



GREEN SPRING GARDENS

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GARDEN MAINTENANCE FOR THE ECO-FRIENDLY GARDENER

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1. Watering

Water greatly influences the productivity of plants. Use supplemental watering during the growing season only when needed and if rainfall is less than 1 inch per week. Use a rain gauge to measure rainfall. Less water is needed in cooler periods in the spring and fall than during the hot days of summer. Less irrigation will be needed if plants are adapted to the moisture conditions of the site and if plants with similar moisture requirements are grouped together. Don't plant thirsty plants in hard to reach areas. **Mulching is a very important way to cut down on water loss.**

Plants that are tolerant of dry sites need less moisture per week, but they need to be watered well until their root systems get established. Dry garden sites are common – plants adapted to dry sites in the Washington, D.C. region are noted in **Green Spring information sheets** in the comments column (information sheets are available on the Green Spring website under Gardening and in the Horticulture Center). Most hardy winter- and spring- flowering bulbs that go dormant in the summer are tolerant of dry sites. During extended dry periods (drought conditions), even plants that are adapted to dry sites like supplemental water, especially woody plants because they generally suffer more damage than herbaceous plants.

Newly planted plants need more watering than most established plants. Annuals, tender perennials, and tender bulbs generally need more water because they are replanted yearly.

In dry years this can become a major issue because more irrigation is needed. Fewer of these plants need to be grown if reduced watering is desired.

Watering Tips:

- ❖ **Water deeply by hand rather than sprinkling lightly.** Spraying plants quickly with water does not result in adequate watering. When watering by hand, it is helpful to use a **water breaker** at the end of the hose to disperse the water flow. Hold the water breaker close to the soil or place the water breaker on the soil by a plant so more water gets to the plant roots. When using a hose it is best to water individual woody plants for several minutes (herbaceous plants need less water).

Watering cans can be used for hand watering. Long-reach watering cans are easier to use than those with shorter necks (the best cans also allow the removal of the water breaker).

Watering bags that slowly release water can be used on trees – these are commonly used on young street trees in some communities. Remember to refill the bags with water during dry periods.

- ❖ **Reduce the use of sprinklers.** Hand watering uses less water than sprinklers. Soaker hoses and drip irrigation use less water than sprinklers - they are easiest to use in areas with linear plantings like vegetable gardens.
- ❖ **Sprinklers should water deeply when used.** Sprinklers often are used to water a given area for one to two hours at a time during dry periods – generally on a weekly or biweekly basis, but some woodland areas and reliably moist to wet areas can wait longer. Public gardens water more frequently than many home gardeners due to aesthetic standards. Green Spring uses oscillating sprinklers most of the time, and impact sprinklers are occasionally used. Keep water from sprinklers off of impervious surfaces as much as possible.

Home gardeners and sprinklers – Most home gardeners can water far less with sprinklers than public gardens because aesthetic standards are lower and money and water savings are desirable. To save water in dry periods, water established plants just enough to keep plants alive. Wilting is a sign of water stress - some plants wilt in the middle of hot, sunny days and look better again in the evening or by the next morning. If a plant hasn't recovered by morning it needs water.

Green Spring doesn't have an in-ground automatic irrigation system - households with these systems use about 35% more water than the average household according to the American Water Works Association. The use of automatic timers on these systems results in even higher levels of water use - manual controls are far better so weather and plant needs can be taken in account. These systems are not for the conservation minded in the Washington, D.C. region – they are best used in public settings or in large scale landscapes.

- ❖ Useful publications include *Water Wise Landscaping and Watering Guide*, which was developed by Water Use It Wisely Campaign Members (<http://wateruseitwisely.com>). This brochure is posted on the Metropolitan Washington Council of Governments website (www.mwcog.org/environment/water/watersupply/downloads/landscape%20guide.PDF).

Innovative Water Conservation: Low-Impact Development

Bioretention areas and **rain gardens** are major components in the **low impact development (LID)** approach to managing stormwater. LID uses a wide range of techniques to reduce water volume and pollutant loading into streams, rivers, and the Chesapeake Bay by **managing runoff as close to the source(s) as possible** (see *Reducing Stormwater Costs through Low Impact Development Strategies and Practices* from the Environmental Protection Agency at www.epa.gov/owow/nps/lid/costs07/documents/reducingstormwatercosts.pdf). Pollutants include

fertilizers, pesticides, other chemicals, sediment (eroded soil), and debris. Stormwater runoff is highest from impervious surfaces such as roofs and paved areas.

LID practices treat water as a valuable resource for plants and attempt to mimic the functions of plants and soils in forests and other natural areas in filtering water, retaining water, and increasing groundwater renewal. Plants help reduce the volume of runoff into receiving waterways by evaporation and transpiration. Over 90% of the water that plants take up with their roots is released into the air.

Components of LID include:

- ❖ **Bioretention areas** - Less supplemental watering is needed in bioretention areas during dry periods. These large, shallow basins use many plants and a porous soil mix to treat stormwater before it flows into storm drains and then waterways. Green Spring Gardens has two large bioretention areas in the Entrance Garden. A porous soil medium was prepared with sand, compost, and soil. Construction techniques were used in accordance with guidelines developed by the Environmental Services Division of Prince George's County in Maryland – drain pipes, a gravel layer, and geotextile fabric were used under the soil mix. Planting of woody and herbaceous plants has been extensive and more plants will be added over time.
- ❖ **Rain gardens** – These specialty gardens need less irrigation during dry periods. These smaller, shallow basins are more useful for the average gardener than bioretention areas – they are easier to construct and their small size is perfect for home gardens. They are created in areas near the end of downspouts or by paved areas so water can accumulate during rains and gradually soak into the soil. These gardens should be located 10 – 15 feet away from homes and are 6 inches below the existing grade of the surrounding soil when completed. If the native soil has a good infiltration rate no amending of the soil is necessary. If the infiltration rate is too slow, soil to a depth of up to 3 ½ feet needs to be dug out and the bottom of the basin filled with a soil mixture that is 50% sand, 25% topsoil (little or no clay), and 25% compost or leaf mulch (leaving the mix 6 inches below the existing grade of the surrounding soil; details in the Virginia Department of Forestry publication below). Plants that tolerate wet soil are an integral part of these gardens.
- ❖ **Other LID techniques to reduce runoff and save water include:**
 - Directing downspouts into permeable areas like garden beds, lawns, or woods
 - Directing downspouts and gutters into containment structures for garden use such as rain barrels, galvanized watering troughs (use Bt mosquito dunks), and cisterns
 - Green roofs – most often used on large buildings
 - Permeable paving or porous pavement – products include porous asphalt and open-jointed blocks (permeable paving units) made from concrete or stone. Open-jointed blocks have open, permeable spaces between the units and include products like Hanover “Eco-Grid” and “Aqua-Loc” pavers.
 - Street swales – currently used in commercial areas for retaining water for street trees. Oregon is a leader in this area of LID.
 - Forest restoration and meadow development – Mowed lawns generate up to 50% more runoff than forests. Meadows and meadow gardens also produce less runoff than turf.
- ❖ **Websites with information about low impact development techniques and associated native plants for this region:**
 - *Rain Gardens. A landscape tool to improve water quality. Technical Guide.* Virginia Department of Forestry (available as a publication and at www.dof.virginia.gov/rfb/rain-gardens.shtml)
 - Prince Georges' County in Maryland has extensive specifications for LID (www.goprincegeorgescounty.com/government/agencyindex/der/lid/biotetention.asp)
 - Montgomery County Department of Environmental Protection in Maryland (www.montgomerycountymd.gov/Content/DEP/Rainscapes/home.html)

#Publications)

- For an extensive list of native plants to grow in moisture-retentive areas see the brochure *Riparian Forest Buffers - Native Plants for Conservation, Restoration and Landscaping* (published by the Natural Heritage Program of the Virginia Department of Conservation and Recreation; also at www.dcr.virginia.gov/natural_heritage/documents/riparian.shtml)
- For an extensive list of native plants for meadows, see the brochure *Grasslands - Native Plants for Conservation, Restoration and Landscaping* (also published by the Natural Heritage Program of the Virginia; website is www.dcr.virginia.gov/natural_heritage/documents/natvglnd.pdf)

2. Weeding

An essential part of gardening is weeding. A weed is any unwanted plant. Exotic invasive plants are weeds in general (see **Garden Installation For Eco-Friendly Gardeners** on Green Spring's website and in the Horticulture Center).

There are many ways to remove unwanted plants:

- ❖ **Hand Weeding** – Tools such as a dandelion fork (weeding fork), hand trowel, Japanese farmer's knife (hori-hori), round point shovel, and hand hoe (hand weeder/ cultivator) are useful for the removal of weeds. Mulching cuts down on the amount of weeding that is needed. Gardening gloves keep hands from getting too weathered – manual dexterity is better with cloth gloves than with leather gloves. Polypropylene tip baskets are useful for transporting weeds to the compost pile. Don't put wild garlic bulbs or weeds with fully ripened seeds in the compost pile – put them in the trash so they don't reestablish in gardens.

To identify weeds, the following are helpful:

- Virginia Tech Weed Identification Guide (www.ppws.vt.edu/weedindex.htm)
- *Invasive Plants. Guide to Identification and the Impacts and Control of Common North American Species* by Sylvan Ramsey Kaufman and Wallace Kaufman
- *Plant Invaders of Mid-Atlantic Natural Areas* by the National Park Service and the U.S. Fish and Wildlife Service (www.nps.gov/plants/alien/pubs/midatlantic/)
- *Weeds of the Northeast* by Richard Uva, Joseph Neal, and Joseph DiTomaso

- ❖ **Glyphosate** (a relatively safe herbicide with minimal impact on the environment due to rapid breakdown and few effects on non-target species) –

Glyphosate is marketed under many names including Roundup Pro and Razor Pro. It has a low acute toxicity to humans – read and follow label directions. Glyphosate is non-selective, so apply spot treatments carefully because it can kill or at least damage most plants. It is most commonly used to control perennial weeds, exotic invasive plants, and weeds in large garden areas. Some perennial weeds are very difficult to kill without herbicides, such as field bindweed, Canada thistle, and mugwort.

- **Using Glyphosate Around Water** - A formulation of glyphosate without a surfactant needs to be used around water because surfactants are toxic to frogs – **trade names include AquaMaster and Rodeo.**

- ❖ **String Trimmers And Mowers** – In rough areas, cut down smaller weeds with string trimmers, then mulch heavily or apply glyphosate. Be careful not to injure plants to be kept, especially trees (and shrubs to a lesser extent) – **bark injury greatly shortens the life of trees. This applies to trees in manicured lawn areas as well – young trees and trees with thin bark are the most easily damaged.**

Using mowers to knock down exotic invasive groundcovers like English ivy is possible but is hard on mowers. String trimmers generally hold up better when cutting back small woody plants.

Electric string trimmers are suitable for relatively short weeds in small areas only and aren't very powerful compared to polluting gas-powered machines. Two-stroke engines pollute more than four-stroke engines because gas is mixed with oil, but string trimmers with two-stroke engines are lighter and therefore easier to use. This is an area for engineers and inventors to develop effective tools that pollute less!

- ❖ **Mechanical Removal Of Woody Plants** – Smaller woody plants can be removed with a round point shovel, and sometimes a steel pry bar is used in combination with a sledgehammer if a shovel isn't sufficient. A weed wrench is useful for large-scale removal of small woody exotic invasives. Certified arborists can grind out stumps in high visibility areas accessible by trucks, and backhoes can dig out smaller stumps, but these techniques are expensive and energy intensive.
- ❖ **Woody Plants That Cannot Be Dug Up Or Stumps Cannot Be Ground Down** - Pruning equipment such as a pruning saw, bow saw, lopper, hand pruner, and chain saw are used to cut down woody plants that are too large to dig up or to be cut down by string trimmers and mowers. Few conifers are capable of resprouting after they are cut down, but yews and most broadleaf woody plants will resprout. Cut the stump close to the ground and cover with soil and mulch if possible. Cut off any suckers that come up. The Maryland Native Plant Society has developed **The Invasive Alien Species Handbook** for exotic invasive identification and removal – it is an excellent reference for successful removal techniques (www.mdflora.org/publications/otherstuff/invasiveshandbook.html).

3. **Mulching**

Mulches reduce evaporation of soil moisture, reduce weed populations, and gradually enrich the soil. Mulches are commonly applied after spring cleanup, after planting, and in the fall and winter. Summer is fine as well – hot weather makes the work harder, though.

Mulching materials include shredded leaves (leaf mulch), pine bark, shredded hardwood bark, and grass clippings. Don't use grass clippings if the lawn was recently treated with herbicides. Shredded leaves are an excellent choice - it is free (available from local governments), attractive, and breaks down rapidly enough to supply needed nutrients to plants. Mulch as needed, which is yearly in some areas when shredded leaves are used or seldom in woodland areas because leaves provide a natural mulch.

Mulching Tips:

- ❖ **Apply mulch to a depth of 2 to 3 inches.** One exception is new bed preparation for gardeners who want to use no-tillage (no-till) techniques: use about 3 to 6 inches of mulch initially on turf or in an area with many weeds (knocking down unwanted vegetation first) , then use 2 to 3 inches of mulch when re-mulching several months later. Another exception is mulching borderline hardy plants with a heavy mulch in early winter (see the **Fall Cleanup** section). Sometimes too much mulch builds up over the years – rake up the older mulch and compost it (unless it's wood chips, which will attract termites).
- ❖ Do not mulch too closely to plant crowns (the plant base) because crown rot can occur.
- ❖ **Plants that need excellent drainage and air circulation, such as many rock garden and Mediterranean plants (including lavender)** - These plants can be mulched with a layer of pea gravel.
- ❖ **Mulching Tools** – Pitchforks and manure forks (4 to 6 tines) are useful for loading and

spreading mulch. Aluminum scoop shovels are useful for spreading mulch because less mulch drops on the ground when walking to the desired location. Wheelbarrows and polypropylene tip baskets are useful as well.

4. Composting

Compost improves soil in many ways – it improves soil structure, increases water-holding capacity, increases nutrient levels, and supplies a wide range of slow-release nutrients. Composting is a great way to recycle plant debris from the garden and the kitchen and to have a ready source of organic matter for the garden. Just pile up organic materials in a less visible, well drained area of the yard. Don't bother to sort organic material into layers. Nitrogen fertilizers are not needed (manure or granular ones). Excess soil from other garden operations is a good addition to compost piles. Take finished compost from the bottom of the pile when it's ready for garden use. For more information see *The Truth About Organic Gardening. Benefits, Drawbacks, And The Bottom Line* by Jeff Gillman (a 2008 book by a University of Minnesota horticulture professor that supports eco-friendly gardening).

Compost tea is also used successfully by some individuals and institutions (see *Sustainable Landscape Construction. A Guide to Green Building Outdoors*. 2nd edition. J. William Thompson and Kim Sorvig).

5. Fertilizer Use

Most plants need little or no fertilization when grown in the ground, especially when shredded leaves are used as mulch (air pollution also results in higher nitrogen levels in soils). **One notable exception is small transplants, which might need fertilization.** These small transplants are most commonly vegetables, annuals, and tender perennials. Vegetable transplants may produce a crop faster and more abundantly when fertilized. Nutrient deficiencies are also more common in the spring when transplants are planted in cold soil.

A liquid fertilizer, such as quick-release synthetic (inorganic) 20-20-20, works rapidly if a plant is nutrient deficient. Liquid fertilizers are usually purchased in the dry form and mixed in a watering can.

A 20-20-20 fertilizer is:

20% **nitrogen (N)**

20% **phosphate** - indicates the **phosphorus (P) level** - phosphate is a compound that is 44% phosphorus

20% **potash** - indicates **potassium (K) level** - potash is a compound that is 83% potassium

The true expression of N-P-K levels for a 20-20-20 fertilizer:

20% nitrogen,

About 9% phosphorus

About 17% potassium

The best reason to fertilize is if a plant is showing signs of a nutrient deficiency.

Nitrogen, phosphorus, and iron are the most common nutrients to be deficient:

❖ **Nitrogen Deficiency** – If nitrogen is in short supply, older foliage is yellow and new foliage is green. Eventually all leaves can turn yellow. **Use nitrogen fertilizers carefully - nitrogen is very destructive to the health of watersheds and is the most serious nutrient problem in the Chesapeake Bay watershed.** A basic soil test does not measure nitrogen levels since nitrogen is susceptible to rapid changes in availability in soils (it can be lost as a gas or leached out).

❖ **Iron Deficiency** – This deficiency is usually related to the pH of the soil and young leaves are affected - veins are green and the rest of the leaves are yellow or whitish. It is

commonly treated with sprays with soluble forms of iron and by stopping liming for several years (iron chlorosis is more common with some plants as the pH gets above 6.5). Amendments can be added to acidify the soil, but results can be difficult to predict.

- ❖ **Phosphorus Deficiency** – This deficiency usually shows up as purplish colorations on leaves and plants grow slowly. It is most commonly seen on vegetable transplants in the spring before the soil has warmed up.

If a widespread phosphorus deficiency is suspected, it is best to apply phosphorus according to soil test recommendations. Phosphorus is very destructive to the health of waterways including the Chesapeake Bay. Phosphate mining destroys the site it is mined from, including many natural areas (as does potash mining for potassium). Soils that have frequently been fertilized, such as turf, often have high phosphorus levels and more phosphorus is not needed. Get soil tests done through the Virginia Cooperative Extension/Virginia Tech Soil Testing Laboratory. Soil test kits are available at Fairfax County public libraries.

Certain towns, counties, and entire states in the eastern half of the U.S. are restricting phosphorus fertilizer use in some fashion because of their negative effects on waterways. States where phosphorus fertilizer regulations have been put in place include Minnesota, Maine, Florida, New Jersey, Wisconsin, and Michigan (see *Lawns Green, Lakes Clean. Use phosphorus-free fertilizer* on the website of the Department of Environmental Protection in Maine, as well as links to regulations in the above states (<http://maine.gov/dep/blwq/doclake/fert/phospage.htm>).

Fertilizing Herbaceous Perennials - Established herbaceous plants can also be fertilized with liquid fertilizers, but synthetic liquid fertilizers are more prone to leaching into groundwater. An organic granular fertilizer is a better alternative. Only fertilize perennials lightly in the spring as shoots emerge if a plant is showing signs of a nutrient deficiency. **Nutrient deficiencies of established perennials are rare at Green Spring.**

Fertilizing Bulbs –Bulb declines usually are not caused by nutrient deficiencies but by too much shade, poorly adapted forms, crowding, sites that are too dry in the spring, or cutting back foliage too soon in early summer. Most tulips are short-lived in our area unless site conditions are perfect and well adapted forms are selected (see **Recommended Hardy Bulbs For The Washington, D.C. Area** on the Green Spring website and in the Horticulture Center).

Nutrient deficiencies are most evident in the spring when leaves are emerging – only fertilize at that time. **Nutrient deficiencies of bulbs at Green Spring are rare** – they occur after some very wet years (organic granular fertilizers with low nutrient levels were used to supply nitrogen).

Fertilizing Trees and Shrubs - **Woody plants seldom need fertilization due to their extensive root systems.** If fertilization is needed due to a nutrient deficiency, the most common nutrient to be deficient is nitrogen. They are best fertilized with an organic granular fertilizer in early to mid spring as plants start active growth and after any pruning is done. However, nitrogen fertilization in woody plants often results in reduced flowering and floppy growth that is prone to pests. **Woody plants are seldom fertilized at Green Spring.**

Other Fertilizer Tips:

- ❖ **Granular Fertilizers** – **If gardeners need to use granular fertilizers, it is best for the environment to use an organic fertilizer** such as Plant-tone (5-3-3). Also use generous amounts of compost, especially for vegetable production – compost decreases the need

for additional fertilizer. Organic fertilizers slowly release their nutrients – they are derived from natural products including plant and animal by-products, as well as rock powders.

The likelihood of fertilizer burn is much greater when quick-release synthetic granular fertilizers are used, and they are much more likely to leach into groundwater. Organic fertilizers are better for the environment than most slow-release synthetic fertilizers as well. For example, 50% slow-release synthetic fertilizers are commonly sold and only 50% of the nutrients are in slow-release form, so half of the nutrients are released rapidly.

Applying granular fertilizers - Use rubber or plastic gloves when applying by hand. Water granular fertilizers in well after application so nutrient uptake can begin or apply them before a rain is expected. It is okay to apply them before a light rain - don't apply them before a heavy rain is expected. Avoid using granular fertilizers on areas subject to runoff such as paved areas.

❖ **Container grown plants usually need fertilization due to more leaching.**

Slow-release Osmocote can be incorporated into potting mixes and quick-release synthetic liquid fertilizers, such as 20-20-20, can be used on an as-needed basis. Osmocote Classic only has nitrogen, phosphorus, and potassium (N-P-K), so secondary nutrients and micronutrients need to be supplied by another source. Osmocote Plus has N-P-K plus magnesium and micronutrients.

- ❖ A reference for the eco-friendly use of fertilizers is *The Truth About Organic Gardening. Benefits, Drawbacks, And The Bottom Line* by Jeff Gillman.

6. Liming

Get a soil test done for lime recommendations. The greatest benefit to plants, in terms of nutrient levels, is from proper pH values - calcium availability and the availability of other nutrients is affected by pH. Get soil tests done through the Virginia Cooperative Extension/Virginia Tech Soil Testing Laboratory.

Calcium-Loving Woodland Plants - Gypsum (calcium sulfate) or lime can be applied to calcium-loving woodland plants on an occasional basis. This includes such plants as maidenhair fern (*Adiantum pedatum*) and black bugbane or fairy candles (*Actaea racemosa* – was *Cimicifuga racemosa*; these plants are Virginia natives). These plants often grow in limestone-derived soils in nature and like a pH that is less acid and closer to neutral (pH of 7). See the comments column in **Recommended Native Herbaceous Perennials And Ferns For Shade Gardens In The Washington, D.C. Area** and **Recommended Non-Native Hardy Perennials And Ferns For The Washington, D.C. Area** on the Green Spring website and in the Horticulture Center for a listing of these plants (a few calcium-loving *Epimedium* and *Helleborus* are listed in the latter information sheet).

7. Staking

- ❖ Staking is used to keep plants upright. Staking is most useful for some tall plants, such as tomatoes and tall dahlias cultivars. Other conditions that may cause plants to need staking include overfertilization, too much shade, overcrowding (due to plant growth over time or planting too close together), or the growth habit of some plants. Staking is labor intensive and is only done for a few plants at Green Spring. In addition, cutting back certain plants early in the growing season can reduce staking needs.

Staking Tips:

- ❖ It is easiest to insert stakes early when growth is still low. Stakes should be about 2/3's as tall as the ultimate height of the plant. Tie loosely at intervals using green or natural colored twine. Using a figure 8 tie is helpful.

❖ **Materials To Use For Staking Include:**

- Brush stakes or twiggy brush
- Bamboo stakes - ones that are dyed green are excellent
- Metal or wooden stakes
- Wire supports – tall supports are commonly used for tomatoes

8. Deadheading

Spent blossoms can be cut off or removed on certain plants to improve their appearance. Some plants will rebloom when deadheaded, but many plants will rebloom without deadheading.

Deadheading Tips:

- ❖ If using pruning shears, use a scissors-type shear. Loppers can be used on some plants.
- ❖ Some plants should not be deadheaded due to their long season of interest into the winter. It is best not to deadhead plants that attract seed-eating birds: it is especially important to leave the spent flowers of native herbaceous perennials standing as long as possible because native plants support more wildlife than non-natives.

9. Cutting Back Bulb Foliage In The Summer

Do not cut back bulb foliage until it turns yellow and falls over, which usually occurs by mid-summer. It is often easier to wait for foliage to turn brown before cutting it back or breaking it off.

10. Fall Cleanup

Cleaning up before the winter begins is a gradual process. Some tasks need to be done sooner than others.

Fall Cleanup Tips:

- ❖ **Tender Plants And Borderline Hardy Plants** - Dig up tender perennials or take cuttings before the first hard frost for plants that need to be overwintered indoors. Some borderline hardy bulbs can be dug up before the first hard frost, such as *Hedychium* or ginger lilies, and potted for wintering indoors.

Any tender annuals and tender perennials that died after the first hard frost can be removed. Some borderline hardy bulbs such as cannas can be dug up after the first hard frost and stored indoors.

With borderline hardy bulbs that have vigorous clumps, it is often good to leave a few plants in the ground and mulch them thoroughly, as well as have backup plants indoors in case the outdoor plants winter kill. See **Recommended Annuals, Tender Perennials, Tender Bulbs, And Biennials For Gardens In The Washington, D.C. Area** on Green Spring's website or in the Horticulture Center for details. This applies to borderline tender perennials as well; the indoor plants are usually propagated by cuttings.

- ❖ Rake up excess leaves, especially on lawn areas because lawns die if leaves are too thick. In many gardens including woodland gardens, leaves may only need to be raked off plants that are sensitive to rot when leaves remain on their crowns, such as cardinal flower and creeping phlox. However, it is less critical to remove excess leaves in early winter than in mid to late winter. Bamboo and plastic leaf rakes are easier to use than metal leaf rakes. Use rakes instead of blowers to reduce noise and air pollution.
- ❖ Do not cut back the foliage of certain plants that may be cold sensitive until March (starting in mid-March in most years). These plants include *Salvia chamaedryoides*, *Salvia greggii*, *Salvia microphylla*, and hybrids between the last two species.

- ❖ Dying, non-evergreen foliage of hardy perennials can be cut back from one to several inches from the ground (if a plant is cut back too much it can be hard to find later). However, it is best to leave many herbaceous perennials standing as long as possible to provide cover and seeds for birds and other overwintering wildlife – this is especially true for native plants because they support more wildlife than non-natives.
- ❖ Compost garden debris and leaves.
- ❖ **Mulching For Winter Protection** - This is helpful for newly planted plants and marginally hardy plants. Place up to 6 inches of mulch on borderline hardy bulbs like *Amarcrinum*, *Crinum*, *Hedychium*, and *Canna*. Apply protection between Thanksgiving and Christmas. Shredded leaves are widely used because they are readily available. **Borderline hardy plants should not be planted in the fall.**

Mulch newly planted pansies, violets, and other hardy plants with 2 to 3 inches of mulch after planting.

11. Late Winter And Spring Cleanup

Get the garden ready for the upcoming growing season from February through mid April, depending on the weather. Some cleanup can be done earlier as weather permits.

Cleanup Tips:

- ❖ Now is a very important time to rake leaves off areas where thick layers have accumulated, especially on lawns and on sensitive plants. In many gardens including woodland gardens, leaves may only need to be raked off plants that are sensitive to rot when leaves remain on their crowns, such as cardinal flower and creeping phlox. Remove the thick mulch used for winter protection on borderline hardy bulbs before plants start actively growing in the spring.
- ❖ Cut back remaining dried foliage including ornamental grasses. This generally doesn't benefit the plant unless pests remain in the foliage – it is for aesthetic reasons.
- ❖ **Pruning Roses** – Spring rose pruning is usually done from March into early April, although **dead wood can be removed from woody plants at any time**. It is best not to do any significant pruning after mid August due to potential winter hardiness problems in the Washington, D.C. region. See the pruning references below on how to make proper pruning cuts – improper pruning cuts are commonly seen in local landscapes.

Timing Of Rose Pruning:

- **Roses that bloom only on old wood** – These roses should be pruned little in the spring. This group includes most old garden roses - any serious pruning should be done after the first flush of bloom – prune in late May or early June.
- **Roses that bloom on new wood as well as old wood** - Most modern shrub roses are in this group. They can be cut back as needed in early spring, but pruning will remove the flowers on old wood. Green Spring prunes roses less than more formal rose gardens.
- **Nesting birds and roses** – Some birds like to nest in certain vigorous shrub roses (carefree beauty rose is a favorite at Green Spring). For plants that birds frequently nest in, spring pruning needs to be done earlier – complete pruning by early March if possible. Otherwise prune after the nesting season is done.
- For detailed pruning information, see *The Pruning Book* by Lee Reich. Another choice is *The American Horticultural Society Pruning and Training. A Fully Illustrated Plant-*

By-Plant Manual by Christopher Bickell and David Joyce (DK Publishing); this book was written in part by British authors, so some timing information is unsuited to our region. For example, major fall pruning for plants like roses should not be done here – substantial pruning of roses should not be done after mid August. Cooperative Extension publications on the internet are also good sources of pruning information.

- ❖ **Pruning Other Woody Plants** - It is best not to do any major pruning after mid August on borderline hardy plants, such as many crape myrtle cultivars, due to potential winter hardiness problems. See the pruning references above for information on how to make proper pruning cuts – improper pruning cuts are commonly seen in local landscapes.

Timing Of Woody Plant Pruning:

- Except for the removal of dead wood, woody plants that bloom only on old wood should be pruned little in early spring. This includes most *Hydrangea macrophylla* and *Hydrangea serrata* cultivars (endless summer hydrangea is an exception – it blooms on both old and new wood). Any serious pruning should be done after the first flush of bloom in spring or summer.
- Woody plants that bloom on new wood, such as butterfly bush, can be cut back as needed in early spring.

12. Division

Division is used to rejuvenate plants, to curtail their spread, and to increase the number of plants.

Division Tips:

- ❖ Division is usually done in the spring or early fall, although some plants like bearded iris and daylilies can be divided in the summer. Spring is best for most plants.
- ❖ The need for division is most evident when the center of a plant dies out or growth becomes leggy.
- ❖ A round point shovel, knife, Japanese farmer's knife (hori-hori), spading fork, ax, a sledgehammer used with a wedge or an ax, or a steel pry bar can be used. Discard the older center with little or no growth in the compost pile.

13. Controlling Insect, Mite, And Slug Problems With Integrated Pest Management (IPM)

Properly identify pest problems before taking action and use organic and non-chemical control methods when appropriate. Grow plants with little or no pest problems. Use carefully targeted, low toxicity pesticides as a last resort (insect growth regulators are commonly used in greenhouses in public gardens due to their low toxicity to people). Biological control agents are used more by large public gardens because careful management is needed if insects are purchased.

Insect And Mite Control Tips:

- ❖ **Insects And Mites** – Insects have 6 legs. Aphids are small insects with sucking mouth parts for feeding on plant sap. For aphid control outdoors, it is best to wait for predators, such as ladybird beetles, to take care of the problem (natural biological control). Do not purchase ladybird beetles to release into local yards – nature will take care of it. Most of the time, nature will keep problems with pests to a low level – tolerating some damage is good for the environment. *Organic Gardening* and other publications by Rodale Press are helpful to organic gardeners.

Mites are small arachnids with 8 legs - they are closely related to spiders. Some species

suck plant sap such as spider mites – they cause stippling of leaves (small dots) and plants look unhealthy. There are also predatory mites that eat other mites, thrips, and fungus gnats (see *Biological Control: A Guide to Natural Enemies in North America. Predatory Mites* from Cornell University at www.nysaes.cornell.edu/ent/biocontrol/predators/mitintro.html).

- ❖ **Spraying safe chemicals for organic pest control** – These products are usually applied with a hand-held compressed sprayer. When using any pesticides, read and follow the label and use safety precautions. Several products are available to organic gardeners, and some of the most commonly used ones include:

- **Horticultural oil**
- **Insecticidal soap**
- ***Bacillus thuringiensis* (Bt) and other species** – Bt is made from a soil dwelling bacterium. Formulations are available for caterpillars (most commonly used to control pests on vegetables), mosquitoes (gardeners mostly commonly use dunks in open water, such as watering troughs), and beetles (San Diego or *tenebrionis* strain; used to control such pests as Colorado potato beetle).

Unfortunately, some pests are showing resistance to this bacterium because the Bt toxin was genetically engineered into the genes of agronomic crops and large acreages of these genetically modified crops are now planted in the U.S. Therefore, Bt may not be as effective against pests in the future.

***Bacillus popilliae* or milky spore** - This bacterium is used to control Japanese beetle grubs in turf. It is effective only when used on a wide scale – treating an individual property won't provide much control.

- ❖ **Organic pesticides that should no longer be used in home gardens, neem and rotenone** - These plant-derived pesticides are not longer used at Green Spring. The British will stop the sale of rotenone to home gardeners in 2008 (*The Garden* February 2008 and www.rhs.org.uk/learning/publications/pubs/garden0503/pesticides2.asp). Both pesticides are toxic to aquatic life. Rotenone causes symptoms similar to Parkinson's disease when injected into rats at low doses. Neem has been linked to reproductive defects in rats and if it is not processed properly it can contain the potent carcinogen aflatoxin (see *The Truth About Organic Gardening. Benefits, Drawbacks, And The Bottom Line* by Jeff Gillman).

- ❖ **Other Useful IPM References:**

- IPM Maryland (www.mdipm.umd.edu/) for timely information about pests and IPM. In addition, they have excellent sheets about a wide range of pest problems on various plant species, such **IPM: Boxwood** (www.hgic.umd.edu/_media/documents/publications/ipm_boxwood_pfv.pdf). They also have sheets on individual pests like spider mites (www.hgic.umd.edu/_media/documents/SpiderMitesHG13pfv.pdf).
- *Garden Insects of North America: The Ultimate Guide to Backyard Bugs* by Whitney Cranshaw.
- *Landscape IPM. Guidelines for Integrated Pest Management of Insect and Mite Pests on Landscape Trees and Shrubs*. Bulletin 350, Cooperative Extension Service, University of Maryland. John Davidson and Michael Raupp.
- *Pests and Diseases of Herbaceous Perennials. The Biological Approach* by Stanton Gill, David Clement, and Ethel Dutky. Maryland Cooperative Extension Service.
- Virginia Tech Virginia Cooperative Extension IPM website (www.vaipm.org/).

- ❖ **Slugs** – These animals are mollusks without shells and they eat holes of various sizes and shapes in leaves. They often feed at night, so hand-picking them at night with a

flashlight works well – drown them in soapy water. Beer in bowls is less effective. They are most common in wet years. For information about other products for controlling slugs, see *The Truth About Organic Gardening. Benefits, Drawbacks, And The Bottom Line* by Jeff Gillman.

14. Controlling Diseases - Use Integrated Pest Management

Properly identify diseases problems before taking action and use organic and non-chemical control methods when appropriate. Grow plants with little or no pest problems. There are fewer chemical controls for diseases than for insect and mite pests. *Pests and Diseases of Herbaceous Perennials. The Biological Approach* (mentioned above) and *Diseases of Trees and Shrubs* by Wayne Sinclair and Howard Lyon (2nd Edition) are good references. Many Cooperative Extension websites address plant diseases, including two websites mentioned above: IPM Maryland and Virginia Tech Virginia Cooperative Extension IPM.

Disease Control Tips:

- ❖ **Black Spot** – This fungal disease starts out with round or irregular spots that darken, the surrounding leaf turns yellow, and eventually leaves can fall off. The best practice is to **grow disease resistant roses or roses that thrive in spite of black spot**. Green Spring no longer sprays roses with fungicides, so roses that are not disease resistant are removed from the collection.

Growing disease prone roses is labor intensive, uses lots of pesticides, and is not eco-friendly. Many roses are very susceptible to this disease. The standard spray schedule for disease prone roses in our area is fungicide sprays every 1 to 2 weeks (with at least 2 different types of fungicides so resistance doesn't develop). Spraying starts in early to mid April (after spring pruning is finished) and continues through early to mid October, except in the summer when temperatures rise above 90 degrees F and during periods of dry weather.

- ❖ **Powdery Mildew** – This fungal disease of many herbaceous and woody plants causes a dusty white to gray coating on leaves and other plant parts. **Grow disease resistant plants or plants that thrive in spite of it.** This disease is hard to control with low toxicity chemicals that are currently available – horticultural oil provides some control.
- ❖ **Soil-Borne Diseases** – Many plant diseases are soil-borne. Sometimes gardeners can dig out contaminated soil in a small area and replace it with compost or with fresh soil mixed with compost. It is very important to grow plants that are tolerant of the cultural conditions of the site – plants that don't like wet soil or poorly drained soil will often decline and die during wet periods. Also, grasses and broadleaf plants can be rotated in problem areas (crop rotation).

Some Soil-Borne Diseases Include:

A. Southern Blight - This soil-borne fungal disease strikes during hot weather under moist conditions. Symptoms including sudden wilting or flagging on one or more shoots (leaf and stem browning), dieback of the damaged areas, and finally plant death. Many herbaceous plants and some woody plants are susceptible but it usually doesn't cause widespread damage. Do not compost the dead plants. The Missouri Botanical Garden is a source of information about this plant disease - see *Crown Rot of Perennials (Southern Blight)* (www.mobot.org/gardeninghelp/plantfinder/ipm.asp?code=34).

B. Verticillium Wilt And Other Pest Problems – This soil-borne fungal disease has caused the death of a number of woody plants at Green Spring. This disease affects hundreds of woody and herbaceous plant species, from tomatoes to maples and magnolias. It is characterized by sudden wilting, often on half of a plant. Plant death often results since there are no treatments for plants or the soil – digging out soil will not control

this disease since it often is present in large areas. The disease is worse during dry periods, so use supplemental water to keep plants healthy. The Missouri Botanical Garden has a useful website on this disease, including lists of susceptible plants and resistant plants

(www.mobot.org/gardeninghelp/plantfinder/IPM.asp?code=147&group=21&level=s).

Species and cultivars resistant to verticillium wilt need to be grown in areas where this disease killed plants in the past. For example, buy disease-resistant tomato cultivars whenever possible. Resistance to various diseases is abbreviated as follows:

- **V** – resistance to verticillium wilt
- **F** - resistance to fusarium wilt, another soil-borne fungal disease
- **N** - resistance to nematodes. These microscopic non-segmented worms are found in soil. A few species are responsible for plant diseases, while most species have beneficial roles - some are even predators of pests. See the Cornell University Plant Diagnostic Clinic Fact Sheet on nematodes for further information

(<http://plantclinic.cornell.edu/FactSheets/nematodes/nematodes.htm>).

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- ❖ **Viruses** - Remove virus-infected plants and discard in the garbage. Viruses show up from time to time on many plant species – they are often transmitted by insects, mites, nematodes, and pruning equipment. Symptoms on many plants include yellow discoloration of the leaves in irregular patterns (mosaics, ringspots, and mottles).

Rose rosette - This disease is spread by a tiny mite. The mite was introduced into the U.S. in an attempt to provide biological control of multiflora rose, an exotic invasive. Grafting of multiflora rose was also used to spread this disease. **This disease is an example of biological control with negative consequences!** With this disease the first symptom is the leaf veins turning red on the underside of the leaf and soon there is a large increase in the number of vegetative shoots. Eventually leaves are much smaller than normal and become deformed, and shoots become short and red. Green Spring has had roses with this disease – one plant was obviously diseased and removed. On a large rose plant suspected of having this disease, the infected shoot was successfully cut off (the hand pruner was sterilized with alcohol afterwards). Photographs of virus symptoms from rose mosaic virus and rose rosette are posted on a Kansas State University Department of Plant Pathology/ Extension Plant Pathology website

(www.oznet.k-state.edu/path-ext/factSheets/Rose/Rose%20Mosaic%20Virus.asp).

The Missouri Botanical Garden has information about rose rosette as well

(<http://mobot.org/gardeninghelp/plantfinder/IPM.asp?code=104&group=67&level=s>).

15. Pests In The Garden

- ❖ **White-tailed Deer** - Deer are a serious problem in much of the Washington, D.C. area due to a lack of predators (wolves and mountain lions historically) and hunting bans. Deer damage plants during feeding and by rubbing bark in the fall mating season. See *Managing Deer Damage in Maryland* by Jonathan Keys (www.naturalresources.umd.edu/Backyard/FactSheets/EB354.pdf), *Reducing Deer Damage to Home Gardens and Landscape Plantings (With Revised Repellent List)* by Paul Curtis and Milo Richmond (www.dnr.cornell.edu/ext/chdp/Reducingdeerdamage.htm), and *The Truth About Organic Gardening. Benefits, Drawbacks, And The Bottom Line* by Jeff Gillman) for information about reducing deer damage in gardens and landscapes.

- **Deer repellents** – Commercial repellents can be used, but most people report limited success over time.

- **Fencing** – Electric fencing can be used in small areas but deer often jump over them eventually and the electricity can be dangerous to children and those with heart conditions (touching these fences causes a very unpleasant sensation!). A deer fence that is 10 feet tall (woven wire type) is a better alternative. Without large scale fencing, gardeners can fence individual plants with plastic mesh fencing wrapped around stakes to somewhat reduce feeding. Mesh fencing stops some browsing but not browsing of the top portions of plants.
 - **Avoid growing plants that are commonly damaged.** See *Mohonk Mountain House Plant Recommendations for Deer-Infested Gardens* from Cornell University (www.gardening.cornell.edu/factsheets/deerdef/mohonk.html). However, when deer populations reach very high levels almost all smaller plants of most plant species will be eaten, and the lower portions of large plants will be browsed on.
 - Support managed hunt programs by professionals in populated areas. Deer are less of a problem in rural areas where hunting occurs on a regular basis.
- ❖ **Small Mammals That Sometimes Are Garden Pests** - *The Truth About Organic Gardening, Benefits, Drawbacks, And The Bottom Line* by Jeff Gillman is a good reference about controlling small mammals that can become pests in the garden (includes reviews of various rodenticides for vole and rat control and their toxicity).
- **Voles** - These mouse-like rodents do the most damage in the winter, when they eat plants with fleshy roots. Green Spring had a vole problem at one time in a few areas – the Mixed Border once had serious infestations. Predators now keep populations at a manageable level – predators of voles in the eastern U.S. include hawks, owls, foxes, coyotes, skunks, weasels, snakes, and bobcats.

Rodenticides can affect non-target organisms such as predators that eat rodents, so use rodenticides only if needed and follow label directions carefully. Green Spring wasn't successful with traps.

- **Non-Native Brown Rat or Common Rat** (not from Norway – thought to have originated in China) - Brown rat infestations are more problematic than voles because these rats carry human diseases. This rat often likes to eat vegetables and fruits in gardens. Use rodenticides to control. Sanitation is very important - don't add fleshy fruit waste to the compost pile if rats are present and have tight-fitting lids on garbage cans.

Native rats do not harm gardens. The Alleghany woodrat is found in the mountains of Virginia and Maryland and resembles a medium-sized mouse. It is threatened in Virginia and endangered in Maryland. It is in decline throughout its range in the eastern U.S.

- **Rabbits and Groundhogs** - Use cages around plants they are eating or have eaten in the past - they eat herbaceous plants. Green Spring has not been successful with live traps.
- **Squirrels and Mice** – Squirrels love to dig up and often eat bulbs like tulips and crocus. It is possible to place plastic mesh over the planting location with landscape pins until bulbs get ready to bloom. Squirrels will sometimes dig up the bulbs even when they are about ready to bloom. Mice apparently will eat certain bulbs as well. It is labor intensive to use plastic mesh and it sometimes tears up the foliage and flowers when it is being taken off – it's often easier to stop growing susceptible bulbs. Squirrels will not dig up many bulbs such as ornamental onion, daffodils, and *Colchicum*, so there are many bulbs to grow if these animals are a problem.

16. Turf Edging Beds And Edging Paths

The traditional way to edge beds is by hand with flat blade spade. A shallow V-shaped area is dug at the front of the bed. A round point shovel makes a slight curve when it digs into soil, so the edge is not as straight as with a flat blade spade but it is easier to dig. To save labor, gardeners can use a deeper layer of mulch on the edges of beds instead of digging. Other attractive edging materials include stone, brick, and logs.

Edging can also be done with a gasoline powered turf edger or a string trimmer, but small engines currently available have no air pollution control equipment. Two-stroke engines pollute more than four-stroke engines because gas is mixed with oil, but two-stroke engines are still popular because they are lighter. Electric trimmers are underpowered as currently sold but can be used for small areas.

17. Maintenance Of Lawn And Meadow Areas

Concern is growing in the U.S. about the overuse of water, fertilizers, and pesticides to maintain lawns. Gas-powered equipment for turf care causes noise and air pollution. Lawns have higher water runoff rates than forests, grasslands, meadows, and some gardens, as well as limited value to wildlife. About 7 million birds are killed yearly by chemicals used on lawns (www.audubon.org/bird/at_home/pdf/LawnFlyer.pdf) and www.birds.cornell.edu/AllAboutBirds/attracting/landscaping/songbirds). For further information see *Outdoor Air – Transportation: Lawn Equipment - Additional Information* from the EPA (www.epa.gov/air/community/details/yardequip_addl_info.html) and *Reduce All Pesticides But Eliminate Those Used on Lawns* by the National Audubon Society (www.audubon.org/bird/at_home/ReducePesticideUse.html). It is best to limit lawn to areas where use demands it, such as play areas & other foot traffic areas.

Maintenance Tips For Lawns and Meadows:

- ❖ **Manage remaining turf areas in a more ecological fashion.** Organic lawn care information is limited and more research needs to be conducted. Cornell University Cooperative Extension has a publication for the New York region: *Lawn Care Without Pesticides* by Frank Rossi (<http://ecommons.library.cornell.edu/bitstream/1813/3574/2/Lawn+Care+without+Pesticides.pdf>). This brochure is useful but needs to be adapted to the Washington, D.C. area. For example, certain tall fescue cultivars are best for most lawns in the Washington, D.C. area, and Kentucky bluegrass does poorly here. One organization dedicated to this cause is SafeLawns Foundation or SafeLawns.org.
- ❖ **Lawn Care Equipment:**
 - **Utilize manual or electric equipment if possible to reduce noise and air pollution.** Use tools appropriate for yard size.
 - Use a lawn mower with a four-stroke engine rather than a two-stroke engine if a gas-powered engine is needed. Lawn mowers are not sold with catalytic converters in the U.S. (unlike Europe) and are much more polluting than cars and trucks for each hour of use.
 - **Sweep with a broom and use rakes rather than using blowers to cut down on noise and air pollution.** For gardeners that prefer blowers, use an electric blower rather than a gas powered blower.
- ❖ **Meadows Or Meadow Gardens** - Meadows are planted with a mix of native grasses and wildflowers. Meadows are cut down or mowed every year or two (often in mid to late winter) in order to keep them from reverting to woodland. Burning can be used in less developed areas with careful management.

18. Garden Installation For The Eco-Friendly Gardener - This information sheet is available under Gardening on the Green Spring website and in the Horticulture Center. The following topics are addressed:

- ❖ **Soil**
- ❖ **Preparation For New Beds And Borders** – both no-tillage and tillage techniques
- ❖ **Composting**
- ❖ **Landscape Planning And Plant Selection**
- ❖ **Planting**

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