecticides late May and mid-June</li> </ul>
juniper	tip blight	<ul style="list-style-type: none"> <li>- branch tips turn brown</li> <li>- entire branches die</li> </ul>	<ul style="list-style-type: none"> <li>- plant resistant varieties</li> <li>- avoid over-watering</li> <li>- prune out dead branches</li> <li>- identify cause and treat with fungicide</li> </ul>

# Chapter VI

## A FINAL WORD: Eight Steps to a Better Landscape and Environment

This guidebook should give you a good idea of what is meant by low-maintenance landscaping and how it helps the environment. We hope that you will put these low-maintenance practices to work in your own landscape. Here is a review of the eight principles of low-maintenance landscaping:

1. **PROPER SOIL PREPARATION**  
This is the foundation of a successful low-maintenance landscape. Use the *Soil Health Assessment Guide* to assess the soil conditions on your property. Add organic matter and correct compaction and the pH level before you plant.
2. **CAREFUL PLANT SELECTION**  
Match the plant to the soil and sunlight conditions of your site. Use native and adapted, drought-tolerant plants wherever possible.
3. **REDUCED LAWN SIZE**  
The smaller the lawn, the easier and less expensive it will be to maintain. Consider alternative landscapes, including wildflower meadows, naturalized areas and rain gardens.
4. **MINIMAL WATERING**  
Water lawns and plants only when needed.  
Plants need about an inch of water a week.  
Don't waste water or irrigate unnecessarily.
5. **MULCHING**  
Maintain 2-3 inches of organic mulch around trees, shrubs, and flowerbeds to conserve water and reduce weeds.
6. **LIMITED FERTILIZATION**  
Fertilize according to the requirements of your soil as indicated by a soil test.  
Fertilize lawns in the fall and late spring for best results. Follow the fertilizer laws of New Jersey.
7. **PROPER PRUNING**  
Pruning helps new plants maintain healthy growth by the removal of dead, diseased, damaged, or insect-infested parts.
8. **ENVIRONMENTALLY FRIENDLY PEST CONTROL**  
Use Integrated Pest Management (IPM) methods to manage pests instead of relying solely upon conventional pesticides.





## Sources of Assistance and Information

### **OCEAN COUNTY SOIL CONSERVATION DISTRICT**

714 Lacey Road  
Forked River, NJ 08731  
Office Hours Monday – Thursday 7:30 a.m. – 4:00 p.m.  
(609) 971-7002  
Email: [info@SoilDistrict.org](mailto:info@SoilDistrict.org)  
Web site: [www.SoilDistrict.org](http://www.SoilDistrict.org)

#### **SERVICES AVAILABLE:**

Information on soil types, growing conditions, rain gardens • Soil maps  
Assistance with drainage problems • Assistance with ponds and waterways

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### **RUTGERS NJAES COOPERATIVE EXTENSION OF OCEAN COUNTY**

1623 Whitesville Road  
Toms River, NJ 08755-1199  
Office Hours: 9 a.m. to 4:30 p.m.

Master Gardener volunteer helpline, (732) 349-1245 (Monday – Friday 9 a.m. -12 noon)

Answers to garden and landscape questions.

For additional or commercial information, (732) 349-1246

Email: [oceanag@rce.rutgers.edu](mailto:oceanag@rce.rutgers.edu)  
Web site: [www.rce.rutgers.edu](http://www.rce.rutgers.edu)

#### **SERVICES AVAILABLE:**

General gardening information • Tick identification  
Soil testing • Plant pest (insect and disease) identification and control advice  
Speakers Bureau • Garden Design for nonprofit community groups  
• Free gardening fact sheets • IPM information

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### **Barnegat Bay Partnership Ocean County College**

P.O.Box 2001, Toms River, NJ 08754-2001  
Phone: 732-255-0472  
website: [bbp.ocean.edu](http://bbp.ocean.edu)

The BBP is one of 28 National Estuary Programs administered by the US Environmental Protection Agency

#### **SERVICES AVAILABLE:**

General Barnegat Bay watershed information  
• Volunteer opportunities • Speakers Bureau  
• Native plant brochure • Research and education information and publications  
• *Barnegat Bay Beat* newsletter.





## Sources of Assistance and Information

**“Alternatives in Insect Management: Biological and Biorational Approaches”** by Rick Weinzierl and Tess Henn  
University of Illinois. North Central Regional Extension Publication 401 at  
[http://web.aces.uiuc.edu/vista/pdf\\_pubs/altinsec.pdf](http://web.aces.uiuc.edu/vista/pdf_pubs/altinsec.pdf).

### **Anoka Conservation District**

Rain garden information and a pretreatment and inlet structure for curb-cut rain garden. <http://www.anokaswcd.org/>.

*Attracting Native Pollinators: Protecting North America’s Bees and Butterflies*. 2011.

Eric Mader, et.al. Storey Publishing. Available from <http://www.xerces.org/>.

**Center for Invasive Species and Ecosystem Health. University of Georgia:** Has links to other websites about invasive plants. <http://www.invasive.org/>.

**Diagnosing landscape plant problems, with integrated pest management controls.**

<http://plantdiagnostics.umd.edu/>.

**Fertilizer application training and certification for professional lawn care contractors.**

<http://profact.rutgers.edu/>.

**Invasive plants and animals.** A New Jersey statewide cooperative effort with a mission to prevent the spread of emerging invasive species across the state. <http://www.njisst.org/>.

**Iowa Dept. of Agriculture rain garden manual:** <http://www.iowaagriculture.gov/>. Search for “rain garden.”

**National Pesticide Information Center:** Pesticide labels, MSDS, usage, safety. <http://npic.orst.edu/>.

**Native Plant Society of New Jersey:** Information on native plants, including a list of plants native to Ocean County. Rain garden manual. List of nurseries selling native plants. <http://www.npsnj.org/>.

**New Jersey Agricultural Experiment Station Snyder Research Farm.** The NJ fertilizer law, fertilizer application calculator, fertilizer spreader calibration, professional certification.

<http://snyderfarm.rutgers.edu/njfertilizerlawguide.html>. Click on “Fertilizer Law.”

**New Jersey Dept. of Environmental Protection:** Information on maintaining water quality through better lawn care, and links to other sites, including lawn care professional certification. <http://www.nj.gov/dep/healthylawnshealthywater/>.

**New Jersey Soil Health website:** *Soil Health Assessment Guide*, upcoming events and programs in soil health. [http://www.njsoilhealth.org/soil\\_compaction](http://www.njsoilhealth.org/soil_compaction).

**Pesticide toxicity, persistence, ingredient and mobility ratings:** <http://growgreen.org>. Search for “Product toxicity ratings.”



## Sources of Assistance and Information

Publications on lawns, landscape management, pest management and more from surrounding states at these websites:

**Penn State:** <http://pubs.cas.psu.edu/>

**University of Maryland:** <http://pubs.agnr.umd.edu/>

**University of Massachusetts:** <http://extension.umass.edu/landscape/fact-sheets>

**Cornell University:** <http://www.cals.cornell.edu/cals/hort/extension/publications.cfm>

**University of Delaware:** <http://ag.udel.edu/extension/horticulture/>

**University of Connecticut:** <http://www.ladybug.uconn.edu/factsheets/index.html>

**Rainscaping Iowa:** Information on urban stormwater management practices to protect water quality and reduce runoff. <http://rainscapingiowa.org/>.

**Rutgers NJAES Cooperative Extension publications:** Free Fact Sheets on many topics, including soil health and management, Integrated Pest Management, lawn and landscape, rain gardens and rain garden installation services, and rain barrels. <http://njaes.rutgers.edu/pubs/>.

**Rutgers Plant Diagnostic Laboratory:** Diagnoses of plant health problems for the residents of New Jersey. Fee-based. <http://njaes.rutgers.edu/plantdiagnosticlab>.

**Rutgers Soil Testing Laboratory:** Chemical and mechanical analyses of soils. Soil and water test reports. Soil test kits and information available online or from the county office of Rutgers Cooperative Extension. <http://njaes.rutgers.edu/soiltestinglab/>.

**Rutgers Water Resources Program.** NJAES Cooperative Extension research and education. Rain gardens and rain barrels, stormwater management, Rain Garden Manual of New Jersey (free download) <http://water.rutgers.edu/>.

**University of Florida:** Tree planting and establishment how-to. <http://hort.ufl.edu/woody/>.

**USDA/Natural Resources Conservation Services:** Soil Quality is the fitness of a specific kind of soil to function within its surroundings, support plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation. <http://www.nj.nrcs.usda.gov/technical/soils/soilquality.html>.

**USDA Plants database:** Authoritative information about the vascular plants, mosses, liverworts, hornworts, and lichens of the U.S. and its territories. <http://plants.usda.gov/>.

**Web Soil Survey:** Volumes of information about the soil in your area. <http://websoilsurvey.nrcs.usda.gov>. Instructions on how to get a soil map from the WSS available at <http://njaes.rutgers.edu/soiltestinglab/>. Click on "More Soil Resources."

**Xerces Society** is an organization that protects wildlife through the conservation of invertebrates such as bees, monarch butterflies and dragonflies. <http://www.xerces.org/>.



## PLANTS FOR THE LOW MAINTENANCE LANDSCAPE

(BARNEGAT BAY WATERSHED-OCEAN COUNTY AREA)

The plants on this list are intended as a starting point for you. There are certainly many other plants you could choose, and we encourage you to explore the fascinating world of plants. The plants listed here are native to Ocean County or adapted to Barnegat Bay Watershed conditions. Naturalized plants are not listed as natives.

Choose plants with pH requirements that match your soil.

### 1. PEST-RESISTANT — DROUGHT-TOLERANT TREES — adapted for sunny locations

Botanical Name	Common Name	Butterfly	Native	Height (feet)	Soil pH	Drainage	Salt Tolerant	Light
<b>Evergreen</b>								
<i>Chamaecyparis thyoides</i>	Atlantic White Cedar		Y	40-50	3.5-6.3	P		Sun-PSH
<i>Ilex opaca</i>	American holly		Y	20-40	5.0-6.0	T	S	Sun-PSH
<i>Juniperus virginiana</i>	Eastern red cedar		Y	40-60	4.7-8.0	P-T	S	Sun
<i>Magnolia grandiflora</i>	Southern magnolia			40-100	4.5-6.5	WD	S	Sun-PSH
<i>Picea pungens glauca</i>	Colorado blue spruce			30-60	6.0-7.5	WD	S	Sun
<i>Pinus echinata</i>	Shortleaf pine		Y	50-60	4.0-6.0	WD		Sun
<i>Pinus rigida</i>	Pitch pine		Y	40-50	3.5-5.1	T	S	Sun
<i>Pinus virginiana</i>	Virginia pine		Y	20-50	4.5-7.5	WD		Sun
<b>Deciduous</b>								
<i>Acer rubrum</i>	Red maple		Y	40-60	4.7-7.3	P-T		S-PSH
<i>Amelanchier canadensis</i>	Serviceberry	X	Y	6-15	5.6-7.5	T-WD	S	S-PSH
<i>Betula lenta</i>	Sweet birch		Y	60	3.6-6.8	WD	S	Sun
<i>Betula nigra</i>	River birch 'Heritage'		Y	45-65	5.0-6.0	P-T	S	Sun
<i>Carpinus betulus</i>	European hornbeam			40-60	5.0-8.0	T		Sun
<i>Carpinus caroliniana</i>	American hornbeam			18-30	4.0-7.4	WD		Sun-Sh
<i>Celtis occidentalis</i>	Hackberry		Y	40-60	6.0-7.8	T		Sun
<i>Cercis canadensis</i>	Eastern redbud	X		20-30	5.0-8.0	WD		Sun-PsH
<i>Cornus florida</i>	Flowering dogwood			20-30	4.8-7.7	WD		PSH
<i>Diospyros virginiana</i>	Persimmon		Y	30-45	4.7-7.5	T		Sun-PSH
<i>Ginkgo biloba</i>	Ginkgo (only plant male)			80	5.2-7.5	WD		Sun
<i>Gleditsia triacanthos inermis</i>	Thornless honeylocust			35-70	4.8-8.0	WD		Sun

Y in the "Native" column = the plant is native to Ocean County.

Naturalized plants are not listed as native.

X in the "Butterfly" column means the plant attracts butterflies, pollinators, or birds.

S in the "Salt Tolerant" column means the plant may grow near saltwater environments.

In the "Drainage" column:

T = Tolerant; adapted to a wide range of soil moisture conditions.

WD = Prefers well-drained soil; avoid soggy soils. Tolerates at least some drought.

P = Adapted to moist, poorly-drained soils. May not tolerate drought.

# A P P E N D I X B (continued)

Botanical Name	Common Name	Butterfly	Native	Height (feet)	Soil pH	Drainage	Salt Tolerant	Light
<b>Deciduous</b> (continued)								
<i>Gymnocladus dioica</i>	Kentucky coffee tree			100	6.0-8.0	WD		Sun
<i>Halesia carolina</i>	Carolina silverbell			20-40	4.7-7.0	WD		S-PSh
<i>Lagerstroemia indica</i>	Grape myrtle			25	5.0-7.5	WD		Sun
<i>Liquidambar styraciflua</i>	Sweetgum		Y	45-100	4.5-7.0	P-WD		Sun
<i>Magnolia virginiana</i>	Sweetbay magnolia	X	Y	10-60	5.0-6.5	P-WD	S	S-PSh
<i>Nyssa sylvatica</i>	Black gum	X	Y	25-30	4.5-6.0	P-T	S	Sun
<i>Oxydendrum arboreum</i>	Sourwood	X		30-40	4.0-6.5	WD		S-PSh
<i>Prunus serotina</i>	Black cherry		Y	40-80	4.0-7.5	WD		Sun
<i>Prunus virginiana</i> 'Canada Red'	Canada Red cherry		Y	20-30	5.2-8.4	T-WD	S	Sun
<i>Quercus species</i>	Oak		Y	40-100	4.5-7.0	WD		Sun-PSh
<i>Sassafras albidum</i>	Sassafras		Y	30-60	6.0-7.0	WD	S	Sun
<i>Syringa reticulata</i>	Japanese tree lilac			20-25	6.0-7.0	WD		Sun
<i>Viburnum prunifolium</i>	Blackhaw viburnum		Y	12-15	6.0-7.0	T		Sun

## 2. PEST-RESISTANT — DROUGHT-TOLERANT SHRUBS

Botanical Name	Common Name	Butterfly	Native	Height (feet)	Soil pH	Drainage	Salt Tolerant	Light
<b>Evergreen</b>								
<i>Ilex cornuta</i>	Chinese holly			8-10	4.5-5.5	T		Sun
<i>Ilex glabra</i>	Inkberry		Y	4-8	4.5-6.0	P-T	S	Sun-PSh
<i>Juniperus species</i>	Junipers			1-8	5.0-6.0	WD	S	Sun-PSh
<i>Kalmia angustifolia</i>	Sheep laurel		Y	1-2	5.0-6.0	P-WD		Sun-PSh
<i>Kalmia latifolia</i>	Mountain laurel		Y	4-6	5.0-6.0	WD		PSh-Sh
<i>Mahonia species</i>	Oregon grapeholly	X		8-12	5.0-6.0	WD		Sh-PSh
<i>Morella cerifera</i>	Wax myrtle		Y	10	5.4-9.1	P-WD		Sun
<i>Nandina domestica</i>	Sacred bamboo			8	4.5-6.0	WD		Sun-Sh
<i>Prunus laurocerasus</i>	Cherry laurel			15-20	5.5-7.5	WD	S	Sun-PSh
<i>Sarcococca hookeriana</i>	Sweetbox			4-6	5.0-6.5	WD		Sh-PSh
<i>Skimmia japonica</i>	Japanese skimmia			3-4	5.0-6.5	WD		Sh-PSh
<i>Yucca filamentosa</i>	Adam's needle yucca		Y	2-3	6.0-8.0	WD	S	Sun
<i>Yucca gloriosa</i>	Moundlily (Spanish Dagger)			6-8	6.0-8.0	WD		Sun

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# A P P E N D I X B (continued)

Botanical Name	Common Name	Butterfly	Native	Height (feet)	Soil pH	Drainage	Salt Tolerant	Light
<b>Deciduous</b>								
<i>Abelia x grandiflora</i>	Glossy abelia			3-6	6.0-8.0	T		Sun-PSh
<i>Photinia pyrifolia</i>	Red chokeberry		Y	3-5	5.5-7.5	P-T		Sun-PSh
<i>Photinia melanocarpa</i>	Black chokeberry		Y	3-10	4.5-6.5	P-T		Sun-PSh
<i>Baccharis halimifolia</i>	Groundsel bush	X	Y	8-10	6.0-8.0	T	S	Sun
<i>Callicarpa americana</i>	Beautyberry			6	4.8-7.0	WD		Sun
<i>Ceanothus americanus</i>	New Jersey tea	X	Y	3	5.0-6.0	WD	S	Sun-PSh
<i>Clethra alnifolia</i>	Summersweet	X	Y	5-8	4.5-7.0	P-T		Sun-PSh
<i>Cornus racemosa</i>	Gray dogwood		Y	8-15	6.0-8.0	T		Part Sh
<i>Cotinus coggygria</i>	European Smoketree			10-15	5.5-7.0	WD		Sun
<i>Dasiphora fruticosa floribunda</i>	Shrubby cinquefoil			1-4	6.0-7.0	P-WD	S	Sun
<i>Fothergilla species</i>	Fothergilla			2-10	5.0-6.0	WD		Sun-PSh
<i>Gaylussacia baccata</i>	Black huckleberry		Y	3	5.0-6.0	WD		Sun-PSh
<i>Ilex verticillata</i>	Winterberry		Y	6-15	4.5-7.5	P-WD		Sun-PSh
<i>Itea virginica</i>	Virginia sweetspire		Y	5-10	4.0-7.5	P-WD		Sun-Sh
<i>Lyonia mariana</i>	Staggerbush		Y	4	4.5-6.0	WD		Sh-PSh
<i>Magnolia stellata</i>	Star magnolia	X		15-20	5.0-6.0	WD		Sun-PSh
<i>Morella pennsylvanica</i>	Bayberry		Y	5-12	5.0-6.0	P	S	Sun-PSh
<i>Physocarpus opulifolius</i>	Common ninebark	Y		10	4.5-6.5	WD		Sun
<i>Prunus maritima</i>	Beach plum	X	Y	2-10	6.0-8.0	WD	S	Sun
<i>Rhododendron periclymenoides</i>	Pinxterbloom azalea	Y	Y	4-10	4.3-5.5	P-WD		Sh-PSh
<i>Rhododendron viscosum</i>	Swamp azalea	X	Y	8-15	4.0-7.0	P-WD		PSh-Sh
<i>Rhus species</i>	Sumac		Y	3-30	4.0-6.0	WD	S	Sun-PSh
<i>Vaccinium angustifolium</i>	Lowbush blueberry		Y	1-2	5.0-6.0	WD	S	Sun-PSh
<i>Vaccinium corymbosum</i>	Highbush blueberry	X	Y	8-10	4.0-5.5	WD		Sun
<i>Viburnum lentago</i>	Nannyberry			28	5.0-7.0	WD		Sun-PSh
<i>Viburnum opulus var. americanum</i>	American cranberry bush			6	5.5-7.5	P-WD		Sun

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drought.

### 3. DROUGHT- AND PEST-RESISTANT GROUNDCOVERS

Botanical Name	Common Name	Butterfly	Native	Height (inches)	Soil pH	Drainage	Salt Tolerant	Light
<b>Evergreen</b>								
<i>Ajuga reptans</i>	Bishop's weed			8-10	5.5-7.5	T		Sun-Sh
<i>Arcostaphylos uva-ursi</i>	Bearberry		Y	6-12	4.0-6.0	WD	S	Sun-PSH
<i>Calluna vulgaris</i>	Heather			12-24	5.0-6.0	WD		Sun
<i>Erica carnea</i>	Heath			6-10	5.0-6.0	WD		Sun
<i>Gaultheria procumbens</i>	Teaberry, American Wintergreen		Y	4-6	4.0-6.5	WD		PSH-Sh
<i>Hudsonia ericoides</i>	Pinebarren goldenheather		Y	4-8	3.5- 5.5	WD		Sun
<i>Hudsonia tomentosa</i>	Woolly beach heather		Y	3-8	5.5-6.9	WD	S	Sun
<i>Iberis sempervirens</i>	Candytuft			12	5.8-7.3	WD		Sun-PSH
<i>Juniperus conferta</i>	Shore juniper			1.5	5.0-8.5	WD	S	Sun-PSH
<i>Liriope spicata</i>	Creeping lilyturf			8-10	4.5-6.0	WD	S	S-Sh
<i>Opuntia species</i>	Prickly pear cactus		Y	6	5.0-6.0	WD	S	Sun-PSH
<i>Sedum species</i>	Sedum			6-12	6.0-8.0	WD	S	Sun-PSH
<i>Sempervivum tectorum</i>	Hen & Chicks			3-4	5.5-7.5	WD		Sun
<i>Waldsteinia fragarioides</i>	Appalachian barren strawberry			6-8	6.0-6.5	WD		Sun-PSH
<b>Deciduous</b>								
<i>Carex pensylvanica</i>	Pennsylvania sedge		Y	10-16	5.6-7.5	WD		Sun-PSH
<i>Chrysogonum virginianum</i>	Green and Gold			6-9	5.5-7.7	WD		Sh-PSH
<i>Comptonia peregrina</i>	Sweet fern		Y	24-36	4.0-7.0	WD		Sun-PSH
<i>Hemerocallis (not H. fulva)</i>	Daylily			12-18	6.0-8.0	WD	S	Sun
<i>Hypericum spp. (not perforatum)</i>	St. Johnswort			12-18	6.0-7.0	WD		Sun-PSH
<i>Lathyrus maritimus</i>	Beach pea		Y	12-24	5.6-7.8	WD	S	Sun
<i>Pachysandra procumbens</i>	Allegheny-spurge			9-12	5.5-6.5	WD		Sh-PSH
<i>Phlox subulata</i>	Moss phlox			12	5.7-7.5	WD		Sun-PSH
<i>Sibbaldiopsis tridentata</i>	Shrubby fivefingers			3-6	6.0-8.0	WD	S	Sun
<i>Stachys byzantina</i>	Lamb's ear			12-15	5.5-8.0	WD	S	Sun-PSH
<i>Tiarella cordifolia</i>	Heartleaf foam flower			6-12	6.5-7.0	WD		Sh-PSH
<i>Thymus praecox</i>	Creeping thyme			2-3	7.0-8.0	WD	S	Sun-PSH

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# A P P E N D I X B (continued)

## 4. LOW-MAINTENANCE — DROUGHT-TOLERANT FLOWERING PERENNIALS

The natives on this list generally prefer a pH between 5.0 and 6.0. Non-natives may prefer a higher pH.

Botanical Name	Common Name	Butterfly	Native	Height (feet)	Moisture	Salt Tolerant	Light
<i>Achillea species</i>	Yarrow	X		1-2	D-WD		Sun
<i>Agastache species</i>	Hyssop	X		3-6	WD		S-Psh
<i>Anthemis tinctoria</i>	Golden marguerite			1 1/2-2	D-WD	S	Sun
<i>Asclepias tuberosa</i>	Butterfly weed	X	Y	2-3	D-WD		Sun
<i>Aurinia saxatilis</i>	Goldentuft			1	D-WD		Sun
<i>Baptisia australis</i>	False indigo	X		3-5	WD		S-Psh
<i>Chrysopsis mariana</i>	Maryland goldenaster		Y	1-2 1/2			Sun
<i>Coreopsis species</i>	Tickseed			1-2	D-WD		Sun
<i>Delosperma species</i>	Ice plant			6"-12"	D-WD		Sun
<i>Dianthus plumarius</i>	Grass pink			1	D		Sun
<i>Echinacea purpurea</i>	Purple coneflower	X		2-5	D-WD		Sun
<i>Echinops ritro</i>	Steel globe thistle	X		3-3 1/2	D		Sun
<i>Epimedium species</i>	Barrenwort			1 1/2	WD		Sh-PSh
<i>Eupatorium species</i>	Boneset, Joe Pye weed	X	Y	3-10	WD-T		Sun
<i>Euphorbia species</i>	Spurge			1-2	D-WD		S-PSh
<i>Gaillardia x grandiflora</i>	Blanketflower	X	Y	1-2	T		Sun
<i>Geranium species</i>	Cranesbill	X		1-3	WD		S-Psh
<i>Gypsophila paniculata</i>	Baby's breath			2-3	WD		Sun-PSh
<i>Helianthemum canadense</i>	Frostweed	X	Y	0.5-1	D-WD		Sun
<i>Helianthus divaricatus</i>	Woodland sunflower	X	Y	2-6	D-WD		Sun-Sh
<i>Lavendula species</i>	Lavender	X		1 -1 1/2	D-WD		Sun
<i>Liatris species</i>	Gayfeather, Blazing star	X		2-5	D-WD		Sun
<i>Limonium carolinianum</i>	Lavender thrift		Y	1-2	D	S	Sun
<i>Lupinus perennis</i>	Sundial lupine	X	Y	1-1 1/2	WD		Sun
<i>Monarda species</i>	Beebalm	X	Y	2-4	WD		S-PSh
<i>Nipponanthemum nipponicum</i>	Montauk daisy			1-3	D-WD	S	Sun
<i>Oenothera fruticosa</i>	Sundrops		Y	1	D-WD		Sun
<i>Penstemon species</i>	Beardstongue	X		1-3	D-WD		S-PSh
<i>Perovskia atriplicifolia</i>	Russian sage	X		3-4	D	S	Sun
<i>Rudbeckia species</i>	Coneflower	X	Y	2-4	D	S	Sun-PSh
<i>Salvia species</i>	Sage	X		1-1 1/2	D-WD		S-PSh

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The Moisture column is coded as follows:  
 D = Tolerant of dry soil or drought.  
 WD = Well-drained but moist soil.  
 T = Tolerant; adapted to a wide range of soil moisture conditions.

## A P P E N D I X B (continued)

Botanical Name	Common Name	Butterfly	Native	Height (feet)	Moisture	Salt Tolerant	Light
<i>Santolina species</i>	Lavender cotton			.1-2	D-WD	S	Sun
<i>Scabiosa species</i>	Pincushion flower	X		1-3	WD		S-PSh
<i>Senecio cineraria</i>	Dusty miller			1-1 1/2	D-WD		S-Psh
<i>Solidago sempervirens</i>	Seaside goldenrod	X	Y	2-3	D-WD	S	Sun
<i>Solidago species</i>	Goldenrod	X	Y	2-3	D-WD		Sun
<i>Symphotrichum species</i>	Aster	X	Y	1-3	D-WD		Sun
<i>Tephrosia virginiana</i>	Virginia tephrosia		Y	1-3	D-WD		Sun
<i>Veronica spicata</i>	Speedwell			3-6	D-WD	S	Sun
<i>Veronicastrum virginicum</i>	Culver's root	X	Y	2-6	T		Sun

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### 5. LOW-MAINTENANCE — DROUGHT-TOLERANT ANNUALS

Unless otherwise indicated, the annuals included in this list require well-drained soil, and soil pH between 6.0 and 7.0.  
 All should do well without excessive water. With protection from wind, annuals generally can be grown near the oceanfront.

Botanical Name	Common Name	Butterfly	Height	Light
<i>Ageratum houstonianum</i>	Ageratum, Floss flower	X	6-12"	Sun
<i>Begonia cultivars</i>	Begonia		12-24"	Sh-PSh
<i>Bracteantha bracteata</i>	Bracted strawflower		24-30"	Sun
<i>Capsicum annuum</i>	Ornamental pepper		12-24"	Sun
<i>Celosia argentea</i>	Celosia, Cock's Comb		12-30"	Sun
<i>Centaurea cyanus</i>	Cornflower		11-36"	Sun
<i>Cleome hassleriana</i>	Cleome		48"	Sun
<i>Consolida ambigua</i>	Rocket larkspur	X	24-36"	Sun
<i>Coreopsis tinctoria</i>	Coreopsis, annual	X	12-36"	Sun
<i>Cosmos bipinnatus</i>	Cosmos	X	24-36"	Sun
<i>Gaillardia x grandiflora</i>	Gaillardia		14-24"	Sun
<i>Gazania rigens</i>	Gazania, treasure flower	X	8"	Sun
<i>Gomphrena globosa</i>	Globe amaranth		12-24"	Sun
<i>Helichrysum petiolare</i>	Licorice plant		12-18"	S-PSh
<i>Helianthus annuus</i>	Sunflower	X	3-9 feet	Sun
<i>Lantana camara</i>	Lantana	X	36-48"	Sun
<i>Lobularia maritima</i>	Sweet alyssum	X	3-12"	S-PSh
<i>Mirabilis jalapa</i>	Four-o'clocks		24"	Sun
<i>Nicotiana glauca</i>	Flowering tobacco	X	36-48"	S-PSh



## A P P E N D I X B (continued)

Botanical Name	Common Name	Butterfly	Height (feet)	Light
<i>Nierembergia species</i>	Nierembergia, Cup flower	X	6-12"	S-PSH
<i>Pelargonium x hortorum</i>	Zonal geranium		18-24"	Sun
<i>Petunia x hybrida</i>	Petunia	X	12-15"	Sun
<i>Phlox drummondii</i>	Phlox, annual		6-12"	Sun
<i>Portulaca grandiflora</i>	Portulaca, rose moss		6"	Sun
<i>Salvia splendens</i>	Scarlet sage	X	12-24"	Sun
<i>Tagetes hybrids</i>	Marigold		6-36"	Sun
<i>Zinnia species</i>	Zinnia	X	12-36"	Sun

### 6. LOW-MAINTENANCE — DROUGHT-TOLERANT ORNAMENTAL GRASSES

All of these grasses are clump-forming and have few pests and diseases.

Height is given in either inches or feet. Because the flower stalks are usually taller than the leaves, height is given for both foliage and flowers.

Botanical Name	Common Name	Native	Height (foliage) (flower)		Soil pH	Drainage	Salt Tolerant	Light
<i>Andropogon glomeratus</i>	Bushy bluestem		2'	4'	5.0-6.3	T		Sun
<i>Calamagrostis x acutiflora</i>	Feather reed grass		3'	6'	6.1-7.8	P-WD		Sun
<i>Festuca arvenensis</i>	Blue fescue		8"	16"	6.1-7.8	WD		Sun-PSH
<i>Muhlenbergia capillaris</i>	Hairawn muhly		18"	36"	5.8-6.8	T	S	Sun
<i>Muhlenbergia lindheimeri</i>	Lindheimer's mulhy grass		18"	5'	6.6-9.0	WD		Sun-PSH
<i>Panicum virgatum</i>	Switchgrass	Y	3'	5'	4.5-8.0	T	S	Sun
<i>Saccharum brevibarbe</i> <i>var. contortum</i>	Soft beard plume grass		2'	4'	4.0-7.5	T-WD		Sun-PSH
<i>Saccharum giganteum</i>	Sugarcane plume grass	Y		10'	3.5-7.0	T		Sun
<i>Schizachyrium scoparium</i>	Little bluestem	Y	18"	40"	5.0-8.4	WD		Sun
<i>Sorghastrum nutans</i>	Indiangrass	Y	3'	6'	4.8-8.0	T	S	Sun
<i>Spodiopogon sibiricus</i>	Frost grass		3'	4'	6.0-7.0	P-WD		S-PSH
<i>Sporobolus heterolepis</i>	Prairie dropseed		15"	4'	6.0-7.2	WD		Sun

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## 7. SEEDING MIXTURES FOR LOW-MAINTENANCE HOME LAWNS

- Avoid planting only one variety of seed. Even if you use one species, such as turf-type tall fescue, **use a mix of at least three or four varieties**. The mixture of varieties (and of species) will provide diversity of resistance to insects and diseases and will provide a healthier lawn.
- High-maintenance Kentucky bluegrass varieties are not recommended for, and will not do well in, low-maintenance lawns. **Look for bluegrass varieties sold as low-maintenance grasses** or use other grass species.
- Pay attention to shade and moisture conditions in the lawn, and **buy grasses suited to grow in the conditions** you have.
- Look for **endophyte-enhanced** grass seed. These fungi live within the grass and help produce high-quality lawns by controlling some insects and making lawns more drought-resistant.
- Clover may be added to any of the seed mixes. There is no recommended percentage, but a low percentage of clover seed is likely to be enough.

CONDITIONS AND SEED TYPE	PERCENT OF TYPE	SEEDING RATE (LBS. PER 1000 SQ. FT.)
Open sunny sites, some shade, well-drained soils		
A. Turf-type tall fescue	100%	6-8 lb.
B. Fineleaf fescue species	40-50%	
Kentucky bluegrass	50-60%	
Perennial ryegrass	0-10%	
Total	100%	3-4 lb.
Moderate to partial shade, well-drained soils		
A. Turf-type tall fescue	100%	6-8 lb.
B. Hard fescue	10-30%	
Creeping red fescue	20-50%	
Chewing's fescue	10-30%	
Total	100%	4-5 lb.
C. Fineleaf fescue species	50-75%	
Kentucky bluegrass	25-50%	
Perennial ryegrass	0-10%	
Total	100%	3-4 lb.
Heavily-used high traffic or play areas		
A. Turf-type tall fescue	85-95%	
Kentucky bluegrass	5-15%	
Total	100%	4-6 lb.

## LAWN FERTILIZATION GUIDELINES



Fertilizing a low-maintenance lawn requires judgment rather than rote application.

Use the least nitrogen necessary to maintain a healthy lawn. By law, at least 20% of the nitrogen fertilizer will be of the slow-release type and the maximum annual nitrogen rate is 3.2 lb. per 1000 square feet of lawn.

Apply no more than 0.7 lb. of N per 1000 sq. ft. at each feeding,  
unless you are applying a fertilizer with 30% or more slow-release nitrogen.

Higher, less frequent amounts of slow-release nitrogen (such as 50% slow-release), may be used on high quality, healthy lawns. A poor quality turf may need smaller, more frequent applications of faster-releasing nitrogen.

	<b>APPLICATION – MONTH AND AMOUNT</b>			
<b>Type of Lawn Maintenance</b>	<b>Mid-April</b>	<b>May</b>	<b>September</b>	<b>October</b>
	Range of Nitrogen Amounts (lb. per 1000 square feet) Applications in parentheses “( )” are optional.			
A. If you irrigate and remove the grass clippings, apply 0 - 3 lbs. of N per 1000 sq. ft. each year.	(0.5 lb.)	0.5 - 0.9 lb.	0.5 - 0.9 lb.	0.5 - 0.9 lb.
B. If you irrigate, but don't remove the clippings, apply 0 - 2.5 lbs. of N per 1000 sq. ft. each year.	(0.5 lb.)	0.5 - 0.9 lb.	0.5 - 0.9 lb.	0.5 lb.
C. If you don't irrigate, and don't remove the clippings, apply 0 - 2 lbs. of N per 1000 sq. ft. each year.	(0.5 lb.)	0.5 - 0.9 lb.	0.5 - 0.9 lb.	(0.5 lb.)

### CONVERSION TABLE FOR NITROGEN FERTILIZER

The following chart will help you to determine how much fertilizer is needed to supply the required nitrogen for your lawn. Keep in mind that the first number on the fertilizer bag (e.g., 8-0-24) represents the percentage of N.

<b>% of N on fertilizer bag</b>	<b>POUNDS OF THAT BAG'S FERTILIZER NEEDED FOR:</b>		
	<b>0.5 lb. of N/1000 sq. ft.</b>	<b>0.7 lb. of N/1000 sq. ft.</b>	<b>0.9 lb. of N/1000 sq. ft.</b>
5	10 lb.	14 lb.	18 lb.
10	5 lb.	7 lb.	9 lb.
12	4.15 lb.	5.8 lb.	7.5 lb.
16	3.15 lb.	4.4 lb.	5.7 lb.
20	2.5 lb.	3.5 lb.	4.5 lb.
25	2.0 lb.	2.8 lb.	3.6 lb.
30	1.65 lb.	2.3 lb.	3.0 lb.
33	1.5 lb.	2.1 lb.	2.7 lb.
40	1.25 lb.	1.8 lb.	2.3 lb.
45	1.1 lb.	1.6 lb.	2.0 lb.

For other ratios of N, use this chart to approximate the amount needed.

**NATURAL ORGANIC FERTILIZERS:** Organic Nitrogen Sources

	Amount of N in Fertilizer	Pounds Needed for			Rate of Release
		0.5 lb. N	0.7 lb. N	0.9 lb. N	
cow manure (composted)	1%	50	70	90	slow
cow manure (dehydrated)	2%	25	35	45	medium
compost	2.5%	20	28	36	slow
*OCEANGRO® 5-5-0	5%	10	14	18	slow-medium
cottonseed meal	7%	7	10	13	slow-medium
dried blood	10%	5	7	9	medium-rapid
fish meal (dry)	12%	4	6	7.5	slow

\*OCEANGRO® is a granular biosolid fertilizer produced by the Ocean County Utilities Authority. It is labeled for use on turf and ornamentals and is available at retail outlets. [www.ocua.com](http://www.ocua.com)

**HOW MUCH FERTILIZER SHOULD I USE?**

If you bought a 50 lb. bag of 10-0-8 fertilizer for a 4000 square foot lawn, and wanted to apply 0.5 lb. of N per 1000 square feet, how much fertilizer should you apply?

*The calculation is done as follows:*

Divide the desired rate by the percent of nutrient in the fertilizer. For mixed fertilizers, base the rate on nitrogen. The first number on the fertilizer bag (10) indicates the percentage of nitrogen.

*The general rule is:*

Divide the pounds of nutrient needed by the fraction of fertilizer that is nitrogen. (Number on the bag divided by 100.) Then multiply by the number of 1000's of square feet to be treated.

*In our example:*

To apply 0.5 lb N per 1000 sq. ft., divide 0.5 by 0.10 (fertilizer is 10% N) = 5 lb. fertilizer per 1000 sq. ft.

Multiply by the total square footage to get the total fertilizer to apply.

5 lb./1000 x 4(000) sq. ft. = apply 20 lbs. of 10% nitrogen fertilizer per 4000 square feet.

To apply 0.7 lb. N/1000 sq. ft. divide 0.7 by 0.10 and multiply by 4(000) sq. ft.

You would apply a total of 28 lb. of fertilizer.

To apply 0.9 lb. N/1000 sq. ft. divide 0.9 by 0.10 and multiply by 4(000) sq. ft.

You would apply a total of 36 lb. of fertilizer.



## How Do I Calculate Single-Nutrient Fertilizers?

*Use the same formula for single-nutrient fertilizers.*

If you wish to use organic fertilizers, such as OCEANGRO® or dried blood, or if mixed fertilizers are not available in the ratio recommended by the soil test, you can still use the general rule above to calculate recommended amounts of single-nutrient fertilizers.

Let us say that the soil test recommends 0.9 lb nitrogen per 1000 sq. ft., applied in a 4-3-1 ratio fertilizer. This is telling you to use 4 parts nitrogen to 3 parts phosphorus and 1 part potassium.

*To use dried blood, 12-0-0, as the N source:*

0.9 lb. N divided by 0.12 (%N) = 7.5 lbs. dried blood per 1000 sq. ft.

If the recommended ratio is 4-3-1, then 0.9 lb. N = 4 parts, and 1 part is 0.9 lbs. divided by 4 = 0.225 lb.

*To use superphosphate, 0-20-0 as the phosphorus source:*

0.225 lb. per part x 3 parts P = 0.675 lb. P needed per 1000 sq. ft.

0.675 lb. P divided by 0.20 (% P) = 3.38 lb. superphosphate per 1000 sq. ft.

*To use muriate of potash, 0-0-60 as the potassium (K) source:*

0.225 lb. per part x 1 part K = 0.225 lb. K needed per 1000 sq. ft.

0.225 lb. K divided by 0.60 (% K) = 0.375 lb. muriate of potash per 1000 sq. ft.

*The last step is to multiply by the number of 1000 square feet to get the total to apply.*

For a 4000 sq. ft. lawn:

Dried blood (N) = 7.5 lbs./1000 x 4(000) = 30 lbs. total on 4000 sq. ft.

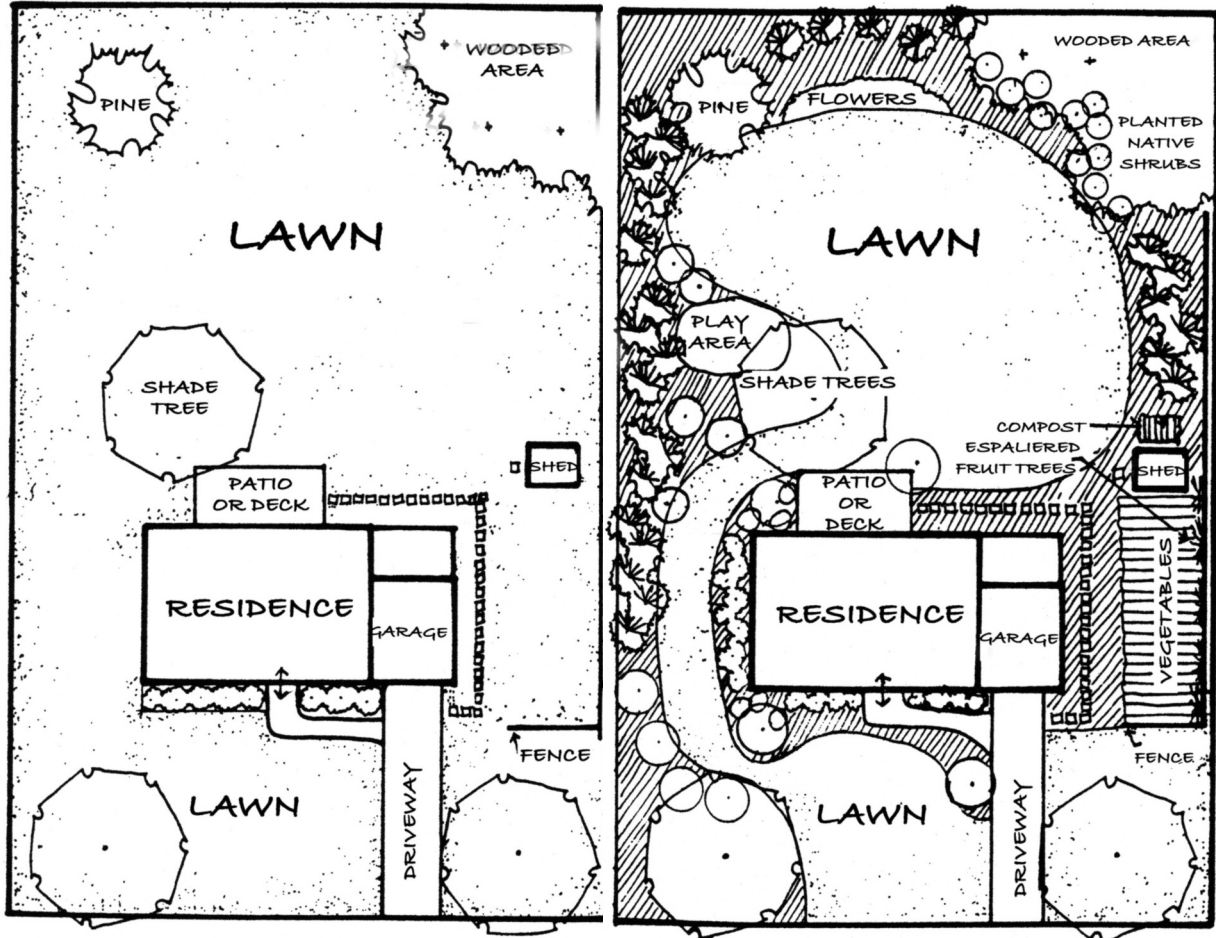
Super phosphate (P) = 3.38 lbs./1000 x 4(000) = 13.52 lbs. total on 4000 sq. ft.

Muriate of potash (K) = 0.375 x 4(000) = 1.5 lbs. total on 4000 sq. ft.

Note that the Snyder Farm at Rutgers University has a fertilizer calculator that can help. The fertilizer calculator can be reached from the Snyder Farm website, <http://snyderfarm.rutgers.edu/> under Education and Training, Fertilizer Law Guide. At this writing, the fertilizer calculator emphasizes calculations based on nitrogen, but it can also be used for any single nutrient fertilizer.



## SAMPLE LANDSCAPING PLAN



### The BEFORE Plan

Remember to include all permanent natural and man-made features in your sketch. Note the drainage and the amount of sunlight each area of your yard receives.

### The AFTER Plan

Remember to select plants that are adapted to the soil and sunlight conditions in your yard. Group plants together according to their watering requirements.