



YOUR YARD,
YOUR SHRUBS



A HOMEOWNER'S GUIDE

The central graphic features a dark silhouette of a rounded, bushy shrub centered within a decorative, shield-shaped frame with horizontal lines. The background of the central panel is a light green with a subtle, repeating pattern of small leaves.



Winterberry



Spicebush



Lilac Bush



Serviceberry Fruit



Lowbush Blueberry



Black Chokeberry

YOUR YARD, YOUR SHRUBS

A HOMEOWNER'S GUIDE

A PROJECT OF THE HOOSIER HEARTLAND RESOURCE
CONSERVATION AND DEVELOPMENT COUNCIL
Backyard Trees Committee

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INTRODUCTION

Many homeowners want to know more about the shrubs in their yard. Others have new homes and want to know how to plan for the yard of their dreams. This book is designed to help with the basics of both. You will learn how shrubs benefit you, your family, your neighbors and your community.

Learning how shrubs grow, both above and below ground will help you decide what kinds of shrubs to plant and how to care for them after planting. The basics of shrub identification can start you on an exciting activity that can carry you far beyond your yard and into parks, community spaces, and natural areas across the country.

Over and over the book urges selecting and planting the right shrub in the right place for the right reasons. Observing this principle will eliminate future problems with utilities, root damage, landscape maintenance, and many other concerns. Planting the right shrub in the right place provides many benefits. For example, an air conditioning unit shaded by shrubs is 10% more efficient than one without shade. One of the key benefits of trees and shrubs in the urban area is to modify local climate, especially in what are called “heat islands”. The right shrubs combined with the right tree in the right place can reduce temperatures by 6 to 10 degrees on hot summer days.

A chapter is devoted to the proper planting and maintenance of shrubs. Selecting the right shrub is the first step. Planting, care and maintenance then becomes the key to having the shrub or shrubs work for you for many years. Chapter 5 is devoted to these all-important aspects of success in your yard, including how to protect your shrubs from insects or diseases.

Like trees, shrubs will work and benefit us in many ways – they are a basic part of our landscape. You will learn specific social, community, environmental and economic benefits that will come from your efforts in planting and caring for your yard and your shrubs. Most of us enjoy wildlife, therefore Chapter 7 is devoted to some special things we can do to make our yards more inviting to birds and small animals. A glossary of terms is also included.

This book is the result of the many requests homeowners have made following our successful 2005 publication “*Your Yard, Your Trees... A Homeowner’s Guide*.” We hope you will enjoy and learn from having this copy.

Hoosier Heartland Resource Conservation and Development Council, Inc.

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Material from several publications and many websites has been reviewed and referred to in the book. The sources of information are listed at the end of each chapter as references. These and other valuable websites for shrub information are also listed in Appendix 1.



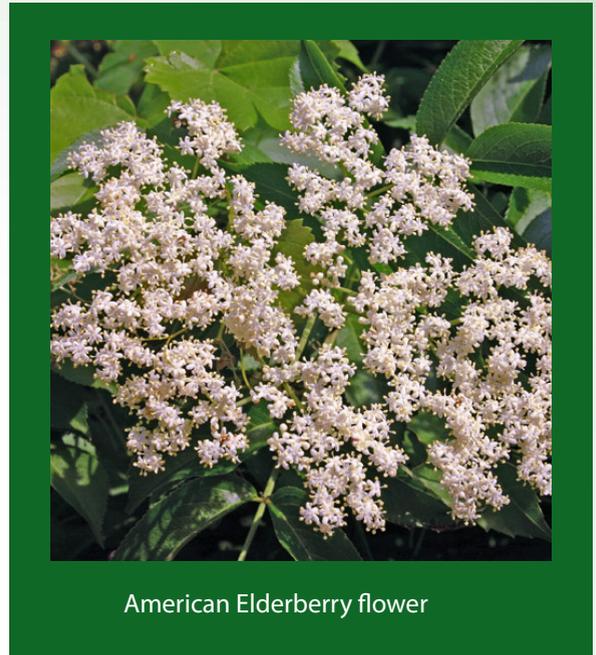
CHAPTER 1: BENEFITS OF URBAN SHRUBS

Landscaping in our urban and suburban areas is obviously beneficial. We all understand the aesthetic benefit of plantings in our yards and in public spaces. When your yard or a city planting space has been landscaped, appreciation is immediate. The lively colors or the bit of shade provided bring a smile to our faces and give us a little pick-me-up. Given the option, we'd all rather walk, drive, or pedal along a landscaped street than beside a hot and boring stretch of asphalt.

There has been much written specifically about the benefits of urban trees. They help cool our downtowns and parking lots; they help filter pollutants out of our air and water; and they provide much needed food, nesting, and cover for wildlife.

But did you know shrubs can provide many of those same advantages?

Shrubs, especially urban shrubs, can make a positive difference in our lives. Summer temperatures and noise levels are higher in urban areas. Air pollution problems are more concentrated in the urban setting – creating health concerns. The urban landscape usually has been greatly altered, reducing access to wooded areas and green open spaces. Impervious surfaces like parking lots and buildings drastically increase the amount of rainfall runoff, overloading municipal storm systems. Shrubs can help reduce each of these concerns. There are a wide variety of social benefits too. Landscaped areas increase overall property values, boost our enjoyment of our surroundings, and even help sick people recover more quickly.



An important focus of this book is to help you understand the benefits associated with shrubs in our urban areas and how they can help minimize many of these concerns.

Shrubs mitigate the impacts of our urban environment in the following ways:

Environmental Benefits

- Shrubs make their own food from carbon dioxide in the air, sunlight, water and a small amount of soil elements. During this process, they release oxygen back to the atmosphere.
- Leaves help settle out, trap and hold particle pollutants such as dust, ash, pollen and smoke that can damage human lungs.
- Vegetation acts as “carbon sinks” by removing the carbon from carbon dioxide and storing it as cellulose in trunk, branches and roots.
- Shrub roots catch water and slowly release it back into the soil, thus reducing runoff to streams. This returns a significant amount of water back to the groundwater supply. This also helps reduce soil erosion.
- Shrubs along streams filter sediments, chemicals, and other pollutants from runoff before it enters the stream and help to cool the water temperature.
- Shrubs help mitigate uncomfortable aspects of urban settings like heat, glare, and hot, dry breezes.
- Shrubs provide unique food and shelter for songbirds, butterflies, and other beneficial wildlife.

Economic Benefits

- Property values of landscaped areas are higher than those without landscaping.
- Because trees and shrubs can help moderate temperatures, direct benefits are obtained through decreased heating and cooling costs.
- This same economic benefit is realized at a macro level. When homeowners decrease their consumption, power companies don't have to generate as much power, can build fewer facilities, and reduce their own fossil fuel use.
- Municipalities can save money by building fewer facilities to control and clean storm water. The individual benefit may be small, but community wide the benefits can be in the thousands of dollars.
- Shrubs enhance community by attracting businesses and tourists.
- People linger and shop longer along landscaped streets.



Social/Health Benefits

- Green spaces foster an essential connection between community residents and the natural environment, allowing for a more livable city.
- Landscaped areas also allow those same connections between people, enhancing social aspects of play, work, and rest.
- They provide refreshing contrasts to harsh urban environments.
- Planted areas help us understand that green spaces are important not just for human recreation/use, but in and of themselves.
- Green spaces promote safer neighborhoods. When residents have more vested interest in a place, they will watch to make sure it's not being misused, damaged, etc. The better maintained a public space is, the safer it is going to be.
- Hospital patients have been shown to recover more quickly when their room offers a view of landscaped areas.
- Shrubs help bring natural elements and wildlife habitats into urban areas, which increases everyone's quality of life.
- We are able to be more 'in tune' with our surroundings in natural spaces.

As we pave over more and more open green space, we should keep in mind that we're losing more than a few inconsequential trees and shrubs. We're also losing an important human resource. As our population continues to grow, more and more people will be living in urban areas. This causes concern not only for the quality of life for humans, but for all biological systems and the natural environment. The urban environment is an ecosystem and needs to be treated as such. Although it may take some getting used to, it is possible to view today's cities as an interdependent web of relations.

The list of benefits provided by shrubs to the urban area and its residents is almost endless. The focus of this book is to help you in your overall landscape management options.



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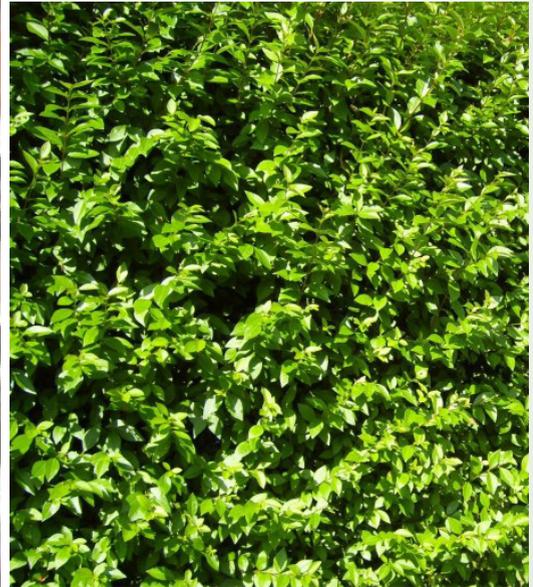
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Maryland DNR: www.dnr.state.md.us/forests

International Society of Arboriculture: www.treesaregood.com

CHAPTER 2



CHAPTER 2: GETTING TO KNOW SHRUBS

Sam Carman, IDNR

In order to grow healthy and vigorous shrubs, it is important to know and understand how they grow. A basic understanding of how the various parts of shrubs function is needed to keep them alive and growing.

Shrub Growth

Shrubs grow in essentially the same manner as trees. There are six organs of all shrubs that can be broken into two general categories: vegetative structures (leaves, stems, and roots) and reproductive structures (flowers, fruits, and seeds). Shrub growth refers to the increase in size and number of the vegetative structures, and that will be our focus for this book. Shrubs grow in the same manner in the city or the country, but we will emphasize their growth in cities and discuss factors of the urban environment that affect their growth.

Homeowners should not expect steady, consistent growth year round. Shrub growth is seasonal and often in response to the environment. A variety of factors including soil, temperature, moisture, sunlight, air, insects, competing vegetation, wildlife, and cultural practices affect shrub growth.

Environmental factors have the greatest impact on photosynthesis, a vital plant process that takes place in the leaves of the shrub. Within each leaf cell, a structure called a chloroplast uses the compound chlorophyll to capture light energy from the sun and produce carbohydrates, or sugars, from carbon dioxide and water. This process produces oxygen and releases it to the atmosphere.

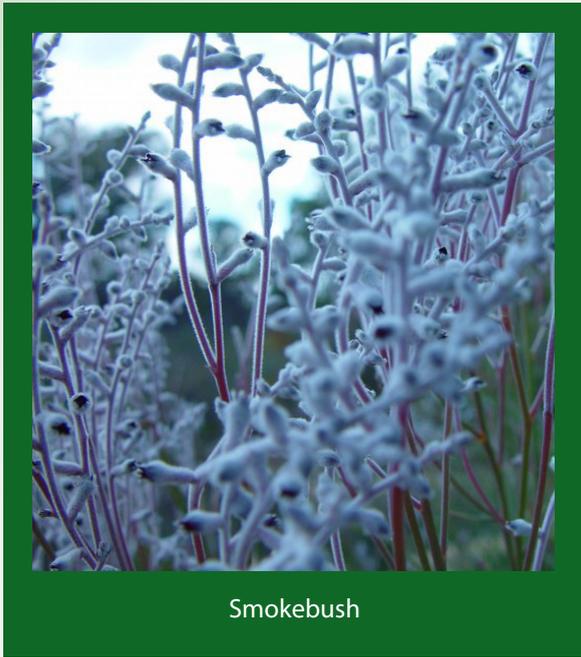
Respiration is the opposite of photosynthesis. It consumes oxygen by oxidizing the sugars and then releases carbon dioxide, which serves as energy for shrub growth. This process also releases water vapor into the air.

The movement of air and water vapor into and out of the leaf occurs through microscopic openings called stomata. Guard cells around the stomata cause them to open and close based on environmental conditions. During periods of higher humidity, heavier concentrations of carbon dioxide, or higher temperatures, the guard cells cause the stomata openings to enlarge, as photosynthesis increases during these times. Likewise, during times of low humidity or low temperature, the stomata openings reduce in size to conserve water and prevent wilting of the leaves. The stomata also become smaller when photosynthesis slows down due to a decrease of carbon dioxide. The optimum temperature for photosynthesis is between 65 and 95 degrees Fahrenheit. The process essentially shuts down at 32 degrees.



The sugars produced by photosynthesis are used by the shrub in the following ways:

- For a source of quick and immediate energy (through plant respiration) to grow, reproduce, and absorb nutrients.
- For the formation of plant tissues. Sugars are transformed into proteins to produce leaves, flowers, fruits, wood, and roots.
- For energy reserves. The shrub stores the sugars in the form of starch and uses them to start functioning and growing again in the spring.



Photosynthesis is influenced to a great degree by the intensity of light and by the amount of leaf surface area exposed to the light. The result is that the shrub grows vigorously in sunlight and slowly in the shade of buildings or trees.

The movement of water from the soil through the shrub's roots and up through the trunk and branches to the leaves is called transpiration. The process of transpiration also carries nutrients from the soil to the leaves. The final step of the transpiration process is the release of water vapor back to the atmosphere. When water becomes scarce, respiration decreases and photosynthesis slows.

Soil is probably the most important factor in shrub growth. It is the storage place for the water that, along with

carbon dioxide, provides the fuel for shrub growth through the photosynthetic process. Most shrubs grow best in deep, well-drained soil that has good water holding capacity. Shrubs planted in poor, compacted soil will grow more slowly and have more problems than those grown in rich, loamy soil. More detailed information about soil is contained in Chapter 4.

As you can see, a variety of processes and factors affect shrubs growing in urban areas. A shrub growing on the north side of a large paved area will always be surrounded by higher temperatures and drier air during the summer, resulting in slower growth. Heat reflected from large buildings will also cause growth to decrease. The most frequent factors affecting shrub growth in urban situations are soil compaction, shading by buildings or trees, and pruning. Knowing and understanding these factors will help you plant and maintain healthy, vigorous shrubs in your backyard and community.



The most important functions of the shrub stems and leaves are:

- Support (stem)
- Storage of vast amounts of water and some starch (stem)
- Food production (leaves)
- Photosynthesis (leaves)
- Respiration (leaves)
- Transpiration (leaves)

Different Kinds of Shrubs Grow Differently

Charles Deam, renowned botanist and Indiana's first State Forester, listed more than 160 shrub species as native to Indiana, with most being deciduous (shrubs that lose their leaves in the fall or winter). Some examples of deciduous shrubs include spicebush, currant, raspberry, winterberry, dogwood, and many viburnum. While some evergreen shrubs are native to Indiana, most are introduced from other regions.

Deciduous shrubs are usually angiosperms, meaning they bear their seeds inside a fruit (a drupe or berry, for example). Contrastingly, most evergreens are gymnosperms - their seeds develop at the ends of branches in cones, as in the case of pines. There are a few exceptions; for example, juniper is an evergreen shrub that grows its seed in a berry-like fruit rather than a cone. This makes juniper an evergreen angiosperm.

Like trees, shrubs may produce branches in opposite, alternate, or whorled patterns. Nearly all shrubs have multiple stems.

Growth Above the Ground

At the cellular level, the point of growth in a shrub (whether it be roots, stems, or leaves) is called the meristem. Simply put, it is the "growing tip" of any part of the shrub. Meristem tissue is important because it is capable of *differentiation*. For example, root meristem cells may form new roots that will absorb water, or they may serve to thicken existing roots and function in nutrient transport. Cells produced in stem meristem may serve to lengthen the stem or develop into new leaves. Shoots grow in length at the tips of the branches. Meristematic tissue in the stem may also develop laterally to increase the shrub's diameter and serve other functions, including the formation of dormant lateral buds. Growth of these buds is usually stimulated by pruning. A good example of

this is seen in the cultivation of Christmas trees. To produce a dense, full evergreen tree for Christmas, growers prune their trees annually. By cutting off the terminal buds on branches and the tree's leader, growth of lateral buds is stimulated and the tree becomes much more compact and appealing. The same can be done with a shrub.

Shrub branches do not move up as the shrub grows. All growth in height of the shrub and in length of branches takes place at the tip or meristem. This is an important consideration for yard tree management. For example, if a branch is at a level that creates problems when mowing, it may require pruning as it will always remain at that height. Since the natural growth of shrubs is to have multiple branches at or very near ground level, a wide mowing radius around a shrub is normal and expected.

Diameter growth occurs due to a layer of dividing cells between the wood and bark. This is called the vascular cambium and is only a few cells thick. As these cells divide, wood is created on the inside (called xylem) and bark (called phloem) on the outside. This cell division causes the diameter of the shrub trunk and branches to increase. The new wood cells carry water, sugars, and minerals up from the roots while the bark cells carry sugars and other nutrients produced by the shrub down to the roots. There they are stored to provide energy for the shrub to continue its growth each spring.

Each year, new layers of wood are added between the bark and previous year's wood. These layers are commonly called annual growth rings. The inner-most wood of a shrub's trunk is dead tissue, called heartwood; it stores some waste products from the shrub such as gums, resins, and tannins. These properties cause the heartwood to be darker and denser.

Like a tree, the shrub's bark protects the plant from pests and some environmental impacts. Unlike trees,

however, a shrub's bark generally does not develop the thickness to withstand the severe impacts it might receive from the scraping of lawnmowers or other mechanical damage. As a shrub increases in diameter, the bark is stretched and splits, forming a rougher texture.

Growth Below the Ground

Roots grow in length and diameter very similar to above-ground growth. At the end of each root is a special tissue called the root cap. Just behind it is meristem tissue that produces new cells for both the root cap as it is worn away and for root elongation. The root grows in length and pushes its way through the soil. It expands in diameter almost the same way as the trunk does above ground.

A shrub's root system is made up of the large, permanent roots which anchor the shrub in the soil and transport the nutrients to and from the trunk. There are also many lateral roots, small temporary feeder roots, and root hairs. These small parts of the root system are the primary means of absorbing water and nutrients. Most of the small roots function for a couple years, then die or become part of the large root system. New feeder roots and root hairs eventually develop.

Most shrub roots do not grow downward and deep into the soil. Rather, they grow laterally at a depth of 6 to 18 inches under the surface where water, oxygen, and nutrients can be found. These extensive lateral root systems anchor the shrub in the ground and provide a great deal of stability. With its extensive root system and low profile above ground, shrubs can withstand wind speeds that might uproot and drop large trees.



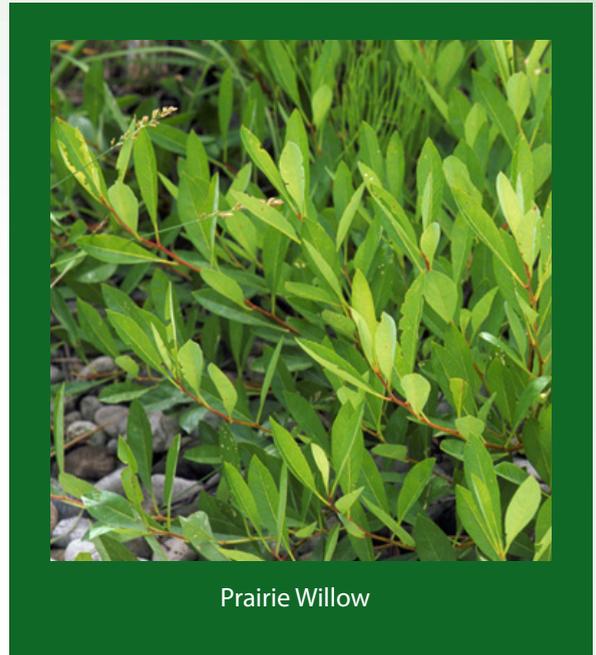
Roots have five main functions:

- Anchoring the shrub in the soil
- Storage of energy (sugars and carbohydrates) Absorption of minerals and water
- Absorption of minerals and water
- Transporting the water and minerals to the trunk tissue during the growing season
- Transporting the stored energy to the trunk to promote new growth in the spring

Compartmentalization

Like trees, shrubs are able to compartmentalize or “wall off” wounded areas. Understanding this process will help the reader understand suggestions given for shrub care in later chapters.

A good way to think of compartmentalization is to compare the wound of a tree or shrub with a wound to your skin. If you cut yourself with a knife, a scab will form and eventually new skin cells will replace the scab. Unless the wound was extremely deep or wide, evidence of the injury will disappear completely after you heal. If you were to x-ray the area of the wound five years later, there would be no evidence that it had ever occurred.



A tree or shrub is not capable of “healing,” but it can grow over an injury, covering it up. So if a tree or shrub is deeply scraped (by a bulldozer during the construction of a house, for example), the cambium layer of the plant’s trunk will eventually grow together to wall off the injury. The injury does not “heal” – evidence of it will always be sealed inside – but in time, there may not be any visible sign on the outside. Trees and shrubs can also grow around one of their own branches, forming a knot.

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CHAPTER 3: WHAT KIND OF SHRUB?

Sam Carman, IDNR and Jodi Dickey, Town of Fishers

Homeowners are interested in shrubs for a variety of reasons. They may want to manage or learn more about existing shrubs. Perhaps they want to add a shrub or two to the current landscape or install a completely new landscape. This chapter describes some of the basic facts a landowner will need to know.

Native vs. Introduced (Exotic or Non-Native) Shrubs

In this book, “native” describes the shrubs that were growing when Europeans first arrived, primarily, in the eastern United States.

Using native plants makes good sense. They have had centuries to hone their survival tactics against local temperature swings, bug infestations, and diseases. Their roots have developed strategies to obtain nutrients and stability from their native surroundings. Native plants are programmed to thrive in their home region. Because of these qualities, native plants are easier to establish in the landscape; are resistant to local insects and diseases; and require less maintenance, water, fertilizers, and pesticides.

Since native plants are so well adapted, why choose to plant an 'introduced' species? One reason might be to avoid problems with an insect or disease currently plaguing the native variety. A good example of this is the flowering dogwood (*Cornus florida*), a popular native plant throughout most of the eastern United States. This natural beauty has recently been plagued with a deadly fungal disease (*anthracnose*) and the disease is taking a toll in the forests and, in some cases, the homeowner's yard.

Many homeowners are turning to the introduced kousa dogwood (*Cornus kousa*), a native of Asia, as an alternative. It is resistant to the deadly anthracnose. (In the plant world, the term "introduced or exotic" defines anything that was not growing in a given area originally. That would make plants indigenous to the eastern United States introduced/exotic in the western part, although all may be native to North America.)

However, some introduced plants become invasive and can be a problem. Examples are bush honeysuckle (*Lonicera maackii*, *L. morrowii*, *L. tatarica*) and Japanese honeysuckle vine (*L. japonica*), which quickly displace native shrubs and wildflowers as they invade natural areas. These plants should not be planted, and if found existing in an area, should be removed. For more information about plants to avoid, visit The Nature Conservancy's Invasive Species page at <http://tncweeds.ucdavis.edu>.

Getting the Right Plant

It is important to know the botanical (or scientific) name to ensure you get the right plant. The botanical name usually appears in italics and is very specific to a particular plant. Botanical names matter because a common name may refer to several different plants. For example, *Viburnum nudum* is known informally as both withe-rod and possumhaw. However, there is another completely different plant also known as possumhaw (*Ilex decidua*). If you ask for possumhaw at the local nursery, you might not get what you want. But when you ask for *Viburnum nudum*, you know you are getting the exact plant you desire. Also, if you understand the botany behind the name, it can give you a hint about what the plant looks like or where it thrives. For example, *Viburnum acerifolium* is the scientific name for the mapleleaf viburnum (*acer* refers to maple and *folium* refers to leaf shape).

Plants can be further identified by cultivars (cultivated varieties). Cultivars are plants specifically bred for a particular characteristic, like flower color or scent. Cultivars are shown in single quotes and are not italicized. An example is *Viburnum nudum*, or "Winterthur."

Deciduous Shrubs

Shrubs that lose their foliage in fall or winter are deciduous plants. The shortening days, late in the growing season, signal deciduous plants to begin dormancy. They shed leaves and stop growth activity. The plants turn their efforts inward, slowing metabolism in preparation for winter winds and freezing temperatures.

As the days begin to lengthen in late winter and early spring, deciduous plants reverse the process, gradually allowing nutrients to flow through their systems, preparing leaf and flower buds for another season of splendor.

Evergreens and Semi-Evergreens

Evergreen is a broad description of plants that do not drop all their leaves in winter. Evergreens can have needle-shaped leaves, such as pines (*Pinus spp.*), or can be broad-leaved, such as American holly (*Ilex opaca*). Sometimes plants are semi-evergreen or have “persistent” leaves; this means they may hold onto their leaves throughout winter, depending on weather and other conditions. The leaves on semi-evergreen shrubs usually stay green until early winter, while the persistent leaves will turn brown in autumn. Some examples of these shrubs include bunchberry dogwood (*Cornus canadensis*) and northern bayberry (*Myrica pennsylvanica*).

Deciduous and Evergreen Plants Beautify Landscapes

When selecting shrubs, consider a mix of evergreen and deciduous species. Selecting plants with more than one season of interest is an added bonus. For instance, refer back to the native flowering dogwood (*Cornus florida*). It has beautiful white (or pink) flowers in spring, followed by lush green leaves in summer. For fall, the dogwood produces brilliant red berries and the foliage turns a deep purple. In winter, the next season’s flowers dot the branches like small onions. The flower buds swell in late winter and early spring, enhancing the attractive gray bark.

Evergreens are just that – green all year. When mixed with deciduous trees, evergreens add texture as well as

color to the landscape. And there is nothing like a snow covered evergreen to deepen our appreciation of these plants in winter.

Size: As Important as Flowers and Color

There are numerous choices to make when selecting a shrub. Do you want flowers for summer color, or fall foliage? Are scents or berries important? Will the shrub serve as a screen or natural air conditioner?

The primary point to consider is location. Everything else flows from that. Keep in mind—right plant/right place. Selecting the right plant for the site will save a lot of future maintenance and allow shrubs to thrive and mature with all of their grace and beauty intact. Begin by deciding what you want the shrub to do—shade or screen an area, or just add beauty. Next, look at the site and see how much room you have. Then consider elements like soil types, microclimate, and sun exposure. Finally, choose exactly which shrub fits the bill!

By considering the site and the size of shrub it will accommodate, you avoid major problems and expenses in the future. A vast open space without interference from utility lines, roofs, or driveways will handle large shrubs, such as downy serviceberry (*Amelanchier arborea*). Small urban yards are better planted with shrubs that stay fairly narrow and not too tall.



Very Small shrubs are those up to 3 feet tall. Bearberry (*Arctostaphylos uva-ursi*), Carolina rose (*Rosa carolina*), and dwarf fothergilla (*Fothergilla gardenii*) are a few examples.

- *Small shrubs* are those between 3 feet and 6 feet tall. These include black chokeberry (*Aronia melanocarpa*), meadowsweet spirea (*Spiraea alba*), and leatherwood (*Dirca palustris*).
- *Medium shrubs* are those between 6 and 12 feet tall. Gray dogwood (*Cornus racemosa*), winterberry (*Ilex verticillata*), and common ninebark (*Physocarpus opulifolius*) are just a few shrubs that make up this category.
- *Large shrubs* are those growing more than 12 feet tall. Many of these shrubs can also function as small trees in the home landscape. These include Allegheny serviceberry (*Amelanchier laevis*), common witchhazel (*Hamamelis virginiana*), and pagoda dogwood (*Cornus alternifolia*).

* See Appendix 2 for additional suggestions.

Additional Considerations

Another important consideration is soil type and moisture for the planting site. Is the soil well or poorly drained? Is it acidic or alkaline? Is there a lot of clay or is the soil sandy?

The amount of shade for the site is another element to consider. Most shrubs do well in full sun, but many will not tolerate full shade. For example, junipers (*Juniperus* spp.) require full sun exposure to thrive, whereas spicebush (*Lindera benzoin*) does quite nicely beneath dense shade.

You may also want to avoid planting shrubs with fruit or thorns close to driveways and sidewalks. Buffaloberry (*Shepherdia* spp.) and shrub roses (*Rosa* spp.) have long, sharp thorns that can catch arms or ankles. Chokeberries (*Aronia* spp.) and viburnums (*Viburnum* spp.) have soft fleshy fruits that can be messy and slippery if they fall on sidewalks. On the other hand, you might want to place nicely scented shrubs close to walks so you can enjoy the fragrance as you walk by. Summersweet (*Clethra alnifolia*) has a pleasant, spicy fragrance and Virginia sweetspire (*Itea virginica*) has sweetly perfumed blooms.

Shrub Identification

Shrub identification is a skill that must be learned; luckily, it follows some basic principles. Many good shrub identification books are available, including Charles Deam's book, *Shrubs of Indiana*. The USDA Natural Resources Conservation Service, University of Tennessee, and University of Connecticut have great online shrub indices. A quick trip to your local nursery can also be of help. To help identify the shrubs in your yard, first consider these basic points:



False Indigo Bush flower

- *Determine the shrub type. Is it deciduous or evergreen?*
 - Evergreen shrubs keep their leaves year round and may be needle shaped, like junipers, or broad and flat, like Oregon grape (*Mahonia aquifolium*).
 - Deciduous shrubs shed their leaves in the fall and usually have some color change in the foliage as the seasons progress. Examples here include gray dogwood and dwarf fothergilla.
- *Study the leaves.*
 - Most identification by homeowners is done in the summer when leaves are present. A close look at the leaves is usually the easiest way to identify the shrub.

Are they arranged in an opposite, alternate, or whorled pattern? Opposite leaves grow out of the stem or branch in pairs and are directly opposite each other on the stem. Alternate leaves grow out of the stem or branch in an alternative fashion. If three or more leaves arise from a single point on a stem or branch, the leaves are whorled.

- Are the leaves simple (one leaf per stem), compound (more than one leaflet per stem), or bipinnately compound (leaflets on several stems attached to one main stem)? Dogwoods and viburnums have simple leaves. Swamp rose (*Rosa palustris*) and potentilla (*Potentilla fruticosa*) demonstrate compound leaves. Shrubs with bipinnately compound leaves are rare, but a good, native tree example is the Kentucky coffeetree (*Gymnocladus dioecious*). Are the leaf margins or edges smooth (or “entire”), toothed (small, jagged teeth along edges), or lobed (deeper cuts or divisions in the margins)? Singly toothed (teeth all one size) or doubly toothed (alternating sizes of teeth)?

- *Notice the flowers.*

- Flower size, shape, season, color, and scent can all offer valuable clues to identifying a particular shrub.

- *Form and size are important identifying characteristics.*

- Is the shrub knee-high? Waist-high? Head-high or taller?
- Is it low and spreading or tall and narrow?
- Keep in mind that pruning and environmental conditions may have changed the form of a particular shrub from its natural growth, so form is not always a reliable identification tool.

- When the *fruit or seed* is visible, it offers additional clues as to the shrub's identity.
 - This characteristic works well to identify the family group but more information is required to get to the specific species.
- *Pay attention to the bark, especially for identification in winter.*
 - Generally, the bark on shrubs is smooth. However, some shrubs have scaly bark, like summersweet, blueberry (*Vaccinium spp.*), and viburnum.
 - Other shrubs have bark that peels or exfoliates. These shrubs are especially interesting in winter when they add a unique element of interest. Exfoliating shrubs include hydrangeas (*Hydrangea spp.*), ninebark, and potentilla.
 - Shrubs like inkberry (*Ilex glabra*), sweetspire, and spicebush form bark with ridges or furrows.

Let's follow the principles outlined above to identify two shrubs that can be seen in Indiana yards during the month of July.

The first is a very small deciduous shrub with a rounded form. It has small compound leaves, with 5-7 leaflets per stem. At this time of year, the shrub is in full bloom, with bright yellow blossoms covering the plant and contrasting nicely with the gray green leaves. The bark of this plant is exfoliating. This is enough information to identify this shrub as a potentilla.

The second shrub in the yard is an evergreen, although it doesn't have the needle shaped leaf most people associate with evergreen plants. This shrub is medium sized and has a mounded shape. The leaves are a dark green during summer. A close look at the plant may reveal a few late blossoms hidden among the simple, alternate leaves. By now we have correctly identified this shrub as an inkberry.

Summary

Knowing the general characteristics is an important step in the selection process for shrubs. Keeping size, shape, and seasonal color in mind when selecting plant material will help in creating an attractive and balanced landscape. Native shrubs, or those growing locally when the country was settled, have adapted to the environment and are often the best choices for home landscaping. Selecting shrubs that are not native to Indiana may be a good choice as long as you understand their characteristics and they are not an invasive plant that will cause harm to the local ecosystem.

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CHAPTER 4



CHAPTER 4: RIGHT SHRUB – RIGHT PLACE

Jodi Dickey, Town of Fishers and Mike Baldwin, IPL

There is more to growing a high quality shrub than digging a hole. Planting the “right shrub in the right place in the right way for the right reason” will optimize the longevity and health of your shrubs. The use of this concept can be the most important decision a homeowner makes when adding shrubs to his/her landscape. Being an informed participant in the selection and planting process will provide the best chance of success for your shrubs. Consider the following when deciding what shrub to plant.

Asking and answering these questions prior to selecting your shrub(s) will help to determine the “right shrub for the right place for the right reasons.”

- Why is the shrub being planted? Do you want the shrub to provide shade, fruit, seasonal color, act as a windbreak, screen an unsightly object, offer privacy, attract wildlife, or reduce erosion? Maybe more than one of the above?
- Where is the planting site? Is it sunny or shaded? What is the size and location of the planting site? Does the space lend itself to a large, medium, small, or very small shrub? Do you need to consider clearance for sidewalks, patios, driveways, or roadways (de-icing salt)? Are there other shrubs in the area that will compete for space?
- Are there overhead or underground utility lines in the area that may conflict with roots or branches as the shrub matures?
- What type of soil conditions exist? Is the soil deep and fertile or is it shallow, compacted, and infertile? Is it acidic or alkaline, wet or dry?
- What type of maintenance are you willing to provide? Do you have time to water, mulch, and protect the newly planted shrub until it is established?
- Are there local ordinances, subdivision covenants, or other regulations that may influence shrub planting decisions?

Shrub Function

Shrubs function in many ways to make our landscapes more pleasant and provide environmental benefits. Having healthy, mature shrubs on your property increases its value. Large, deciduous shrubs can provide shady relief from summer's heat and, when properly located, can help reduce home cooling costs. In the fall, plants drop their leaves, allowing the sun to warm the home during the cooler months. Evergreens with dense, persistent foliage can be clustered to provide a windbreak to block cold northwest winds or can be arranged as a screen for privacy. An ornamental shrub provides beautiful flowers, leaves, bark, or fruit. A shrub that produces fruit can provide food for the owner and/or attract birds and other wildlife into your landscape. Shrubs can also be planted along backyard streams or ditches to stabilize banks and reduce soil erosion. These are just a few of the many ways shrubs function to benefit our lives.

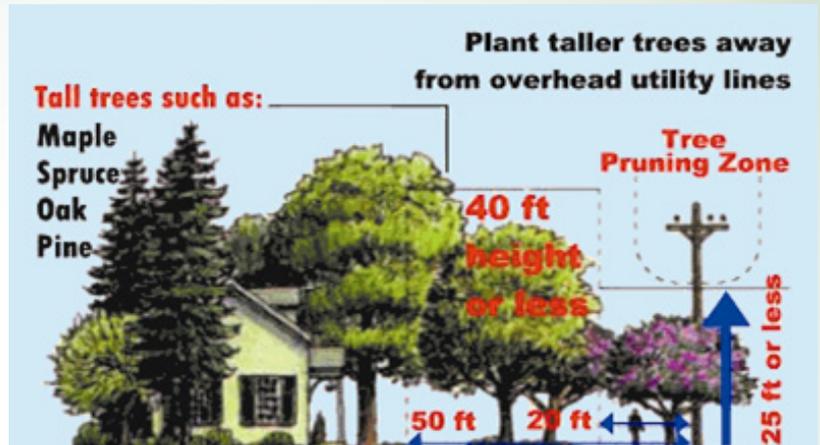
Form and Size

Louis Sullivan, a famous architect, coined the phrase, "form follows function." His advice is a good rule to remember when selecting a shrub. Selecting the right form (shape) to complement the desired function (the results you expect from the shrub) can significantly reduce maintenance cost and increase the shrub's value in the landscape. When making a selection based on form, be sure to consider the *mature* size and shape of the shrub.

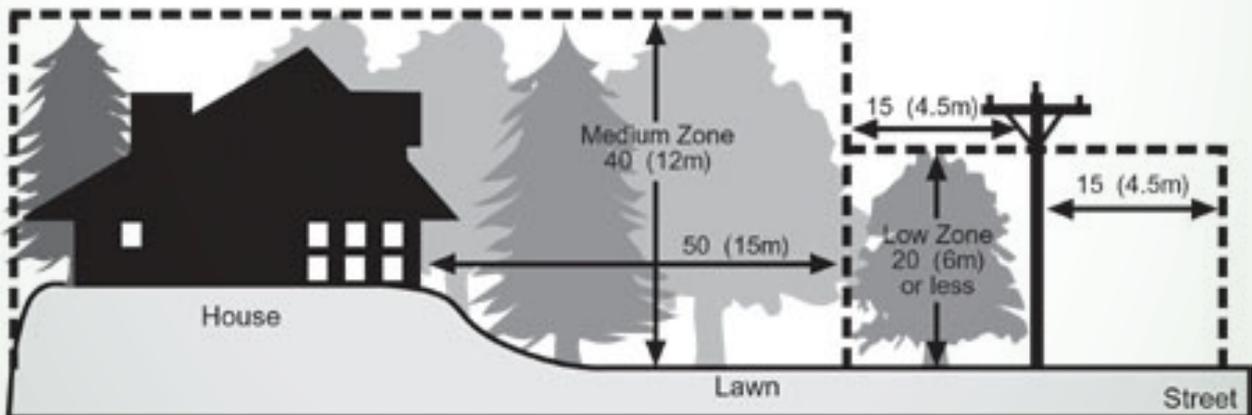
Shrubs grow in a variety of sizes and shapes and can significantly vary in height and width, as shown below. Select a form and size that, when mature, will fit the planting space provided. You may select a "short" species to plant near your house foundations beneath the front window. You may select a narrow columnar form to provide a screen around your back patio. You may choose large vase-shaped or rounded shrubs to create a hedge or backdrop for specimen plants. You may even determine that the site just does not have enough space for a shrub of any kind. See Appendix 2 for information about specific species.

Shrub and Utility Conflicts

It is important to ensure that our shrubs do not interfere with the proper function of utility services. Unreliable utility service not only interrupts daily conveniences, it can even jeopardize lives. It is important when selecting shrubs, to stand at the proposed planting site and look up and down. Do you see overhead wires or signs of underground utilities? Overhead and underground shrub and utility conflicts cost millions of dollars each year. People tend to think of trees when considering potential utility conflicts; however, some shrubs can reach heights of 20 feet or more. Therefore, it is important to consider all types of plants that will be placed near utility lines.



Overhead lines can be electric, telephone, or cable television. Most overhead lines we see are distribution lines, but some are larger transmission lines, carrying bulk electricity, gas, water, or communications from the manufacturing site to cities. These lines may need special consideration; often no shrubs (of any height) are allowed within their easement. Contact your local utility provider if you are unsure about the type of line and what you may plant nearby.



(height and width zones are shown in feet) Provided by Virginia Cooperative Extension, Virginia Tech, and Virginia State University

Underground lines include the three mentioned above, plus water, sewer, and natural gas. The location of underground lines may restrict the species that can be placed over or near the easement. Shrub roots and underground utility lines can usually coexist; however, shrub roots can be severely damaged if it is necessary to dig up the utility line for maintenance. The biggest danger when planting shrubs near underground utilities is digging the hole. Fatal explosions have been the result of digging equipment striking underground natural gas lines. Be sure you know where the lines are before you dig.

Indiana law requires you call the Indiana Underground Plant Protection Service at least 2 full business days before any digging begins. Call 811 or 1-800-382-5544 to ask that utility lines be marked on your property.

Site Conditions

Selecting a shrub that will thrive in a given set of site conditions is the key to long-term shrub growth and survival.

The following is a list of the major site conditions to consider before selecting a shrub for planting:

- Soil Conditions
- Exposure (sun and wind)
- Human Activity
- Drainage
- Space Constraints
- Hardiness Zone

Soil Conditions

The amount and quality of soil present in your yard can limit planting success. In urban sites, the topsoil has usually been disturbed and frequently is shallow, compacted, and subject to drought. When a developer comes in and builds a neighborhood, the topsoil may be stripped. What is left is the infertile, hard subsoil that cannot easily support plant life. In such poor soil, shrubs are continually under stress. For species unable to handle these types of conditions, proper maintenance designed to reduce stress is necessary. You may want to have the soil tested for fertility and pH (alkalinity or acidity). Contact your local Purdue University Cooperative Extension Service Office to find out where to get soil tested in your area. Most shrubs grow best in soils with a pH between 5 and 6. Many new subdivisions erected in former crop fields have a much higher pH and may need treatment. Ask for the test results to be returned with recommendations on ways to improve poor soil conditions with soil amendments (sand, peat moss, manure, or maybe even sulfur to lower pH). This information will help you and your local nursery or garden center select shrub species that will do well in your soil.





Exposure

The amount of available sunlight will affect species selection for a particular location. Most woody plants require full sunlight (at least 6 hours per day) for optimal growth and flower bloom. Some do well in light shade, and a few shrub species perform well in dense shade. Exposure to wind is also a consideration. Wind can dry out soils (creating a drought condition) and desiccate foliage. Storm winds can damage branches and actually uproot newly planted shrubs that have not had an opportunity to establish root systems. Special maintenance, such as staking or more frequent watering, may be needed to establish young shrubs on windy sites.

Human Activity

This aspect of shrub selection is often overlooked. The reality of the situation is that many times, shrub death is caused by people. Soil compaction (by construction or heavy traffic), under watering, over watering, vandalism, and planting the wrong shrub to begin with account for more urban shrub deaths than many people realize. This is why it is so important to learn how to plant and care for your shrub long before you have a shovel in your hand.

Drainage

Shrub roots require oxygen to develop and thrive. Poor drainage can minimize available oxygen to the root system and subject a shrub to premature decline. To

assess drainage, dig some test holes 12 inches square and 12 inches deep in the areas under consideration. Fill the holes with water and time how long it takes for the water to drain away. If it takes more than 6 hours, you may have a drainage problem. You can select an alternative site or choose a species tolerant of wet conditions, such as buttonbush (*Cephalanthus occidentalis*) or redosier dogwood (*Cornus sericea*). Subsurface (tile) drainage may be installed to reduce water retention, but an adequate outlet must be available for the drainage system. Talk with your local soil and water conservation district office for information about installing subsurface drainage systems on your property.

Space Constraints

Always research a shrub's mature height and width, and make sure there will be adequate room (above and below ground) for the shrub throughout its lifetime – prior to purchase. Be sure all possible constraints are considered such as overhead or underground utilities, pavement, buildings, other vegetation, and visibility. Unfortunately, many homeowners spontaneously choose a plant they see at the nursery without considering future size. Years later, the shrub has grown five feet taller and three feet wider, and the homeowner cuts it down because it has “taken over.”

Hardiness

Hardiness is the plant's ability to survive through the coldest temperatures in a given area. A plant hardiness map has been developed based on local weather history and can be used to identify your hardiness zone. Most of Indiana is in Zone 5 or 6. To discover your zone, see the map in Appendix 4. Shrubs are usually tagged to indicate the hardiness zone for which they are suited. Most professionals recommend that shrubs not be obtained from more than 200 miles south of the planting location. Shrubs grown in much different climates will usually be shocked if suddenly brought to

a much colder or wetter environment.

Fruit

Consider where the fruit will fall from the mature shrub. No one wants messy fruit falling on a sidewalk, driveway, deck, or other high traffic area where residues will be tracked into the house. Some fruit may pose a tripping or slipping hazard. Many fruits are also very attractive to wildlife. Bear in mind that while you might enjoy the fruits, so might songbirds, raccoons, and deer. Decide whether or not you want those critters near the front door or on the back deck before planting a shrub there.

Pest Problems

Insects and diseases can be a problem for almost every shrub species. Every plant has its particular pest problems, and the severity varies geographically. These may or may not be life threatening to the plant. You should select plants resistant to pest problems for your area. Choosing native plant species is always the best option, because native plants are naturally more resistant to local insects and diseases than introduced species. Your local International Society of Arboriculture Certified Arborist, shrub consultant, or Purdue extension educator in your county can direct you to information relevant to problem species for your location.



Ordinances or Other Regulations

It is always a good idea to check with local planning and zoning authorities before planting shrubs in urbanized areas. Numerous local cities and towns have regulations concerning the type, size, and placement of shrubs, especially near street intersections, buildings, between streets and sidewalks, along property boundaries, or other public use areas. Contact the local planning office or building authorities for details about your location.

Species Selection

Now that your homework is done, you are ready to select a species for the planting site you have chosen. Make sure you use the information you have gathered about your site conditions and balance it with aesthetic decisions based on your personal preferences. The species must be suitable for the geographic region (hardy), tolerant to the moisture and drainage conditions of your soil, resistant to pests in your area, and have the right form and size for the site and function you have envisioned. If your site conditions indicate the species you selected will not do well under those conditions, you should choose a different shrub, or be prepared to be disappointed when the shrub does not perform as you hoped.

At The Nursery

Some key points to look for when selecting your shrub:

- You should see the root crown – where the base of the plant spreads out to become roots. The root crown should never be covered with soil. Planting a shrub too deeply and covering the root crown with soil will smother the roots.
- Examine the root mass of container grown shrubs by removing the shrub from the container to locate any circling roots (which can strangle the plant). You can still purchase a plant with circling roots, but make sure you cut or straighten them in the planting process. The root mass should feel heavy and thick.
- Look for dried out roots, branches or foliage. This is a sign of stress from which the shrub may or may not recover.
- Inspect the overall look of the plant. Check for mechanical wounds or wounds from poor pruning. Again, these wounds may or may not heal.
- Consider the branches that make up the canopy, looking for any discolored wood, insect or mechanical damage, or multiple weak stems.
- Inquire about where the shrubs were grown and how long ago they were packaged.
- Above all, do not forget the reasons you selected a certain species and be suspicious of shrubs “on sale.” If you change your mind regarding species, be sure the new shrub meets all your requirements.

If you are having difficulty answering any of these questions, contact your local International Society of Arboriculture Certified Arborist, shrub care professional, garden center, or county extension educator for assistance. Their assistance will help you plant the “right shrub in the right place for the right reasons.” It is best to get them involved early and make the right decision, to avoid having to call them later to ask them if you made the wrong decision.



CHAPTER 5: PLANTING AND MAINTENANCE

Glenn Lange, Marion County SWCD

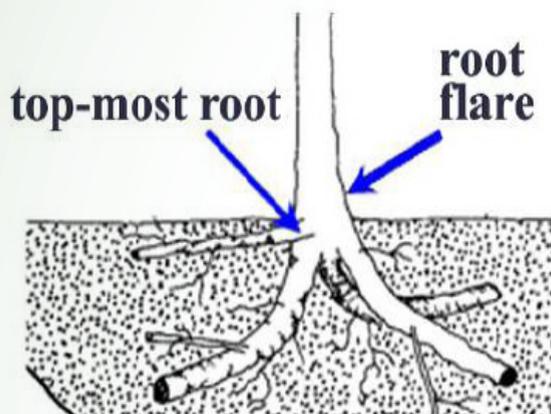
Now that you have completed your research on which shrubs to purchase and matched them to your soils, light, moisture, and landscape conditions, you are ready to plant.

Shrub Planting

Shrubs are purchased in three forms: balled and burlapped (B&B), container grown, and bare root. Each has specific planting requirements as discussed below. *Nothing is as important to the successful growth of a new yard shrub as the planting process and the first year's care.*

Start with the hole. This is about the same for container grown or B&B shrubs. There is a lot of truth to the old saying that it is better to plant a \$50 shrub in a \$100 hole than to plant a \$100 shrub in a \$50 hole. How do you know how deep and wide to dig the hole?

First, find the root flare of the shrub. The root flare is the point where the shrub roots end and the trunk or stem(s) begins. The root flare will show how deep the shrub was growing in the nursery or woods. The shrub should be planted no deeper than this. For a B&B shrub, you may have to dig around the surface of the ball to find the flare, and it is very important that you take the time to do this. Measure the distance from the flare to the bottom of the ball so that you will know how deep to dig the hole. For a container-grown shrub, the flare should be at the surface of the soil in the container, but if it is not, take time to dig down and find it.



Dig the hole no deeper than the distance from the root flare to the bottom of the root ball or the bottom of the container. The hole should be dug at least two times wider than the root ball, whether it is a B&B or container grown shrub. The reason is that the roots need to have access to well-aerated (non-compacted) soil so they can grow outward from the shrub. The most common mistake in planting shrubs is to dig the hole too deep and too narrow.

When planting around a new home, it is important to loosen the soil for a distance of at least three times the diameter of the root ball or container. This is because of the heavy compaction that has taken place during the construction as trucks, tractors, and other equipment have made repeated trips around the house. Compacted soil often results in tree roots growing in a circle around the hole, keeping them from penetrating outward. To prevent this problem, loosen the soil near the hole with a rotary tiller or digging spade.

Should the planting site be in poorly drained, heavy, clay soil, another concern is 'glazing' of the hole. This happens when the sides and bottom of the hole become slick or smooth during the digging process. The result is a barrier that is difficult for water to penetrate. To prevent this problem, use a digging fork, large screwdriver, or similar tool to roughen the bottom and sides. It is also a good idea to raise the center of the hole by replacing some soil so that water flows away from the center and does not pool in the planting zone.

Planting Balled and Burlapped Shrubs

Balled and burlapped (B&B) shrubs should be planted as soon as possible after delivery, but can be stored for a short time if the ball is kept moist and the shrub is placed in a shady area. Always handle B&B shrubs by the ball and not the stem(s). Cut away as much of the burlap, wire, and any other packaging material as possible. It is often best to put the ball in the hole and then remove this material so the root wad does not fall apart.

Carefully place the shrub in the center of the prepared hole and backfill with natural soil. Continuously add water as you are backfilling. Leave a slight basin when backfilling to collect rain water which will soak down to the roots. Do not add soil amendments unless the soil is very poor. Do not pack the backfilled soil tightly, only enough to ensure that air pockets are removed. Over packing will prevent water from reaching the roots and discourage the roots from growing

outward from the ball.

Planting Container Grown Shrubs

Container grown shrubs can also be stored for some time after purchase, but it is very important to be sure the soil mixture is kept moist. Container shrubs usually dry out much faster than B&B because of the smaller amount of soil mixture. Dig the hole no deeper than the container. It is easy to know when the hole is at the proper depth by simply setting the shrub in the hole while it is still in the container. Handle the shrub by the container, not the trunk or stem(s).

Completely remove plastic, fiber, or metal containers. Once the container has been carefully removed, check the roots which may be tightly compressed or 'pot-bound'. Use your fingers or some blunt instrument to carefully tease the roots away from this tight mass. Spread the roots before planting.

You may find some or many roots circling the root mass. It is extremely important that those roots be released and spread out or they may girdle the root mass and kill the shrub. In extreme cases, it may be necessary to prune or cut away a girdling root.

Once the roots have been prepared, place the shrub in the hole, backfill with the original soil, leaving a slight basin to collect rainfall and compress with your hands. Add water as the backfilling is taking place. It is not necessary or desirable to pack the soil with your feet.

Planting Bare Root Shrubs

Planting bare root shrubs is a little different than B&B or container shrubs because you are dealing with very fragile roots that will dry out in minutes.

Unpack and keep the roots moist by heeling in soil or packing in moist sphagnum moss. Do not allow the roots to dry. Place the roots in a bucket of water when you are ready to plant.



Example of a root-bound, container-grown plant. Notice how the roots completely encircle and cover the exterior of the root ball.



Watering

Newly planted shrubs should receive 1-inch of water (via rainfall and/or supplemental watering) every 7 to 10 days during the first year, more often if the weather is very hot and dry. If you do not know if a shrub needs watering, a good way to check is to dig down about 6 inches next to the planting hole. If the soil is dry and powdery, the tree needs a good soaking. Regular, deep soakings are much more effective than squirting a little water in the shrub's direction every day.

Over watering can result in oxygen deprivation around the roots, and is just as damaging as under watering. Be sure that your shrub needs watered before you turn on the hose. Soil that has adequate moisture will form a ball when squeezed in the hand.

Fertilizing Shrubs

Newly planted shrubs generally need no fertilizer during the first year or as they mature. Shrubs growing in a lawn area will usually get all the fertility they need from normal lawn fertilization.

Mature shrubs making satisfactory growth may not require fertilization. When considering supplemental fertilizer, it is important to know what nutrients are needed and when and how they should be applied. Soil conditions, especially pH and organic matter content, vary greatly, making the proper selection and use of fertilizer a somewhat complex process. When dealing with a mature shrub that provides considerable benefit and value to a landscape, it is worth the time and investment to have the soil tested for nutrient content. An arborist can arrange to have the soil tested at a soil testing laboratory and can give advice on application rates, timing, and the best blend of fertilizer to use, if any.

Dig the hole wider than seems necessary, so that the roots can be spread without crowding. Remove grass from an area at least 3 feet around the hole to reduce competition for water and nutrients. If the soil is compacted from equipment used around a new house, it is a good idea to dig up or till this entire three-foot circle. This will aid in root development. Remove air pockets using slicing motions with the spade. Then plant your shrub in the center of the tilled area. Place the shrub in the hole at the same depth it grew in the nursery. The root flare will help you determine this depth. Spread the roots around the hole and partially fill the hole, firming the soil with your hands around the lower roots. Add some water but no soil amendments unless the soil is very poor. Shovel in the rest of the soil, leaving a one or two inch deep water basin around the tree. Give it plenty of water at this time.

After the water has soaked in, add a 2-inch deep layer of mulch on the area where the grass was removed. Keep the mulch several inches away from the shrub's stem(s) to prevent stem stress and reduce insect and disease problems.

Mulching

Mulching is one of the most beneficial practices for the health of a shrub. Mulch imitates the natural environment, in which shrubs have their roots anchored in a rich, well-aerated soil full of essential nutrients. Leaves and organic materials replenish nutrients, provide an optimal environment for root growth and mineral uptake, and blanket the soil, holding moisture content and soil temperature somewhat stable. Urban landscapes are a much harsher environment with poor soils, little organic matter, and big fluctuations in temperature and moisture. Applying a 2 to 3 inch layer of organic mulch can mimic the natural environment and improve plant health. The most common benefits of mulching include:

- Helps maintain soil moisture.
- Helps control weeds.
- Serves as nature's insulating blanket, reducing the effects of temperature fluctuations.
- Some mulch can improve soil fertility.
- Many types of mulch can improve soil aeration, structure, and drainage.
- Reduces the likelihood of damage from weed eaters and lawn mowers.
- Helps inhibit certain plant diseases.
- Gives planting beds a uniform, well-cared-for look.

When practical, mulch should extend out at least three feet from the base of a shrub. Most of the fine, absorbing roots are located within inches of the soil surface. These roots, which are essential for taking up water and minerals, require oxygen to survive. A thin



layer of mulch (2 to 3 inches), applied as broadly as practical, can improve the soil structure, oxygen levels, temperature, and moisture availability where these roots grow.

Mulch can be purchased in organic and inorganic forms. Inorganic mulches include stone, lava rock, pulverized rubber, geotextile fabrics, and other materials. Inorganic forms do not decompose and do not need to be replenished often. On the other hand, they do not improve soil structure, add organic matter, or provide nutrients. For these reasons, most arborists prefer organic mulches.

Organic mulches include wood chips, pine needles, hardwood and softwood bark, leaves, compost mixes, and a variety of other products usually derived from plants. Organic mulches decompose in the landscape at different rates depending on the material. Those that decompose faster must be replenished more often. Because the decomposition process improves soil quality and fertility, many arborists and landscape professionals consider this a positive characteristic, despite the added maintenance.

As beneficial as mulch is, too much can be harmful. The generally recommended mulching depth is 2 to 4 inches.

Problems with improper mulching include:

- Deep mulch can lead to excess moisture in the root zone, which can stress the plant and cause root rot.
- Piling mulch against the stems of plants can stress stem tissues and may lead to insect and disease damage.
- Mulch piled high against the stems of young shrubs may create habitat for rodents that chew the bark and girdle the shrubs.
- Some mulch, especially those containing cut grass, can affect soil pH. Continued use of certain mulches over long periods can lead to micronutrient deficiencies or toxicities.
- Thick blankets of fine mulch can become matted, and may prevent the penetration of water and air.
- Anaerobic “sour” mulch may give off pungent odors and the alcohols and organic acids that build up may be toxic to young plants.



It is clear that the choice of mulch and the method of application can be important to the health of landscape plants. The following are some guidelines to use when applying mulch.

- For well-drained sites, apply a 2 to 3 inch layer.
- If there are drainage problems, a thinner layer should be used.
- DO NOT place mulch against the shrub’s stem(s). Keep it several inches away.
- Consider a 3-foot circle as a minimum distance for mulching.
- Organic mulches are usually preferred due to their soil-enhancing properties.
- Organic mulch should be well aerated by occasional raking or other method of “fluffing up”.
- Avoid buying or using sour smelling mulch.
- If mulch is already present, check depth before adding more. Use a rake to refresh the appearance.

Pruning

Correct pruning is an essential maintenance practice for shrubs in the home landscape. However, most homeowners regard pruning with considerable, though unnecessary, apprehension. Pruning is not difficult if you understand the basics and learn why, when, and how to prune.

Shrubs should be examined annually for pruning requirements. Too often, pruning is ignored for several years. Many shrubs become overgrown and often weak, making drastic pruning a necessity to bring the plant back to usefulness. Regular pruning will help keep the plant in bounds and keep its growth vigorous. To prune successfully, you must 1) know why you are pruning, 2) be correct in your timing, and 3) follow proper techniques using proper tools: why, when, and how.



MYTHS ABOUT PRUNING

There are a number of myths and misconceptions about pruning which should be laid to rest.

Pruning is difficult.

Pruning is straightforward if one knows a little about how the plant grows and what it should look like when the process is complete.

Plants will die if pruned at the wrong time of year. Plants may be injured, but seldom, if ever, are they killed by poorly timed pruning.

All pruning must be done during the winter.

Actually, many plants are best pruned during the growing season.

Hedge shears are all you need to prune shrubs.

Hedge shears are intended to prune hedges, only! Using them on shrubs not intended as hedge plants destroys the natural grace and beauty of the plants.

All cut surfaces must be treated with tree paint.

While long recommended, the evidence is conflicting on the use of tree paint. Largely, its use should be thought of as cosmetic, helping to hide light-colored scars.

Times to Prune For Specific Purposes

The best time to prune is based on the flowering, fruiting, or growth habits of a plant, its tendency to “bleed,” and the fact that pruning usually stimulates a flush of re-growth.

Most plants can be pruned at almost any time of year without jeopardizing basic survival. However, it is preferable to prune specific plants at specific points in the year.

Reasons To Prune

Pruning is necessary to maintain a healthy, vigorous shrub. Specifically, pruning is practiced to:

Maintain or reduce plant size.

Pruning can prevent a plant from overgrowing its space in the landscape and eliminates the need for drastic cutting of crowded, overgrown plants. It can allow for growth of plants under or adjacent to the pruned plant. It can also serve to reduce leaf area on newly planted trees and shrubs. This promotes survival through transplanting and consequent root loss.

Remove undesirable growth.

Pruning can encourage plant vigor through the removal of weak, overcrowded growth. Such thinning often improves the visual balance or symmetry of the plant.

Remove dead, diseased, or broken branches.

Pruning will aid in maintaining the shape, vigor, and health of the plant.

Stimulate flowering and fruiting.

Removal of the current year's old, faded flowers and fruit clusters will promote flower buds for the following season.

Rejuvenate and restore old plants to vigorous growth.

Proper pruning can restore a youthful, natural growth habit in certain overgrown shrubs.

Pruning According to Season of Bloom

Shrubs that flower before the end of June should be pruned immediately after flowering. Flower buds develop during the previous season's growth, thus, the flowers for the current year's bloom developed last year and overwintered in the bud. If pruned before spring flowering, the flower buds will be removed, thus eliminating flowering. Table 1 shows examples of plants which should be pruned after flowering.

Other trees and shrubs, those which flower after the end of June, should be pruned in winter or early spring before new growth starts. These plants develop flower buds during the spring of the flowering season. Examples of plants of this type are shown in Table 2.

Certain plants may be lightly pruned both before and after flowering. This often increases flower and fruit production, and several may produce a second bloom during the year. Table 3 shows examples of this plant type.

In any of the foregoing cases, the best time to prune is based on practices which maximize flowering of a shrub planted for its flowers. If badly timed, pruning sacrifices flowering, however, it will not be detrimental to the plant's survival. It will simply mean a loss of one season's floral display.

Table 1. Spring-flowering shrubs which should be pruned after flowering

Common Name	Scientific Name
Spicebush	<i>Lindera benzoin</i>
Downy serviceberry	<i>Amelanchier arborea</i>
Dommon chokecherry	<i>Prunus virginiana</i>
Forsythia	<i>Forsythia spp.</i>
Lilac	<i>Syringa spp.</i>
Viburnums (nannyberry, cranberry, arrowwood)	<i>Viburnum spp.</i>
Currant, gooseberry	<i>Ribes spp.</i>
Weigela	<i>Weigela spp.</i>
Smoketree	<i>Cotinus coggygria</i>
Beautybush	<i>Kolkwitzia amabilis</i>



Table 2. Summer-flowering shrubs which should be pruned before spring growth begins.

Common Name	Scientific Name
Buttonbush	<i>Cephalanthus occidentalis</i>
American elderberry	<i>Sambucus canadensis</i>
Common ninebark	<i>Physocarpus opulifolius</i>
Black chokeberry	<i>Aronia melanocarpa</i>
Winterberry	<i>Ilex verticillata</i>
Wild hydrangea	<i>Hydrangea arborescens</i>
Virginia sweetspire	<i>Itea virginica</i>
Butterflybush	<i>Buddleia davidii</i>
Sumac	<i>Rhus spp.</i>
Coralberry, snowberry	<i>Symphoricarpos spp.</i>

Table 3. Shrubs which may be pruned both before and after bloom.

Common Name	Scientific Name
Redosier dogwood	<i>Cornus sericea</i>
Cranberry, spreading, or many-flowered cotoneaster	<i>Cotoneaster spp.</i>
Snowberry	<i>Symphoricarpos albus</i>
Weigela	<i>Weigela spp.</i>
Oregon hollygrape	<i>Mahonia aquifolium</i>
Anthony Waterer, Froebel spirea	<i>Spirea x bumalda</i>
Chenault coralberry	<i>Symphoricarpos x chenaultii</i>

Pruning to Maximize Fruiting Display

Shrubs that are prized for their fruit should be pruned after the fruit drops or is eaten by wildlife. Although they may flower early in the season, the fruit should be allowed to develop. After the fruit has lost its appeal, then prune. Examples of plants in this group are certain viburnums (*Viburnum spp.*) and hawthorns (*Crataegus spp.*).

Pruning Needle (Coniferous) Evergreens

To promote a compact plant, coniferous evergreens can be pruned in late spring as the new branches elongate, but before they become stiff. Otherwise, they, like broadleaved evergreens, can be pruned whenever the wood is not frozen. However, coniferous types will generally not develop new shoots on older wood, so it is not advisable to cut back beyond the living foliage portion of the branches.

Pruning in Anticipation of Growth Stimulation

In general, except for the cases already cited, the best time to prune is when the plant will recover the fastest. Severe pruning should be done just before regrowth starts in the spring in order to hide bare stubs quickly. Pruning in late summer should be avoided since it stimulates succulent growth which may not harden sufficiently to avoid winter dieback. Storm-damaged plants should be pruned as soon after the damage occurs as possible.

Tools For Pruning

Proper pruning requires proper tools, employing correct methods, and applying the methods accurately to the appropriate plant. Tools should be of the highest quality

you can afford, and they should be sharp. Keep them in good condition by lubricating regularly, cleaning to prevent rust, and only using them for their intended function.



Basic Pruning Tools

- Hand shears (for branches up to 1/4" diameter)
- Both scissors and blade/anvil types are available in 6-9" sizes. Scissor type cuts more closely, while anvil type allows the cutting of slightly larger branches.
- Scissors and blade/anvil types each have 16-30" handles. Strong but light-weight handles are critical.
- Hedge shears (for clipping new growth into formal shapes)
- Power and hand types are available in 6-18" blades. These shears are not useful for pruning large branches or for any pruning which is intended to maintain a plant's natural appearance.
- Pruning saws (for branches over 1" diameter)
- Pruning saws are characterized by coarse teeth to prevent gumming. Most cut on the pull stroke for easier, safer use. Chain saws are dangerous to use for pruning. They are best used for cutting up limbs already pruned or for removing dead plants.

Basic Procedures In Pruning

There are three relatively simple techniques basic to all pruning situations.

Pinching is usually done by hand, and this is a good way to control plant size. (See Fig. 2.)

Thinning completely removes some branches back to a main branch, trunk, or soil line. Do not cut into the branch collar when making a thinning cut; only cut back to a trunk or main branch. That is, do not cut so near the trunk that you cut through the area at the base of the limb adjacent to the main trunk, known as the branch collar. Such a cut allows for infection to spread into the part of the plant you wish to keep. Cut only the branch to be removed, about 1/2"-2" from the main trunk (depending on age). (See Fig. 3.)

Heading back involves shortening branches back to a good bud or lateral branch. A proper heading back cut should not leave a stub. Make your cut about 1/4" above an active bud or lateral branch. (See Fig. 4.)

The Wound Dressing Question

Wound dressing or tree paint is not essential; recent research has pointed out that tree paint or wound dressing is not as advantageous as previously thought. Dressings may actually harbor disease organisms rather than exclude them. It has also been determined that wound dressing slows the wound callusing (often called healing) process, rather than speeding it up. The only reason for painting a pruning cut is for cosmetic purposes. When appearance is a factor, the painting should be done with latex paint. A good, clean, unpainted pruning cut, while perhaps unsightly at first, will probably callus faster than a painted one. On the basis of shrub health alone, pruning cuts should not be painted.



Figure 2.



Figure 3.



Figure 4.

Procedures For Pruning Specific Shrubs

Deciduous Shrubs. Always allow a shrub or tree to develop its natural shape, except when special effects are desirable, such as for hedges. "Haircut" pruning should be avoided. Perfectly sheared globes and squares make a mockery of the plant's natural form and beauty. (See Fig. 5.)

Instead, use the thinning technique on shrubs. Cut the branches at different lengths, 1/4" above an active bud. Remove twigs or branches selectively and thus reduce overcrowding. Some stems should also be removed at ground level. The length of new shoots should be reduced 1/3 to 1/2 of their length, which induces side shoots to develop.

Cutting above a bud prevents dieback of the stem and encourages a new branch to develop from the bud. The haircut technique causes a dense growth at the ends of the pruned branches which shades the rest of the plant, thus causing the interior of the plant to die and eventually develop a leggy appearance. If a shrub develops weak, dense growth, thin out many of the smaller branches and twigs. This promotes the vigorous growth of the remaining branches. Also remove branches which tend to rub against one another, opening wounds for the entrance of disease.



Figure 5.



Figure 6.

Evergreen Shrubs. With evergreen shrubs, avoid shearing to artificial shapes. If the evergreen plant has a soft, feathery appearance, do not cut it square or make a round shrub out of it. Prune using the thinning technique, thus keeping the natural shape of the evergreen. Remember, the non-green portion of needle-leaved evergreen branches does not normally put out new branches, so you do not want to cut stems back to the old wood. Reduce new growth annually, and when removing the larger branches for thinning, cut close to the main trunk, leaving no stubs. Heavy thinning is only needed every few years.

With certain evergreens, such as yews (*Taxus spp.*), a new flush of growth will occur in the early fall. Head back these long shoots to keep the plants in shape.

Broadleaved evergreen shrubs are pruned in the same manner as needled evergreens, by thinning and heading back. Light pruning every year is preferred, but heavy pruning every three years is acceptable. Rhododendron species benefit from removal of flower heads immediately after flowering. Most types of broadleaved evergreen shrubs, such as hollies (*Ilex spp.*), pyracantha (*Pyracantha spp.*), azaleas (*Rhododendron spp.*), and euonymus (*Euonymus spp.*), can be cut back severely, but avoid cutting all the way to the ground.

the smaller branches and twigs. This promotes the vigorous growth of the remaining branches. Also remove branches which tend to rub against one another, opening wounds for the entrance of disease.

Always remove dead, damaged, or diseased branches and limbs from established plants as well as newly planted trees and shrubs. The plant should then develop new, stronger growth, free of diseases. Also, remove dead flower branches, dead flowers, and old fruit stocks as soon as the flowers have wilted or the fruit has dropped. This stimulates new growth and helps to make a stronger tree or shrub. It also encourages plants such as rhododendrons (*Rhododendron spp.*) to produce more flower buds for next season.

Old, Overgrown Shrubs. Another aspect of pruning is the renewal of declining shrubs. In renewal pruning, remove one-third of the old, mature stems per season. These large, old branches are removed at the ground level. Leave the young, vigorous branches. The water sprouts that develop should be cut back to different lengths and encouraged to develop into strong branches for the shrubs by the thinning process. (See Fig. 8.)

Lilac wood often is more than 3 years old before it flowers. Therefore, large, overgrown lilac bushes can gradually be cut back over a period of years, but do not remove all the old, flowering wood until the new growth begins to flower. Then the bush will flower every year and will not have any barren periods. If it is essential to immediately reduce the size of a shrub, rejuvenation pruning is appropriate for some species (Fig. 9 and Table 4). Cut back the entire top of the plant to the ground line.

Many new shoots will grow from the base, and they will require thinning. As much as 3/4 of the new growth should be removed, depending on the species.

Some plants frequently suffer winter die back of all above-ground stems. These may be safely rejuvenation pruned to produce rapid new growth. These plants are considered to be usefully winter hardy. They can be used for landscaping purposes similar to an herbaceous perennial, even though severe rejuvenation pruning often is necessary.

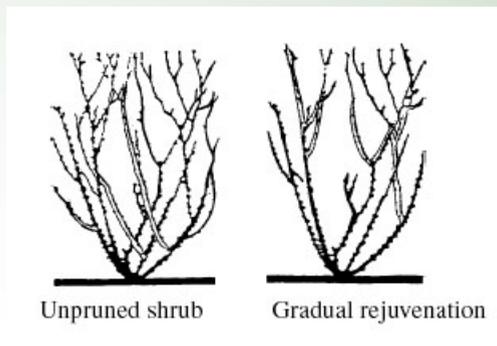


Figure 9. Image Courtesy Virginia Technical Extension

Review of General Pruning Procedures

1. Start pruning while plants are young to maintain the natural form and avoid the need for corrective pruning later.
2. Know why the plant is being pruned and what your final goal is before you start.
3. Time your pruning properly for aesthetic and functional reasons.
4. Remove any dead, broken, injured, diseased, or insect infested branches. When removing diseased wood, clean your tools after each cut by immersing cutting blades in rubbing alcohol or household bleach.
5. Prune out undesirable branches such as crossovers, suckers, sprouts, or those branches which are too long or too low.
6. Make proper cuts without leaving stubs, but do not cut into the collar.
7. Clean and oil metal parts of pruning tools when finished.

Table 4. Landscape plants which may be rejuvenation pruned (completely cut back to the ground)

Common Name	Scientific Name
wild hydrangea	<i>Hydrangea arborescens</i>
spirea	<i>Spirea spp.</i>
butterflybush	<i>Buddleia davidii</i>
lilac	<i>Syringa spp.</i>
forsythia	<i>Forsythia spp.</i>
oakleaf hydrangea	<i>Hydrangea quercifolia</i>

References:

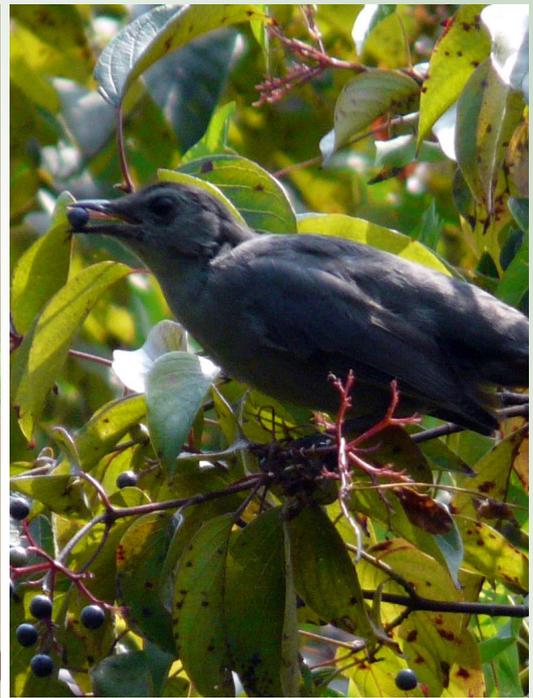
International Society of Arboriculture: www.isa-arbor.com

Purdue University Department of Forestry & Natural Resources: www.fnr.purdue.edu

Root ball photo: Virginia Cooperative Extension, Virginia Tech, and Virginia State University Alex X. Niemiera, Associate Professor and Extension Specialist, Pub 426-701



CHAPTER 6



CHAPTER 6: PROTECTING SHRUBS FROM INSECTS, DISEASES AND OTHER PROBLEMS

Shrubs can be attacked by pests or disease. They can also be damaged by environmental factors, nutrition deficiencies or improper chemical use. In order to correct the problem, you must first identify the problem to determine the correct solution.

Types of Causal Agents

Plant problems are often categorized according to the type of causal agent. Biotic (living) causal agents include insects, mites, slugs and related pests as well as disease-causing organisms such as fungi, bacteria, viruses and nematodes. Other biotic causal agents include vertebrate animals (rabbits, squirrels, deer, chipmunks, etc.)

and weeds (unwanted plants). When any of these causal agents produce undesirable plant damage, it is called a pest (an unwanted plant, animal or microorganism).

Damage from abiotic (non-living) causal agents may be the result of environmental conditions, plant management practices, chemical use or genetic change.

Shrubs may be damaged from excess heat, frequent heavy rains, extended drought, low winter temperatures, drying winds or late spring freezes. Other environmental factors include the amount of light, soil characteristics (acid or alkaline, texture, degree of aeration, compaction or plant toxins) and air pollution.

Mechanical injury and poor management practices may cause shrub damage. Girdling may occur from roots or twine. Stems may be damaged from lawn mowers and grass trimmers. Shrubs may also be damaged from improper planting, fertilizing, pruning or mulching.

Shrubs can be injured from improper pesticide selection and use. Drift from lawn herbicides (weed killers) to desirable plants is a relatively common abiotic disorder. Other chemicals such as deicing salts may damage trees and shrubs.

Occasionally plant abnormalities occur through genetic change (mutations or reversions).

Biotic causal agents are considered infectious because they can spread from one susceptible plant to another while abiotic causal agents are noninfectious and cannot spread from plant to plant.

The causes of plant problems are similar to human ailments that have different causal agents. Strep throat is an infectious disease caused by a type of bacteria. It can spread from one person to another. However, a sore back from raking too many leaves or shoveling

too much snow is a noninfectious disorder that is not contagious.

Fire blight, a disease caused by bacteria, and bagworm, an insect, could both be considered infectious because they can spread to other susceptible plants. However, winter desiccation (drying) is a noninfectious disorder that is not contagious to other plants. It is caused by water loss due to deficient moisture, drying winds, frozen soil, full sun and/or fluctuating temperatures. Pesticides should never be used for noninfectious disorders.

Conditions Required For Infectious Problems

Three conditions are necessary in order for an infectious problem to occur. First, the host plant must be susceptible to a particular disease organism, insect or other living agent. Plants are only attacked by certain organisms. The fungus that causes black spot on rose does not infect any other plant species, and specific rose species and cultivars (cultivated varieties) vary greatly in their susceptibility or resistance to black spot. Spicebush swallowtail caterpillars may feed on the leaves of spicebush (*Lindera benzoin*) but do not eat the leaves of shrubby dogwoods (*Cornus* sp.)



Similarly, dogwood sawflies may feed on the foliage of dogwood but are not known to attack spicebush.

The second condition that must be present in order for an infectious problem to occur is an active pathogen (disease-causing organism) or an insect or related pest that is present in sufficient numbers to cause damage. In addition, the pest must be in the proper development stage before infection or plant damage can occur. Adult moths or butterflies cannot damage plants but the caterpillars that hatch from their eggs may feed on plant foliage.

The third requirement is an environment suitable for the development of the infectious problem. Infection and/or pest development are often related to temperature and moisture.

Fire blight, a bacterial disease, is often most severe when warm spring weather occurs with rainfall and hail. However, two spotted spider mite populations tend to build up more rapidly during hot, dry conditions.

The interaction of susceptible host, pathogen and suitable environment is often communicated in disease management as the “disease triangle.” However, the concept can be expanded to include all biotic organisms (biotic triangle). Pest problems occur only when all three of these conditions are present at the same time. If you think of susceptible host, pest organism and suitable environment as the three legs of a stool, the goal in pest management is to break one of the legs in the biotic triangle.

Insects and Related Pests

There are about 100,000 different insect species in North America. However, most of them are beneficial or harmless. It is estimated that less than 3 percent are considered pests. Insects and related pests, such as spider mites, can injure shrubs in the following ways:

- Discolor or disfigure leaves by sucking plant sap (plant bug, lace bug, privet thrips, spider mites)
- Produce sticky or waxy liquid excrement called honeydew by sucking plant sap (some scale insects and aphids)
- Bore into plant stems and feed inside, cutting off vascular tissue (lilac/ash borer, rhododendron borer, viburnum borer, dogwood borer, currant borer)
- Chew between upper and lower leaf surfaces (azalea leaf miner, boxwood leaf miner, holly leaf miner, lilac leaf miner)
- Injure plant tissue resulting in tumor-like growths (gall makers may occur on rose and witchhazel)
- Lay eggs in leaves or stems (periodical cicada may damage twigs of cotoneaster, dogwood, witchhazel and weigela)
- Feed on plant roots in the soil (black vine weevil larvae may damage rhododendron, euonymus or yew)
- Transmit disease (ambrosia beetles breed in a wide variety of trees and shrubs and could introduce pathogenic fungi such as fusarium)
- Remove leaf tissue by chewing (defoliators such as Japanese beetle, bagworm, dogwood sawfly, rose slug, spicebush caterpillar)



Infectious Diseases

Fungi are the most common plant pathogens of shrubs, followed by bacteria. Other pathogens include viruses, nematodes, phytoplasmas (bacteria-like) and viroids (virus-like). Parasitic flowering plants like dodder also occasionally occur.

Only a small number of severe disease problems typically occur on shrubs. Among the most serious fungal diseases are root/crown rot and verticillium wilt. Both may cause branch dieback and/or death. Most root/crown rot problems can be prevented with proper shrub selection, planting and care. Azaleas and rhododendrons tend to be prone to root/crown rot, especially in heavy, poorly drained soils.



Verticillium wilt is a soil-borne vascular disease that cannot be controlled with fungicides (pesticides to control fungi). It is not extremely common on shrubs, but it can be lethal. Shrubs susceptible to verticillium include azalea, barberry, boxwood, cotoneaster, currant, deutzia, dogwood, honeysuckle, lilac, privet, rose, smoke bush, sumac, viburnum and weigela. Proper water and nutrient management can help reduce the chances of infection.

Fire blight and crown gall are two bacterial diseases that may cause branch dieback on shrubs. Fire blight can attack more than 70 members of the Rosaceae (rose family) such as crabapple, ornamental pear, cotoneaster, pyracantha, flowering quince, serviceberry and spirea. Proper pruning and fertilization practices are important to prevent branch dieback.

Ornamentals commonly affected by crown gall include rose and euonymus. However, flowering almond, honeysuckle, lilac, ornamental plum, privet, pyracantha, viburnum and willow are also susceptible. Abnormal outgrowths of plant tissue appear on roots or stems. This reduces plant aesthetics or causes dieback due to girdling of plant tissue. Selecting resistant plants is the best way to prevent this disease.

Canker diseases cause localized dieback on stems, sometimes causing girdling and branch dieback. Canker diseases may be found on a variety of shrubs including dogwood and viburnum and can be pruned out when practical. To help prevent canker diseases, select the right plant for the right place and reduce plant stress with proper planting and maintenance.

Other common shrub diseases include powdery mildew and various leaf spots caused by fungi or bacteria. These foliage diseases can affect the aesthetics of the shrub but rarely result in permanent injury to the health of the plant. Selecting resistant shrub species and/or cultivars as well as providing appropriate plant maintenance will help prevent these diseases. For example, Meyer lilac and Miss Kim lilac are much more resistant to powdery mildew than common lilac. Proper shrub pruning involves selectively removing older, thicker stems. This increases air circulation and reduces chances of disease.



Many of the insects that feed on shrubs only affect the plants aesthetically. Those insects that are more likely to produce serious permanent plant damage include wood borers, heavy infestations of scale insects, root feeders and foliage feeders of needle evergreens such as bagworms. Foliage injury will only stress the plant if a large amount of the leaves are consumed or damaged.

Many of the wood boring insects tend to attack plants under stress so proper shrub selection, planting and maintenance will help prevent borer problems. Keep plants healthy with adequate irrigation and fertilization. Avoid plant injury and avoid pruning while adult borers are active.

Noninfectious Disorders

According to the International Society of Arboriculture, noninfectious disorders are responsible for 70 to 90 percent of all plant problems in urban areas. Therefore, proper shrub selection, planting and care will prevent many plant problems.

Noninfectious (abiotic) disorders include nutrient deficiencies or excesses, too much or too little soil moisture, temperature stresses from heat or cold, drying winds, mechanical damage or herbicide injury.

The term “decline” is used to describe trees and shrubs that have gradual, progressive deterioration in plant health, often attributed to a combination of noninfectious factors that affect root growth. Some of the most common reasons for decline are poorly drained and/or compacted soils, planting too deep and irrigating too often or too infrequently. To prevent decline, plant the right shrub in the right location and avoid changes to the growing site. To treat shrubs in decline, water, fertilize and mulch properly and correct specific root stresses.

Symptoms of “leaf scorch” appear as a browning of leaf tissue along the edges of the leaf, progressing inward between leaf veins. The symptoms appear because the plant cannot supply enough water to the leaves. The actual causes vary and may include drought, high temperature, drying winds and/or damage to the roots or stems. Newly planted shrubs are more prone to leaf scorch during the first few years after planting. To avoid leaf scorch, avoid plant injury and water properly.

The nutritional disorder known as “iron chlorosis” is caused by high soil pH (alkaline soils) and/or root injury. The leaf veins remain green while the rest of the leaf tissue turns pale yellow. The best way to avoid the problem is to plant shrubs that are tolerant to the existing soil pH. Azaleas and rhododendrons are very susceptible to iron chlorosis because they require strongly acid soils like other members in the plant family Ericaceae (mountain laurel, heath, heather, blueberry, cranberry). If the existing plants show iron chlorosis and do not have root injury, reduce the soil pH with sulfur and/or treat the soil and/or foliage with iron. If chlorosis is due to root injury, follow the recommendations for shrub decline.

Plant Problem Diagnosis

There are many different causes of plant problems – infectious and noninfectious. Sometimes shrub problems have multiple causes. Do not treat the plant problem until you diagnose the cause(s). Consider the following important steps in plant problem diagnosis:

- Identify the plant. Many infectious causal agents attack only certain types of plants. This can narrow down the list of potential problems. At least identify the plant by major plant type (pine, dogwood, forsythia, viburnum, etc.). Ideally, it is most helpful to identify the shrub species and cultivar.
 - Know what is normal and abnormal. Plants may normally appear different in different seasons of the year. Different shrub cultivars may have different characteristics such as foliage color, plant size or disease resistance.
 - Consider each plant part. If possible, examine each part for any abnormalities. This includes the leaves, stems, branches, roots, flowers, fruits, overall plant or the vascular system. Keep in mind that the cause of the problem may be in a different location than the part of plant showing abnormal characteristics. For example, leaf injury may be due to damage to the stems or roots.
 - Look for signs of the problem. A sign is the actual infectious causal agent or other physical evidence of its presence. Examples of signs include: insects, mites, fungal mycelium or fruiting bodies, insect or mite eggs or remains, webbing or silk shelters, honeydew, scale coverings, sawdust or bacterial oozing.
 - Identify the symptoms. A symptom is a plant's response to an infectious or noninfectious causal agent. A symptom appears as any change in the known structure, appearance or function of the plant. Examples of symptoms include: holes in leaves or stems, leaf spots, distorted foliage, leaf discoloration, weak growth, dead branches or plant galls. Look at the pattern of the symptoms. Infectious (biotic) causal agents frequently produce a random distribution of symptoms and often affect one plant species or family. Noninfectious (abiotic) causal agents often produce a more uniform distribution of symptoms and affect many different plant species.
- Determine relevant situations. Try to identify all of the circumstances surrounding the development of the problem. Consider the soil and other site conditions, types of plants affected, time of year, history of cultural practices such as watering and fertilizing, recent weather conditions and long-term trends, and chemicals such as pesticides and deicing salt. One of the best ways to determine this information is to ask questions related to issues such as the time of planting, the frequency of watering, the time the symptoms were first noticed, and when and how fertilizers and pesticides were used.

If help is needed in diagnosis, contact your local office of the Purdue University Cooperative Extension Service. If possible, bring a sample of the pest or problem to the office. Horticulture educators, agriculture and natural resources (ANR) educators and/or Master Gardeners are available to help. A website that provides contacts for each Extension office in Indiana is given in Appendix 1.

Integrated Pest Management

Once you have correctly identified the specific pest, implement the proper controls as necessary. Develop a complete pest management program. Decide whether the number of pests is large enough to warrant control. Consider whether control is needed to keep the shrubs healthy or whether control is desired for plant aesthetics. Determine whether preventive action is necessary. Pesticides are not the only control measure. Implement as many different control measures as practical. This is called integrated pest management. Apply the control methods at the correct time, and evaluate the level of control obtained.

Integrated pest management has four major types of control methods. Cultural controls focus on selecting and growing healthy plants to help resist pests. Website links on pest resistant plants are found in Appendix 1. Biological controls may involve conserving and/or releasing natural predators, parasites or diseases to manage pests. Biological pesticides are another option. Mechanical controls physically remove or exclude pests. Chemical controls involve the use of synthetic pesticides. When pesticides are needed, select the least toxic product to provide the desired level of control. Pesticide applications may be preventive or responsive.

Here is a model of an integrated pest management plan using Japanese beetle as an example. Follow as many guidelines as practical for the specific situation.

- Plant shrubs resistant to Japanese beetle. Avoid shrubs highly prone to damage such as rose-of-sharon and rose.
- Monitor highly susceptible plants to detect the first beetles. Removing early arriving beetles and early plant damage will remove signals that can attract other beetles.
- Physically remove adult beetles if practical. The beetles can be killed by causing them to drop into a container of soapy water.
- Protect small plants with netting or cheesecloth.
- Use labeled insecticides for adult beetles if needed or desired. Treatment is needed only for aesthetics. Even severe beetle infestations are unlikely to harm the health of established plants.
- Do not use Japanese beetle traps. They can attract more than they catch, possibly increasing plant damage.
- Do not apply grub insecticides to the lawn to control the beetles. Control of the adult beetles is unlikely since they can fly 1-2 miles to feed.

If help is needed in pest management, contact your local office of the Purdue University Cooperative Extension Service or other suitable professional.



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CHAPTER

7



CHAPTER 7: SHRUBS FOR WILDLIFE

Rick R. Percy, Wildlife Biologist, Division of Fish & Wildlife, IDNR

Creating habitat around your home is very beneficial to wildlife. The use of shrubs in creating this habitat will not only provide food and shelter for wildlife, but will also enhance the beauty of your landscape. No matter what type of community you live in, city, suburb, or rural, the use of a shrub component in your landscape will create a better place for wildlife.

Benefits of Shrubs to Wildlife

Numerous shrubs attractive to wildlife are also attractive to people. However, each wildlife species has different needs, so diversity is key in an effective habitat. This diversity will help in attracting a variety of birds, butterflies,

and other wildlife species, giving you endless viewing pleasure. Variety also gives wildlife a greater survival advantage because most of the food, water, and cover they require are in one area. This minimizes traveling, which increases survival.

Another benefit to planting a variety of shrub species is protection against insect pests and diseases that can affect plants. Monocultures, or plantings of all the same species, can become a disaster if an insect or disease strikes your yard. Instead of just losing a few of your shrubs, you may lose them all.

Shrubs can also help keep soil from eroding during rain and wind storms, reducing the amount of sediment and contaminants that enter water impoundments. Fish, frogs, salamanders, and turtles will thank you for this conservation measure. Shrubs can also help improve air quality by removing particulates and carbon dioxide. In turn, they replace it with oxygen. Shrubs help act as a sound barrier and can help reduce the dust and noise from road traffic around your home. All of these qualities will make your backyard a friendlier place for wildlife and for yourself.

Several species of wildlife, particularly birds, consume insects. By planting shrubs and attracting insectivorous wildlife, you can eliminate many insect pests and possibly reduce the use of harmful pesticides.

The use of native shrubs will make maintenance easier. Native plants are adapted to our climate and soil conditions; they are also more resistant to local insect species and diseases. Additionally, the foods they provide are more familiar to the local wildlife and are more readily available when needed. The use of native plants also reduces the introduction of invasive exotics that have a tendency to cause serious problems to native species. Non-native, invasive plants can spread rapidly, crowding out and competing with native species, causing food shortages or lack of suitable shelter for some wildlife species.

Shrubs provide necessary shelter, or cover, for many species of wildlife. Wildlife use this cover for protection from the elements and predators, as well as for resting and sleeping. Shrubs also provide places for nests and raising young. Shrub cover provides protection from cold winter weather as well as a cool retreat during the hot summer months.

Common Backyard Visitors

Many wildlife species or groups of species benefit from shrubs. Some common backyard species that utilize shrubs are listed below. Many of these require other habitat components, such as nesting cavities or water sources. The final section of this chapter describes other habitat components you may want to add to your yard.

Songbirds

Shrubs are utilized by a wide variety of songbirds. Many songbirds including cardinals, robins, chipping sparrows, catbirds, indigo buntings, and thrashers use shrub components for nesting. Many more songbirds utilize shrubs as a food source, not only for the berries that they produce, but also for the insects that are attracted to the shrubs.

Hummingbirds

The ruby-throated hummingbird is primarily a woodland bird and is the only hummingbird species that nests in the eastern United States. Despite common belief, hummingbirds are not strictly nectar feeders. The primary source of protein for adult hummingbirds and their young is insects.

Most people focus on providing flower gardens for hummingbirds. However, shrubs are a natural companion and can be an important habitat component for feeding and resting perches. An adult female can consume up to 2,000 insects per day. Shrub flowers provide ruby-throats food in the form of nectar and insects. Rhododendrons (*Rhododendron* spp.), deciduous azaleas (*Rhododendron* spp.), rose mallow



(*Hibiscus moscheutos*), and sweet pepperbush (*Clethra alnifolia*) are some shrubs attractive to hummingbirds.

Butterflies

Most people associate nectar plants, especially wildflowers, with butterflies. Shrubs can provide much of the same benefit as a wildflower planting! Shrub species including spicebush (*Lindera benzoin*), New Jersey tea (*Ceanothus americanus*), and sweet pepperbush provide nectar for some common species of butterflies. However, butterflies need more than nectar to complete their life cycle. The larvae, or caterpillars, of many species only eat a few, specific plants, called host plants. Dogwood (*Cornus* spp.), spicebush, and false indigo (*Baptisia* spp.) are caterpillar host plants for some of our native butterfly species.

Complement Your Shrubs

Shrubs are used by a wide variety of wildlife, but they cannot supply all of a species' needs. You can increase the attractiveness of your yard to wildlife by integrating other habitat components, such as those listed below.

Wildflowers

Wildflowers add color and diversity to any backyard, and they are also an important wildlife habitat component. Birds and small mammals consume the seeds. Many butterflies, bees, and hummingbirds relish flower nectar. New shoots are eaten by deer, rabbits and other small mammals. They also are excellent habitat for insects and other invertebrates, which are an important source of protein for desirable wildlife.

Backyard ponds

Water is a critical need for all wildlife. Many species get their daily water requirements from morning dew or food that they eat. However, having a permanent water source is an effective attractant, especially when available water is scarce. Birds and butterflies use birdbaths and water misters readily. Backyard ponds or water gardens can meet a variety of needs. They are an open water source, habitat for aquatic and semi-aquatic organisms, and are an attractive backyard landscape feature. Having gradual slopes and planting vegetation within and adjacent to the pond will enhance its value to wildlife.

Nest Boxes

Nest boxes or houses that are easy to build can supply shelter for cavity nesting animals. They need to be weatherproof and designed for the species you wish to attract. Points to consider when building or selecting nest structures are the building materials, size of the box, size of the opening, height of placement, orientation, and method of hanging.

Human-Wildlife Conflicts

Occasionally, supplying wildlife habitat can attract unwanted guests. The best way to minimize conflicts with wildlife is to be prepared. Early fall, before cold weather sets in, is the optimum time to pest-proof your home. Inspect your home for common wildlife access routes. Open chimneys, unscreened vents, gaps or cracks in the foundation, or gaps around pipes and wires are all common ways wildlife can access your home. See PPP-56, *Conflicts with Wildlife Around the Home*, for information on how to prevent and control wildlife problems around your home. This and other valuable publications are available on the web or through your local Purdue University Cooperative Extension Service Office.

Summary

Planting a diversity of shrubs around your home will provide many values to you and can attract wildlife year round. Integrating your shrub plantings within an overall plan that includes other habitat components will increase their value to your target wildlife species. See the resources listed below for more information on attracting wildlife to your property. Appendix 3 also contains a list of shrub species beneficial to wildlife.



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CHAPTER 8



CHAPTER 8: SHRUBS WORK

Jerry Wheeler, Indiana Wildlife Federation

Shrubs work for humans in many ways. Doctors William and Frances Kuo at the Human-Environmental Research Lab at the University of Illinois classify the assistance of trees and shrubs into four categories: social, communal, environmental, and economic. Let us take a look at shrubs as they relate to each of these areas.

Social Benefits

We like being around shrubs because they make life more pleasant. They, like their big brothers- trees - are peace-inducing elements of nature. We feel serene, peaceful, restful, and tranquil when near healthy, green shrubs. We feel at home.



This feeling is not a false state of mind; our development, health, and mental well-being are enhanced by shrubbery, trees, and other forms of nature. It has been proven that children who grow up with access to nature develop higher self esteem, perform better in school, and suffer less anxiety than do children without such access. Time in green space sharpens their senses and promotes creativity. Adults, like young people, also benefit. Hospital patients often recover more quickly when their rooms offer a view of green space. And the de-stressing effects of shrubs, trees, and outdoor activity have been known since before Dr. Benjamin Rush declared that “digging in the soil has a restorative effect on the mentally ill.” Just as shrubs contribute to individual healthy lives, they also promote productive lives.

Employees are more often drawn to places of work that provide green areas for recreation, breaks, and after work, family fun. Workers in natural environments are less stressed, get along better with co-workers and administrators, and stay with the company longer. They also produce a higher quality product.

Shrubs also make life easier for people. They create shaded areas under which people gather during the summer. Picnics are much more pleasant when enjoyed in the shade of shrubs and trees. Shrubs and their kin make people happy.

Communal Benefits

Shrubs and other vegetation can help define and refine a community. Shrubs are often used as architectural and engineering components. They can provide an inviting entry into a city, town, or neighborhood. Shrubs emphasize enlightening views when positioned as a frame. They provide privacy when used as a natural barrier and block out those views that are less enjoyable. They can even be used to direct traffic flow. Community “greening” projects that include shrubs will bring people closer together as they work toward a common goal.

People who live in green communities (areas with an abundance of shrubs, trees, and flowers) report less crime than do those who live in un-vegetated neighborhoods. The incidence of personal disputes is lower, possibly because shrubs, trees, and other greenery create a soothing effect. Tensions are eased and tempers are less likely to flare when people are in close proximity to vegetation.

The myth of trees and shrubs as cover for criminal activity is being quietly debunked. Green communities invite residents to participate in outdoor activities. Walkers, joggers, and nature enthusiasts bring a constant stream of life out into the community, watching out for their neighborhood, and for each other. Green communities promote communal pride and cohesiveness - exactly what criminals do not want to see.

Environmental Benefits

Shrubs help keep our environment healthy. They clean the air and soil, deter erosion, and provide living spaces

for wildlife. Shrubs are an integral component of the natural world.

We all need clean air, and leafy shrubs help us acquire that. Through the process of photosynthesis, they take in carbon dioxide, ozone, and other particulates from the air, store it in their cellulose, and then release oxygen. By removing carbon from the atmosphere, they lessen the greenhouse effect and help us combat climate change.

Shrub roots also take up metals and organic chemicals which would otherwise remain in the soil and ground water. Some of these pollutants are changed into less harmful forms; others are stored within the shrub. Ongoing research will hopefully develop ways to utilize shrubs and other plants as long-living, non-invasive environmental cleaners.

Shrubs secure the soil, especially when planted on waterways or around ponds and lakes. Their roots hold the soil in place and their leaves cover it with a protective layer of decomposing material. A twenty-five to thirty foot buffer strip of water-loving shrubs along waterways will keep the soil from washing downstream as silt, even during periods of flood. When planted in close rows on flat land, shrubs create a windbreak which holds wind-borne dust in place.

Wildlife utilize plants in many ways. Shrubs create an umbrella under which animals can move while shielded from birds of prey. Wildlife trails are numerous under shrub canopies, especially those shrub corridors along waterways or fencerows. Shrubs hide den openings and offer many wildlife species a place to rear their young. Mammal predators use them as cover when hunting. Birds and mammals feed on the berries, nectar, and nuts produced by shrubs. Many insects lay eggs on shrubs, and their larvae feast on the host plant's leaves. Shrubs make up a transition area between



forests and grasslands or wetlands, and wildlife use them extensively.

In the summertime, shade can also reduce water evaporation, thereby allowing more water to soak into the ground, replenishing ground water supplies. Our earth would be less environmentally sound if not for shrubs.

Economic Benefits

While the economic benefits of shrubs may be less obvious, they are certainly present. Shrubs can ease nature's impact on the temperature of your home, make your home more valuable, and promote your community's economic soundness.

The rays of the sun and the chill of winter can impact the inside temperature of your home. Shrubs can create blocks that lessen that impact. In the summertime, the sun will heat up your home, requiring more energy to keep it cool. Shade from shrubs and trees can block those rays and lower your energy costs. Conversely, in winter, when the sun can help heat your home, deciduous shrubs will have lost their leaves, allowing the sun's rays to come through. However, a winter wind can offset that benefit. Evergreen shrubs

planted in tight rows between the house and the prevailing winds can block this wind and lower your energy bills.

Shrubs that beautify your home and grounds can increase its value. Research by the American Nursery and Landscape Association found that landscaping typically raises a home's value by 7 to 15 percent. The investment for landscaping is usually returned by 100 to 200 percent.

Shrubs can also contribute indirect value, especially to the community as a whole. Shrubs improve the quality of the community by cleaning the air through photosynthesis and lowering energy production by keeping consumption down. A more desirable community will emerge as crime rates lower, social ills are held to a minimum, production rates

increase, and the general population is content. The community becomes a more desirable place to locate manufacturing, business, and retail outlets. More residents move into the community, creating a larger tax base. Greening a community with shrubs, trees, and other vegetation will boost the economy and the desirability of a town.

Shrubs promote individual health, civility, and security in the community. They lower our energy consumption, clean our air, and secure our soil. Shrubs increase the value of our homes and promote the economic vitality of our communities. Our world is a better place because of the shrubs that surround us.

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GLOSSARY

Alternate – A pattern in which only one leaf or branch grows from one location on the stem.

Aerobic – Living or active in the presence of oxygen.

Anaerobic – Living or active in the absence of oxygen.

Angiosperms – A class of plants that has the seeds enclosed in an ovary.

Balled & Burlap – A method of transporting shrubs with most of the root system enclosed in a ball of soil wrapped in burlap or similar material.

Bark – The outer most layer of a shrub branch containing the phloem, which conducts food down to the roots for storage, and dead cells on the outer part.

Branch – Growth off the main stem or other branches.

Bud – A small bulge on a plant stem from which leaves or flowers emerge.

Causal agent – any type of creature that can produce an effect on a plant, whether it be positive or negative.

Compartmentalization – The process of the shrub growing new tissue over a wound.

Compound leaves – Leaves with more than one leaflet attached to a stalk.

Container shrub – A shrub that is grown in a bucket-like container at the nursery and is sold in the container.

Cultivar – One of several named varieties of a plant species.

Deciduous – A perennial plant (shrub), which is normally leafless during a part of the year (winter).

Desiccation – The drying up or wilting of a shrub

due to lack of moisture and hastened by wind.

Entire margin – Leaf margin that is smooth or not toothed.

Extension Educators – Persons in each county who work for Purdue University and provide the public with unbiased research based knowledge on natural resource concerns. Your Extension Service Educator can be located at www.extension.purdue.edu.

Fertilizer – A chemical or organic additive to the soil to increase nutrient availability to plants.

Greenhouse effect – The buildup of gases in the atmosphere that traps radiant heat from the sun and increases the earth's surface temperature.

Gymnosperms – The class of plants having seeds not enclosed in an ovary, usually on a cone such as the pines.

Hardwood – Deciduous shrubs that have broad-leaves.

Heat island – The buildup of heat from the sun in pavement, buildings and other heat absorbing structures, which raises the local temperatures.

Herbaceous plant – A non-woody plant.

IDNR – Indiana Department of Natural Resources – The state agency that provides technical and other assistance to Indiana residents about natural resources.

Infiltration – The movement of water or gases into the ground or through vegetation.

Invasive species – A non-native plant species that out-competes native plants and causes the native plant numbers to decrease or in some cases become non-existent.

Landscape – The term applied to the general layout of, and appearance of, an area of land.

Lateral buds – Buds that are found along the length of a twig (not at the tip).

Leaf – The part of a plant, green in color, containing the chlorophyll; where the main food manufacturing takes place.

Leaf margin – The outer edge of a leaf.

Leaflets – Small blades of a compound leaf attached to a stalk (rachis), without buds where they attach.

Lobed margin – A leaf margin with gaps that extend noticeably toward the center of the leaf.

Meristem – A formative plant tissue where active growth or cell division takes place; such as roots, stems, and leaves.

Mulch – An organic or other material placed on the soil surface to control weeds, conserve moisture, and protect shrubs from mechanical damage. Mulch is also placed around shrubs to imitate natural conditions found in woodland.

Native plant – A plant species that is naturally occurring in a region or climatic area.

Non-native (Introduced) plant – A plant species that does not naturally occur in a region or climatic area, but that has been introduced from a different country or climatic region.

NRCS – The Natural Resources Conservation Service (NRCS) is an agency of the United States Department of Agriculture that provides technical and financial assistance to land users.

Opposite – A growth pattern in which two leaves or branches arise across from one another at the same place on the stem.

Pathogen – A disease-causing organism such as a virus or bacteria.

Phloem – The very inner part of the bark of a shrub that contains the “tubes” to transport food manufactured in the shrub leaves down to the roots for storage, or to other parts of the shrub.

Photosynthesis – The process where green plants use sunlight, carbon dioxide and water to make food (carbohydrates) and oxygen.

Physiology – The study of the structures and functions of a living organism.

Pruning – The practice of removing unwanted branches from a shrub.

Respiration – The process where cells use food from the photosynthesis process to release stored energy.

Root – The part of the plant that grows down into the soil and laterally throughout the soil, absorbing water and nutrients into the plant. The root anchors the shrub into the soil.

Root hair – Very fine roots that actually absorb the water and nutrients from the soil.

Sapwood – The living wood, often light colored, found between the cambium and the heartwood.

Shrub – A low-growing woody plant with many stems.

Simple leaves – Leaves with one blade attached to a stem, or stalk.

Softwood – Shrubs that are conifers or cone bearing.

Soil – The surface of the earth made up of minerals and organic materials that serve as the growing medium for plants.

Soil and Water Conservation District – A county level subdivision of state government charged with the responsibility of helping local citizens understand and solve concerns related to soil, water and related natural resources. They provide educational, technical and financial assistance with the support of cooperating agencies. The phone number can be found in the blue pages under Natural Resources Conservation Service.

Soil drainage – The action of removing excess water from pores in the soil so that oxygen is available to plant roots.

Stem – The vertical growing part of a plant.

Terminal bud – The bud at the apex or end of a twig or branch; it is usually larger than the lateral buds.

Toothed/serrated margin – A leaf margin that has coarse, fine or blunt tooth-like appearance.

Transpiration – The process of water molecules being actively cycled through a plant and released into the air through the leaves.

Tree – A woody plant with one to a few main stems and many branches; usually over 10 feet tall.

Urban forest – Consists of all trees located in a city or town whether on public or private land.

Utility – The general term applied to electrical, water and gas distribution companies.

Whorl – A group of branches growing from the same level of a plant stem.

Woody plant – A plant that has woody type cells as its inner core, usually growing on one or more stems, and is much stronger or stiffer and taller than a herbaceous plant.

Wound – Removal of protective bark from a shrub by any type of intentional or unintentional action such as pruning or the breaking off of a limb in a windstorm.

Xylem – The wood of a shrub, made up of strong fibers, and tube-like structures for carrying stored food energy from the roots to the branches and leaves of a shrub (sapwood).

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Tree Glossary and Resources, South Dakota State University
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APPENDIX 1 – WEB SITES OF INTEREST

Hoosier Heartland RC&D Council: www.hhrcd.org

Indiana Department of Natural Resources: www.in.gov/dnr

Indiana Division of Fish and Wildlife: Tree and Shrub Coverts: www.in.gov/dnr/fishwild/files/coverts.pdf

Indiana Native Plant & Wildflower Society: www.inpaws.org

Indiana Wildlife Federation: www.indianawildlife.org/shrublife.htm

Indy Horticulture (Purdue Extension-Marion County Consumer Horticulture): <http://INdyHorticulture.org>

Natural Heritage of Indiana: www.naturalheritageofindiana.org/participate/INPAWS2.pdf

Ohio State University Extension: www.ohioline.osu.edu

Pest Resistant Plants (Purdue Extension-Marion County - includes a wide variety of links on pest resistant plants):
www.extension.purdue.edu/Marion/HortConPlants04.htm

Plant and Pest Problems (Purdue Extension-Marion County- includes many insect and disease links useful to Indiana gardeners): www.extension.purdue.edu/Marion/HortConProbs.htm

Plant Disease and Pathology Fact Sheets (Penn State University Extension):
www.ppath.cas.psu.edu/extension/plant_disease

Plant Information (Purdue Extension-Marion County- includes a wide variety of links on plants including a link to the pest resistant plants page): www.extension.purdue.edu/Marion/HortConPlants.htm

Plant Propagation by Stem Cuttings: www.ces.ncsu.edu/depts/hort/hil/hil-8702.html

Planting Forest Trees and Shrubs in Indiana: www.extension.purdue.edu/extmedia/FNR/FNR-IDNR-36.pdf

Planting with Native Plants: www.plantnative.org

Propagating Shrubs: <http://cru.cahe.wsu.edu/CEPublications/pnw0152/pnw0152.html>

Pruning Ornamental Trees and Shrubs: www.hort.purdue.edu/ext/ho-4.pdf

Purdue Extension Allen County: Horticulture Publications:
www.ag.purdue.edu/counties/allen/Pages/HortPublications.aspx

Purdue University Extension Publications: www.extension.purdue.edu/extmedia/menu.htm

Purdue University Extension Service Office Locations: www.extension.purdue.edu/anr/fields/fs/countyoffices.html

Purdue University Plant and Pest Diagnostic Lab: www.ppd.l.purdue.edu/PPDL

USDA Soil and Plant Information: www.in.nrcs.usda.gov

USDA Plant Database: <http://plants.usda.gov>

APPENDIX 2 – INDIANA SHRUB SELECTION GUIDE

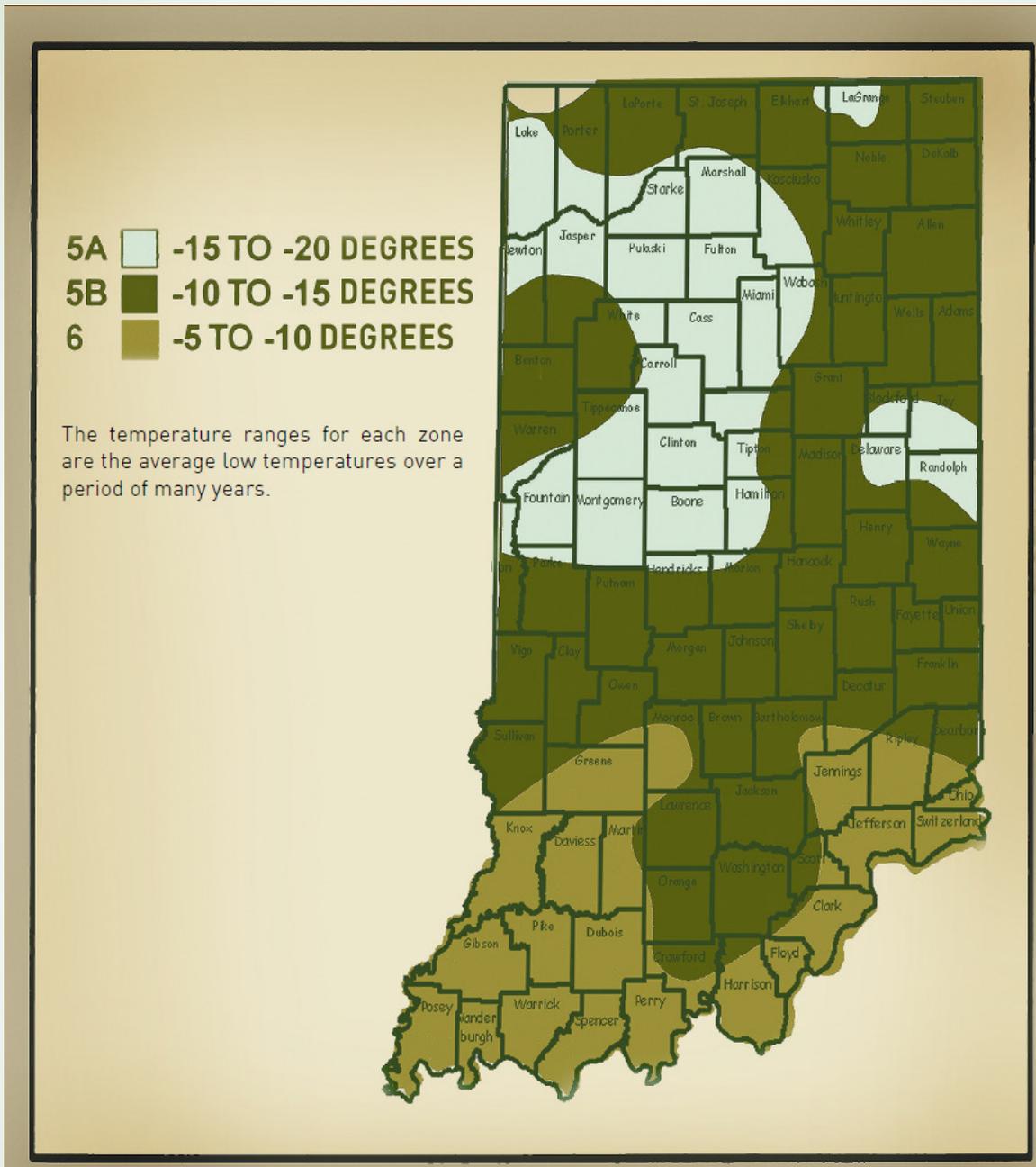
Common Name	Latin Name	Soil Moisture	Sunlight	Mature Height (ft.)	Average Spread (ft.)	Growth Rate	Showy Flower	Fruit	Fall Color
smooth alder	<i>Alnus serrulata</i>	wet-mesic	S	10-20	10-20	fast	no	seed	yes
downy serviceberry	<i>Amelanchier arborea</i>	mesic-dry	S-SH	15-30	15-20	moderate	yes	soft mast	yes
Alleghany serviceberry	<i>Amelanchier laevis</i>	mesic-dry	S-SH	6-15	5-10	moderate	yes	soft mast	yes
black chokeberry	<i>Aronia melanocarpa</i>	mesic-dry	S-SH	3-6	6-8	moderate-slow	yes	soft mast	yes
buttonbush	<i>Cephalanthus occidentalis</i>	wet-mesic	S-SH	10-20	12-18	moderate	yes	seed	no
silky dogwood	<i>Cornus amomum</i>	wet-dry	S-PS	6-10	6-10	fast-moderate	yes	soft mast	no
gray dogwood	<i>Cornus racemosa</i>	mesic-dry	S-SH	5-15	5-15	moderate	yes	soft mast	yes
redosier dogwood	<i>Cornus sericea</i>	wet-dry	S-PS	7-10	7-10	moderate	yes	soft mast	yes
American hazelnut	<i>Corylus americana</i>	mesic-dry	S-PS	3-10	6-8	fast-moderate	no	hard mast	yes
witchhazel	<i>Hamamelis virginiana</i>	mesic-dry	S-PS	15-25	15-20	slow	yes	seed	yes
wild hydrangea	<i>Hydrangea arborescens</i>	wet-dry	PS-SH	3-5	5-8	fast	yes	seed	no
winterberry	<i>Ilex verticillata</i>	wet-dry	S-PS	3-10	6-10	moderate	no	soft mast	no
Virginia sweetspire	<i>Itea virginica</i>	mesic-wet	S-PS	3-6	3-5	moderate	yes	seed	yes
spicebush	<i>Lindera benzoin</i>	mesic	S-SH	8-12	8-12	slow	yes	soft mast	yes
ninebark	<i>Physocarpus opulifolius</i>	wet-dry	S	6-10	6-10	fast-moderate	yes	seed	no
common chokecherry	<i>Prunus virginiana</i>	mesic-dry	S	5-20	5-20	fast	yes	soft mast	yes
smooth sumac	<i>Rhus glabra</i>	mesic-dry	S	10-15	10-20	moderate	no	soft mast	yes
staghorn sumac	<i>Rhus typhina</i>	mesic-dry	S-PS	15-25	15-20	fast	no	soft mast	yes
elderberry	<i>Sambucus canadensis</i>	wet-dry	S-SH	6-12	6-12	fast	yes	soft mast	no
meadowsweet	<i>Spiraea alba</i>	mesic-wet	S-PS	3-4	3-4	moderate	yes	seed	no
steeplebush	<i>Spiraea tomentosa</i>	mesic-dry	S-SH	3-6	3-6	moderate	yes	seed	no
arrowwood	<i>Viburnum dentatum</i>	mesic-dry	S-PS	6-8	6-8	moderate	yes	soft mast	depends on individual plant
nannyberry	<i>Viburnum lentago</i>	mesic-dry	S-SH	10-20	10-15	moderate-slow	yes	soft mast	yes
highbush cranberry	<i>Viburnum opulus americanum</i>	wet-dry	S	8-12	8-12	moderate-slow	yes	soft mast	yes
blackhaw	<i>Viburnum prunifolium</i>	mesic-dry	S-SH	10-15	8-12	slow	yes	soft mast	yes

You may have noticed that many shrubs commonly used in landscaping were left off of this list, including burning bush (*Euonymus alatus*), Japanese barberry (*Berberis thunbergii*), and European privet (*Ligustrum vulgare*). These and other non-native species have become exotic plant problems, spreading into our wild areas without control, and we do not recommend planting them. For more information on invasive plants, visit www.invasive.org.

APPENDIX 3 – SHRUB SPECIES BENEFICIAL TO WILDLIFE

SHRUB NAME	PART USED	KEY ANIMALS	Comments
American hazelnut (<i>Corylus americana</i>)	fruits	turkey, squirrel, chipmunks, raccoon	Nuts edible by humans, good cover and nesting in thickets
	twigs, leaves	beaver, rabbit	
Smooth Alder (<i>Alnus serrulata</i>)	fruits	finches, grosbeaks	dense thicket provide cover, nesting sites
	twigs, leaves	deer, rabbit, beaver	
Spicebush (<i>Lindera aestivale</i>)	leaves	host plant for spicebush swallowtail caterpillar	Polyphemus caterpillars also use this plant especially wood thrush and Veery
	fruits	catbird, larger flycatchers, thrushes	
Witch-hazel (<i>Hamamelis virginiana</i>) - low value	fruits	turkey, squirrel, raccoon	seed persists into winter, source of astringent skin treatment
	twigs, leaves, bark	deer, rabbit	
Serviceberry (<i>Amelanchier canadensis</i> , <i>A. laevis</i>) - high value	fruits	thrushes, tanagers, Oriole, Bluebird squirrels, fox	
	twigs, leaves, bark	rabbit, beaver, deer, fox	
Blackberry (<i>Rubus</i> species) - highest value	fruits	top in summer for most birds and mammals	not a true shrub, but great addition for wildlife
Choke Cherry (<i>Prunus virginiana</i>) - high value	fruits	all birds - turkey, quail, vireos, thrushes, waxwings	relished by birds -even green, seed can persist into winter
	twigs, leaves, bark	most all mammals	
Wild Plum - low food value	fruit	fox, squirrel, raccoon	forms dense thickets for good cover, can be invasive
Sumac (<i>Rhus glabra</i> and <i>R. typhina</i>) - high value in winter	fruits	quail, turkey, finches, junco, robin, mockingbird, woodpeckers	good source of vitamin A - especially for quail in winter, many mammals eat fruits
Winterberry (<i>Ilex verticillata</i>)	fruits	quail, turkey, bluebird, waxwing, towhee, robin, mockingbird	native non-evergreen holly
Buttonbush (<i>Cephalanthus occidentalis</i>) - low value	fruits	ducks, Virginia Rail when planted along water	can be invasive
Elderberry (<i>Sambucus canadensis</i>)	fruits	grosbeaks, robin, thrushes	insects drawn to flowers, berries and flowers edible by humans
Viburnums (<i>Viburnum</i> species)	fruits	thrushes, thrasher, waxwing, red squirrel, cardinal, robin	Well-loved by most birds
	twigs, leaves	deer	
Wild Hydrangea (<i>Hydrangea arborescens</i>) - very low food value	flowers	insects	
Meadowsweet (<i>Spirea alba</i>) - very low food value	flowers	insects	
Ninebark (<i>Physocarpus opulifolius</i>) - low value	fruits	mockingbird, robin, thrushes	
	twigs, leaves	deer	
Steeplebush (<i>Spirea tomentosa</i>) - low value	flowers	insects	dense growth makes good nesting for grassland birds
Dogwood (<i>Cornus</i> species)	fruits	wood dock, cardinal, grosbeaks, thrushes, waxwing, rabbit	dense growth good cover, can be invasive
	twigs, leaves, bark	deer beaver, rabbit	
Black Chokeberry (<i>Aronia melanocarpa</i>)	fruits	Waxwings, chickadee, meadowlark	seed persists into winter
Virginia Sweetspire (<i>Itea virginica</i>) - low value	flowers	insects	

APPENDIX 4 – INDIANA PLANT HARDINESS ZONE MAP





YOUR YARD, YOUR SHRUBS

A HOMEOWNER'S GUIDE

