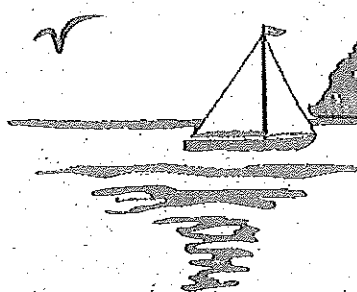


Water Pollution Solutions



Fertilizers and Pesticides

Option for Lawn and Garden Use



Fertilizers and their Nutrients

Did you know that the nutrients that feed your yard's grass, trees, shrubs and flowers are the same ones that create algae blooms in lakes, ponds and streams? Excess nutrients and other garden products such as pesticides can run off the land or leach under ground, eventually making their way to lakes, ponds and streams causing water pollution. That's why it's important to *identify* what type of nutrients your lawn and garden needs and to *follow label directions* whenever using lawn and garden products.

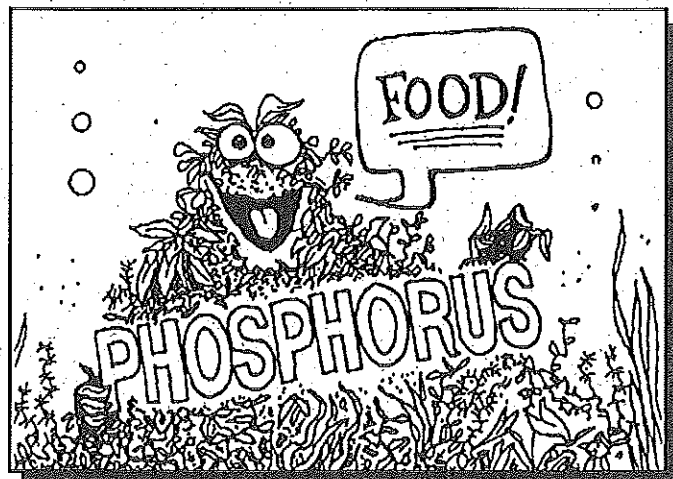
The three primary plant nutrients essential for growth are nitrogen, phosphorus and potassium. Fertilizers can be purchased as "single ingredient" fertilizers (such as ammonium nitrate and urea for nitrogen, triple super phosphate for phosphorus and muriate of potash for potassium). "Combination" fertilizers such as 8-8-8 or 25-10-5 contain all three nutrients. The three numbers indicate the percentage of each nutrient in the fertilizer blend. For example, a 10-6-4 fertilizer contains 10 percent nitrogen, 6 percent available phosphate (which includes phosphorus) and 4 percent soluble potassium.

Fertilizers are available in dry and liquid forms. They also can be classified by their solubility. Soluble fertilizers (liquid and dry formulations) release nutrients rapidly, whereas slow-release and organic fertilizers (typically dry formulations) release nutrients over a period of time.

Plants are not always able to immediately use all of the nutrients available in soluble fertilizers. Some water soluble nutrients may leach below root levels in the ground and be transported into the nearest

lake or stream. Slow-release fertilizers, on the other hand, are designed to release nutrients at a rate more in line with plant needs. This means there is less likelihood that nutrients will leach into groundwater and enter waterways.

It's important to test your soil before applying any lawn or garden fertilizers. Test results will tell you what type and how much, if any, nutrients are needed for optimum plant growth. Soil test kits are easy to use, take the guess work out of fertilizing and, in the long run, will save you money.



Phosphorus is a nutrient that boosts plant and algae growth in bodies of water!

Soil test kits are available at your local Penn State Extension Office and many lawn and garden centers. Follow the simple directions to collect and send in your soil sample (a nominal fee is charged for the analysis). A soil test will tell you the levels of available phosphorus and potassium in the soil as well as the soil pH (because nitrogen is so soluble, it's not practical to test for it). A fertilizer recommendation, including nitrogen, will be included in your soil test

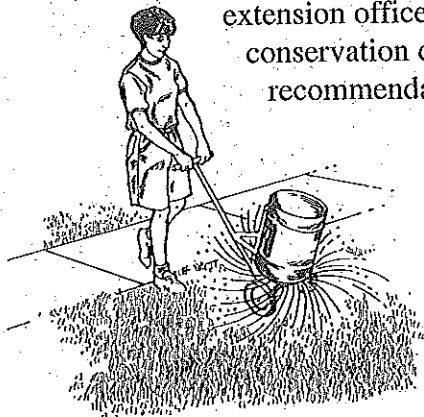
results. If levels of phosphorus and/or potassium are sufficient, there is no need to apply those nutrients. Remember that grass clippings also contain nutrients your lawn needs to grow. A garbage bag of clippings contains up to 1/4 pound of usable organic nitrogen. Over the growing season, grass clippings can provide up to 50% of the nitrogen needed by your lawn. You can potentially reduce your fertilizer costs by mulching grass clippings back into the lawn.

The rate and timing of fertilizer applications are very important in maintaining a vigorous and healthy turf, as well as keeping the nutrients on your lawn. Apply only the amount specified, and water your lawn immediately after application. Never apply fertilizers if rain is forecast: you can control your sprinkler but not the weather! Use a calibrated spreader to ensure uniform distribution and help prevent over-application.

In general it is better to apply fertilizer in the fall than in the spring. Spring applications may actually harm lawns by promoting more blade growth than root growth. This can lead to shallow root systems that are unable to sustain lawns through a drought or harsh winter. Fall applications, on the other hand, promote deep, healthy root systems and hardy lawns. Apply fertilizer in the fall after the average daily temperature drops to 50°F for a week or so (usually in October). To calculate the average daily temperature, add the daily high temperature to the daily low temperature and divide by two. For example, 61° (daily high) + 37° (daily low) / 2 = 49° (average daily temperature).

Trees, shrubs, flowers and vegetable gardens all require differing amounts of fertilizer nutrients under different circumstances. In fact, many healthy trees and shrubs do not require annual fertilization.

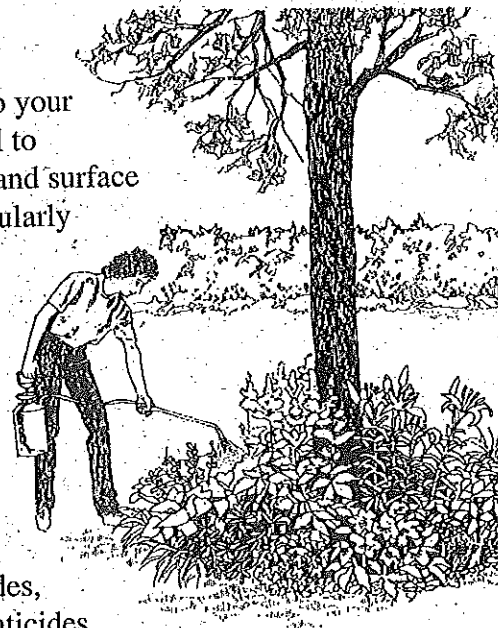
Contact your local nursery, Penn State extension office, or county conservation district for recommendations.



Pesticides

Everything applied to your yard has the potential to contaminate ground and surface waters. This is particularly true with homes located close to lakes and streams.

Pesticides, for instance, are chemicals intended to kill or repel pests and include herbicides, insecticides, fungicides and rodenticides.



Pesticides are poisons that, if not used properly, can pose a threat to humans (especially the person applying them) as well as plants, animals and other non-targeted species such as insects and fish. Some pesticide residues can contaminate freshwater ecosystems for generations. As pesticides decompose the breakdown products produced can sometimes be more toxic and affect more organisms than the original pesticide.

Some pesticides can "bio-accumulate." This means the toxic level of the pesticide increases as it is consumed by each link in the food chain. DDT, which the U.S. banned in 1972, is one of the most famous examples of bioaccumulation. In the late 1960s breeding failures were discovered in eagles as a result of eating fish contaminated with DDT. Many of our prized gamefish are considered top predators, making humans who consume contaminated fish at potential risk from bioaccumulation.

Integrated Pest Management

Integrated Pest Management (IPM) is an ecological approach to pest management that integrates cultural, genetic, mechanical, biological and chemical control methods. IPM stresses the judicious use of pesticides and promotes understanding the relationships between plants and their pests and using this knowledge to manage insect problems. Under the IPM approach, plants are selected that can naturally defend themselves or other plants. IPM also recognizes that not all bugs are bad and that most plants can tolerate a considerable amount of insect feeding without suffering serious

damage. In IPM, chemical control strategies are used only as a last resort or safety net.

Cultural controls work by creating optimal conditions for plants while, at the same time, creating unfavorable conditions for pests.

- ☑ Choose genetic, native, disease-resistant plant varieties suited to your conditions to minimize the need for pesticides. Healthy plants are more effective at defending themselves against insects and competition.
- ☑ Rotate annual plants in your gardens to disrupt the life cycle of plant-specific pests.
- ☑ Clean-up by removing pest-infested plant residues in the fall.
- ☑ Plant a wide variety of plant species to reduce potential pest problems.
- ☑ Maintain optimal light and water levels for plants (mulch can help maintain soil moisture throughout the growing season and reduce the need for watering). Stress weakens plants' natural resistance.
- ☑ Proper mowing heights are important for maintaining a healthy lawn. Set your mower to cut at 2 to 2½ inches. Mow often, each time the grass reaches 3 to 4 inches high (it's important not to cut more than 1/3 of its height in any one cutting). You may be surprised to learn longer lawns are healthier, more drought-resistant and will discourage growth of many common weeds! Collected lawn clippings can be an unwanted source of nitrogen for your yard.

Biological controls take advantage of natural predator/prey or host/parasite relationships to control pest insect populations.

- ☑ Limit pesticide use to allow natural enemies to thrive, helping to keep pest populations in check. Beneficial insect predators include ladybird beetles, ground beetles, praying mantises and dragonflies that consume many pests in their lifetime. Parasites, such as the trichogramma wasp, will generally consume one individual insect pest during its own lifetime. There also are pathogens, such as fungi and bacteria, that infect insect pests (but do not pose a threat to humans).

- ☑ Entice insect-eating birds and/or bats to your yard by providing suitable habitat such as purple martin houses or bat houses.

Mechanical controls use physical disturbance to remove pests.

- ☑ Till or hand-weed instead of using herbicides.
- ☑ Remove large insects by hand.
- ☑ Use mulch to cut down weed growth, reduce erosion and retain soil moisture.

Chemical controls include natural and synthetic pesticides.

- ☑ Use lawn and garden chemicals carefully and sparingly. Pesticides should be considered a last resort after other controls have failed.
- ☑ Use pest-specific pesticides whenever possible—that is, a pesticide designed to kill **only** the targeted insects, weeds, or plant disease organisms causing the damage.
- ☑ Use the least toxic pesticide that will do the job. For example, inorganic insecticides such as some oils and soaps kill pests on contact while posing little threat to the environment. Microbial insecticides (derived from microorganisms) also are less toxic. Keep in mind that botanical pesticides (derived from plants) are not necessarily less toxic than synthetic pesticides. However, they are usually short-lived and break down quickly in the environment. Pesticides with the word “caution” on their label are usually **less** toxic than those labeled “warning” or “danger,” as long as label directions are followed.



Water Pollution Solutions Using Pesticides Safely:

When pests invade lawns and gardens, consider the full range of Integrated Pest Management options. If you decide you must use a pesticide, follow the label directions carefully. In addition, the following guidelines will help minimize risk to you, your lake, and your watershed.




- Read the label carefully. The label will tell you when, where and how to apply the product. You could be held liable—by law—for improperly using certain products.
- Make sure the pesticide is designated for use on the pest you want to control.
- Never apply pesticides near wells, surface waters, or wetlands unless the label specifically allows for such applications.
- Never apply pesticides to bare ground. Pesticides can runoff with eroding soil and contaminate lakes and streams.
- Read the label to determine proper disposal methods. Never pour pesticides into toilets, storm drains, or ditches.
- Properly dispose of extra or old pesticides. Find out the date set for your community's Household Hazardous Waste Collection and put it on your calendar.
- Keep pesticides in their original containers so you know what they are and how to use them. Store them in a dry place, away from childrens' reach.
- Do not apply pesticides if rain is forecast unless specified on the label. Some pesticides need to be watered-in, but others will be washed off, decreasing their effectiveness and contaminating lakes and streams.
- Never spray pesticides on a windy day. Wind will carry the pesticide away from its target area and may unintentionally impact beneficial insects, birds, other wildlife or you.
- Do not mix pesticides unless instructed by the product directions.
- In the event of a small pesticide spill, do *not* hose down the area with water. Wearing rubber gloves, sprinkle absorbent material (e.g., sawdust or kitty litter) over the spill, transfer the material into a sturdy plastic bag, close tightly and store in a safe place until it can be transferred to a hazardous waste collection site.
- Wear protective clothing as instructed on the label. Wash pesticide-contaminated clothing alone, never with other clothing.

For more information contact your county Extension Office or the Extension Service's Publications Distribution Center at the Pennsylvania State University, 112 Ag Administration Building, University Park, Pa 176802 (814-865-6713). You may also find assistance through the PA Department of Agriculture's Bureau of Plant Industry located at 2301 North Cameron Street in Harrisburg, PA 17110-9408.

Water Pollution Solutions is a series of publications produced by the Pennsylvania Association of Conservation Districts, Inc. with funding provided by the Pennsylvania Department of Environmental Protection, Bureau of Watershed Management and the US Environmental Protection Agency, Section 319 Program.

The objective of the series is to provide residents with a greater understanding of how human actions can help protect water quality. For more information about other publications in this series visit the PACD website or contact the Pennsylvania Association of Conservation Districts, Inc. at 25 North Front Street, Harrisburg, PA 17101 (717) 238-PACD (7223) or your county conservation district.

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