YARD CARE

ISSUE

Most Americans love a lush landscape and a thick, green lawn. It looks attractive and the grass feels good to walk and play on. That is why we spend billions of dollars annually to maintain our yards. Unfortunately, that yard maintenance is contributing to a degraded Sound[A]. Everything that is applied to your yard eventually finds its way to the Sound through runoff. This runoff carries excess nutrients and toxic chemicals that can do serous damage to both water quality and marine life.

How does yard care, through fertilizers, pesticides, and herbicides, affect Long Island Sound?

PROBLEM

Much of the chemicals used in yard care are washed away by the next rain. The water then carries those chemicals both over and through the ground in the form of runoff and groundwater to gutters and storm drains, lakes and reservoirs, streams and rivers, harbors and bays, and to Long Island Sound[B]. Obviously, this is not the intent of the gardener, but these actions negatively affect water quality and harm or kill both terrestrial and aquatic creatures.

In general, common yard-care practices pose two threats to Long Island Sound:

1) **loss of life-sustaining oxygen, and**
2) **harm and poisoning of marine organisms and their habitat**

Fertilizers

Nitrogen, in the forms of nitrate, nitrite, or ammonium, is a nutrient that is required for plant growth. Although nitrogen is naturally abundant in the environment, it is also introduced *via* those fertilizers applied to yards and gardens to supplement the soil's supply and stimulate plant growth. The typical commercial fertilizer is made of petroleum and is very water-soluble (it dissolves quickly when wet). However, the soil cannot absorb it quickly and plants cannot use it quickly, so much of it washes away.

While stimulating plant growth may sound like a good thing, the truth is that excess nitrogen in the environment causes two major problems:

1) Excess nitrogen causes excess growth of algae[C].

    a. When algae decomposes, oxygen in the water is used. When excess algae are present (an algal bloom), oxygen can be depleted from the water. Without oxygen, aquatic animals cannot breathe. Then, aquatic animals either emigrate or die, leading to a decrease in animal abundance and diversity and limiting our use of the water for fishing, swimming, and boating[D].

    b. Excess algae also block light from penetrating into to the water. This reduces the growth of plants, such as eelgrass, that provide vital underwater food and shelter. In turn, the animals that depend on those plants either emigrate or die. Additionally, less light results in poor visibility, making it difficult for animals to find prey and avoid predators.

2) Too much nitrate in drinking water can be harmful to young infants or young livestock.

Pesticides,

A pesticide is an agent used to destroy pests. Pest control agents can be placed in three categories 1) insecticide (used to kill insects), herbicides (used to kill weeds), and fungicides (used to kill mold and fungus). Pesticides reach humans by being absorbed through the skin, swallowed or inhaled. Pesticides reach water bodies by being transported by air during application or by runoff. Did you know that:[1]

- Only 5% of pesticides reach their target
- Drift from landscaping ranges from 12 feet to 14.5 miles
- More serious effects appear to be produced by direct inhalation of pesticide sprays than by absorption or ingestion of toxins

Most chemicals that are used to prevent "pests" end up in Long Island Sound where their presence can be harmful to marine organisms through poisoning both their bodies and their habitat. The role of pesticides in the recent lobster die-off has been debated and researchers under Sea Grant have been looking into link between the lobster crisis and the extensive spraying in coastal communities to control the mosquito-borne West Nile virus.

[1] http://www.chebucto.ns.ca/Environment/RATE/pestfact.html

Pesticides have the following effects:[2]

In adults:

- increased risk of leukemia
- cancers (lung, brain, testicular, lymphoma)
- increase in spontaneous abortions
- greater genetic damage
- decreased fertility
- liver and pancreatic damage
- neuropathy
- disturbances to immune systems (asthma/ allergies)
- increases in stillbirths[3]
- decreased sperm counts

In children:

- cancer: leukemia and brain cancer
- asthma and allergies
- polyneuritis with numbness and pain in lower limbs.[4]
- altered neurological functioning and long-lasting neuro-behavioral impairments.[5]
- birth defects
- neurotoxicity
- gangrene (tissue death) of the extremities

Children whose homes and gardens are treated with pesticides have 6.5 times greater risk of leukemia than children living in untreated environments.

In animals:

- Birds die after eating granular pesticides.
- Fish and other animals develop:
    - cancer
    - abnormal thyroid function

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[2] All of these effects are as found and documented at: http://www.chebucto.ns.ca/Environment/RATE/pestfact.html

[3] Rea, William J., 1996, Pesticides. Journal of Nutritional and Environmental Medicine 6, 55-124.

[4] Journal of the American Medical Association 1989;30:1306. Mayo Clinic; Medical Toxicology 1988; 3:350-75. National Poisons Unit, Guy's Hospital, London, England.

[5] Hammond, M., 1995, Pesticide Bylaws: Why We Need Them and How to Get Them. Consultancy for Alternative Education, Quebec.

- decreased fertility
- decreased hatching success
- demasculinization and feminization of males
- alteration of immune function

SOLUTION

There are many things you can do in the lawn and in the garden that will reduce pollution in the Sound. However, you may start with a simple question:

Why do you need it?

Manicured yards are very high-maintenance items. Keeping your lawn weed-free and super-green is a fight against nature. Consider reducing your effort, cost, and your impact on the Sound. Many people assume that they must have the standard run of the mill lawn, but many landscape architects and designers can give you prudent and attractive alternatives to the basic extremely green lawn.

Size:

Even reducing the size of your lawn can have a terrific effect on keeping the Sound healthy. Perhaps you can reduce you lawn area and still maintain the same lawn-based activities. Some questions you should consider are:

- **What do you like about your lawn?**
- **How much do you and your family actually use your lawn?**
- **Do you use the neighborhood park more often?**

Aesthetics:

Do you have a large lawn because you like the look and feel of an open expanse? Many people are unaware that you can maintain that same openness by replacing all or part of your lawn with another lush, green groundcover or even a meadow of wildflowers, both of which will be virtually maintenance-free. This transformation can provide you with unbelievable display of foliage and blooms that change weekly. If you take this approach, and replace the sod with native wildflowers, grasses and ground covers, your lawn will need only an annual mowing. In addition, once it's established, a "lawn full of native plants almost never needs watering, which will make your lawn the best-looking in your neighborhood when drought turns all the other yards brown. Returning the grassy area of your yard to a meadow of indigenous species will also attract birds, butterflies, and beneficial insects to your yard."[6]

Weeds and Pests

[6] http://www.organicgardening.com/library/lawn_ornamental.html

If you have decided that you prefer a yard full of the typical grass species, consider why you are killing weeds. Is it for the health of the grass? If so, consider organic methods of removal. Is it for appearance? Some of the most beautiful lawns are loaded with weeds; just take a look at the fields at your school or the lawn of a park. Besides did you know that:

- **White clover**, a common lawn "weed", that can save you a lot of work. The leaves shade the ground, which help keep the soil moist. And, like beans, the plant is a legume, it can take nitrogen from the air and use it for growth. (This is a trick that most plants cannot perform.) This process then adds nitrogen to the soil that your grass can use, saving you the trouble of adding fertilizer.
- **Dandelions** have attractive flowers and the leaves are edible and very nutritious.

Other Plants:
What types of shrubs, trees, etc. do you like?

Try native plants, they don't need our help to survive**!**[E] These plants are specially adapted over thousands of years to deal with the insects, diseases, climate, and weather conditions of their home area. They don't need extra fertilizer, extra water, or pesticides to live a long, healthy life. And their beauty is renown, from the stately sycamore and oaks to the viburnmums and laurels. If you find a non-native plant that you must have, pick one that needs little maintenance (check with your nursery). This will result in less work for you and less water usage, fertilizer and pesticides for the Sound.

If you have actively decided to have a traditional yard, follow the information and suggestions below to do to make it as environmentally and Sound friendly as possible.

Yard Care

Tailoring yard care practices to local environmental conditions will help reduce the need to add nutrients and pesticides. Evaluate the condition of the lawn area to help select appropriate grass species for the site.

The proper match between conditions and plant species (including grass seed) can help reduce many of the problems associated with yard care. Different conditions may be found even within one lawn and factors such as shade, drainage, pH, low nutrient availability, high salt concentrations, and heavy traffic- all contributing to a negative affect on turf grass growth. Click here for ideas on nutrient enrichment.[F]

A soil test is the fundamental first step to any yard care program. Too often, fertilizers (and pesticides) are applied without knowing exactly what is recommended for the particular lawn or garden being treated. Proper soil pH enhances the ability of plants to utilize available nutrients, tolerate hot and dry weather, and resist disease. Since most

soil in the northeast is acidic (low pH), the application of lime may correct this condition and fertilizer may not be needed. Testing your soil's pH can save you valuable time and money.

It is possible to maintain your lawn without the use of pesticides, while keeping it attractive, by taking actions to ensure a healthy lawn. This may require a slight adjustment of your standards – you may see an occasional weed or dead spot in your lawn. But problems such as these can be kept to a minimum and your lawn will be vigorous and healthy, with increased tolerance to disease.

Actions to ensure a *Healthy Lawn* and *Reduced Impact* on Long Island Sound

- Test soil pH and add lime accordingly.
  - This will result in better nutrient and water retention.

- Aerate soil to promote water infiltration and deep root growth.
  - Deep root growth helps crowd out weeds and makes for healthy grass

- If possible, shrink your lawn to what you need for use and then use other low growing groundcovers in the rest of the yard.

- Grow native plants.

- Sharpen lawn mower blades.
  - dull blades can tear grass, giving it a frayed look and making it more susceptible to disease.

- Leave grass clippings and add compost to soil to increase organic content.[G]

- Keep grass 3 inches tall.
  - shorter grass is susceptible to weeds, has less surface area for taking in sunlight, and has weak roots.
  - never cut more than 1/3 of the grass blades' height at any one time.

- Three to Four pounds of nitrogen (grass clippings with a layer of compost is just about the right amount) per 1,000 square feet annually is usually enough
  - over fertilization will runoff into waterways and actually makes grass more vulnerable to disease. Additionally, it makes the lawn grow faster, so you have to mow more often.
  - Feeding once in the fall promotes strong roots and healthy spring growth

- If you still need to fertilize GO ORGANIC!

- If you spill fertilizers, sweep them up, do not wash them into the streets and storm drains.

- Avoid fertilizing before heavy rain or during long, dry spells.

- Never fertilize before April 1 or after October 15.

- Do not water your grass every night. This wastes water and encourages shallow root formation. Soak, at the most, once per week (about 1")- and rainfall COUNTS!

- If you need to use a weed killer try Corn-gluten meal instead of a chemical. It is a by-product of food processing used to feed livestock that is also a proven killer of weed, seeds, and seedlings.
    - BE CARFUL & READ THE INSTRUCTIONS, it will also kill new grass see
    - use only on an established lawn

- Practice Integrated Pest Management (IPM)[H] and GO ORGANIC![I]

- Make your own pesticide/insecticide.[J]

- According to researchers at the University of Maryland, mowing cool-season turf grasses to 3 inches can work better than herbicides for suppressing crabgrass.

- Compost kitchen waste, garden clippings, and leaves.

Resources

Organic Gardening Books:

- http://homeharvest.com/organicgardeningbooks.htm

Federal Organic Certification Requirements

- http://www4.law.cornell.edu/uscode/7/ch94.html

Other Useful Information:

- Corn Gluten Meal: http://www.gluten.iastate.edu/

- Home Harvest: http://homeharvest.com/

- Cornell Cooperative Extension: www.cce.cornell.edu
- Westchester County Water Quality: www.westchestergov.com/
- http://www.lvstormwater.com/bmps_landscape.html
- Gardener's Supply Company: www.vg.com/community/GAmarch01.asp
- Connecticut Sea Grant Extension Program, Clean Waters, Starting in Your Home and Yard: www.seagrant.uconn.edu
- http://www.organicgardening.com

Important Articles

Human Alteration of the Global Nitrogen Cycle: Causes and Consequences, a report by the Ecological Society of America, www.esa.org/publications.htm.

Preventing Pollution Problems from Lawn and Garden Fertilizers, by the University of Minnesota Extension Service, www.extension.umn.edu.

Geballe, Gordon. "Redesigning the American Lawn: A Search for Environmental Harmony." Yale University Press

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[A] **Long Island Sound Watershed**

Estuaries

Long Island Sound is an estuary. An estuary is a tidal body of water that is fed by both salt and fresh water sources. Estuaries are partially sheltered water sources that are protected by land from harsh winds, and storms, that occur in oceans. Because of this protection, estuaries are perfect habitats for marine creatures in early stages of development. Estuaries are special because they act as transition habitats for marine animals moving from fresh water sources to ocean habitats. They also act as temporary homes or resting places for many creatures such as migratory birds and mammals, and as breeding grounds for many fish and other wildlife, and as permanent homes to shellfish and finfish. Tens of thousands of species can be found in an estuary. Many types of birds, fish, and mammals depend on estuaries for survival.

Estuaries are important because they are among the most productive systems on earth. Due to the unique water chemistry, many habitats are created. The mixture

of salt and fresh water, tidal conditions, and shelter from harsh atmospheric conditions, create a unique and critical habitat for the survival of many marine species. Habitats are very diverse in estuaries ranging from less to concentrated saline areas, rocky shores to sandy beaches, mud flats to coral reefs, shallow harbors to deeper open waters, and regularly flushed areas to more stagnant enclosed areas.

Long Island Sound

Long Island Sound is bordered by New York and Connecticut. It is approximately 110 miles long and at its widest point reaches 21 miles. It is unusual in that it connected to the ocean at opposite ends: "the Race" at its eastern end, and the East River at its west end. (Most estuaries have only one connection to the ocean.) Long Island Sound's salt-water source is the Atlantic Ocean; its fresh water is from all of the rivers that drain to it, but the most significant fresh water sources are the Housatonic, Connecticut, and Thames Rivers.

Over 5,000,000,000 dollars is generated from activities related to Long Island Sound, including sport fishing, boating, swimming, and beach-going as well as commercial fishing. Long Island Sound's oyster fishery is one of the largest in the United States, generating 95% of the Nation's oysters.

Long Island Sound Watershed

Although Long Island Sound itself is 110 miles long, its watershed covers more than 16,000 square miles – an area the size of Delaware times eight. Long Island Sound's watershed covers all of Connecticut and parts of New York, Massachusetts, Rhode Island, Vermont, New Hampshire, and a small portion of Quebec, Canada. It is estimated that 8,000,000 people live within Long Island Sound's watershed. Because of the large human population in the watershed, human impacts are high.

We all live in a watershed. Watersheds consist of a network of land and water that eventually join at one location, much like the branches of a tree come together at its trunk. Watersheds channel water from rain, snow, and ice and from underground sources to larger bodies of water. Watersheds are the land that water flows across as it makes its way to gutters, streams, bays, lakes, and rivers, and out to estuaries and eventually the ocean. In this process, nutrients are picked up and deposited into these bodies of water as well as on the land along the way. Watersheds can be small or large; the Long Island Sound watershed is large, but

consists of a network of many smaller watersheds. Because watersheds are networks, changes to one watershed will affect others downstream.

Due to the significant human population in Long Island Sound's watershed, human-induced activities have a detrimental effect on water quality in the Sound. Humans have altered the land in the watershed, reduced open spaces, and have caused both point and non-point types of pollution in the watershed and in the Sound.

Point-source pollution is pollution from a specific source. It is the type of pollution that is discharged from a pipe from a factory, industrial site, or sewage treatment plant. It is the image most commonly associated with pollution. Although point-source pollution is an important issue concerning Long Island Sound and other water bodies, another type of pollution has an even greater negative effect – non-point source pollution.

Non-point source pollution, or "people pollution", cannot be associated with a distinct source but comes from many diffuse sources. It is a product of human activities, such as driving and washing automobiles and boats, maintaining lawns and gardens, constructing buildings and homes, altering the land, improper disposal of hazardous chemicals, and failing septic systems. These actions directly and indirectly affect the water quality of nearby waters that, in turn, will travel to the Sound. Because Long Island Sound's watershed is large and highly populated, the amount of non-point source pollution entering water bodies that drain into Long Island Sound is quite significant.

Non-point source pollution causes many of the same problems as point-source pollution, the only differences are that it is difficult to pinpoint its exact source and that it is far more difficult to prevent. Non-point source pollution adds extra nutrients, sediment, bacteria, toxins, and heavy metals to the Sound. This can stress and kill organisms and it adds to poor water quality resulting in such problems as hypoxia.

Why protect Long Island Sound?

Long Island Sound provides more than five billion dollars to the region's economy. People enjoy the recreational, economic, and aesthetic values of Long Island Sound, which are part of the region's culture. The Long Island Sound estuary not only provides recreational, economic, and aesthetic values, but it supports a wide variety of habitats. These habitats provide food and shelter for plants and animals as well as protect humans from the full force of storms. As more and more people choose to live and vacation in the region, human impacts to the Sound will also increase. It is critical that humans evaluate their activities at home and work to minimize their impact on the

watershed and the Sound. The Sound is an important to the region's natural, recreational, and economic vitality; it is the region's greatest natural resource. It is our responsibility to protect and restore it so that it remains viable for future generations.

[B] POLLUTED RUNOFF

Polluted runoff contains various components that can degrade water quality. Runoff may contain high levels of suspended solids, nutrients such as phosphorus and nitrogen, heavy metals, pathogens, toxins, pesticides, floatables and organic materials. Rainfall causes these pollutants to be transported into nearby rivers, lakes, streams, estuaries, wetlands and oceans, where they can have a detrimental effect on water quality, compromise designated uses, and cause habitat alteration or destruction.

Landscaping practices are a potential source of pollutants in urban runoff, with fertilizers from use at home and on golf courses, cemeteries and public parks adding nutrients to runoff. Lawn care chemicals have been directly linked to urban water quality, where large amounts of pesticides and herbicides may be found in stormwater.

[C] ALGAE

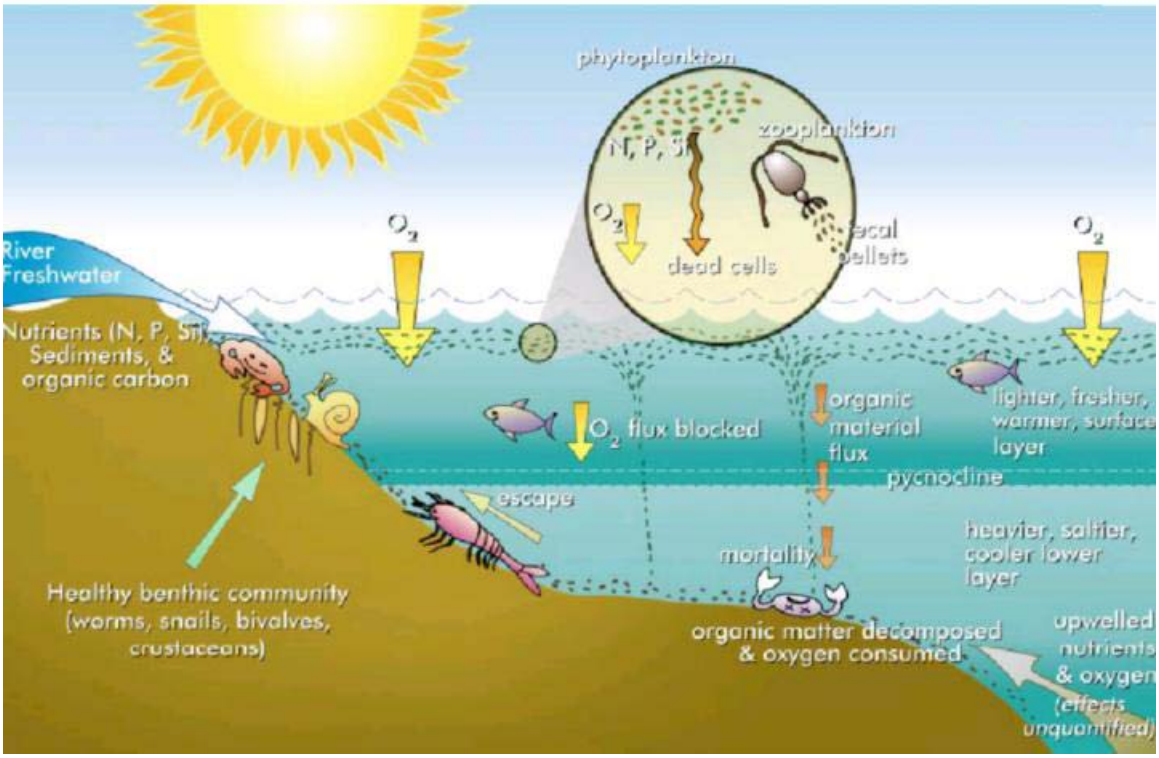
Algae is a plant that can range from a small single-celled form to more intricate multi-cellular forms. They are photosynthetic organisms and exist in a wide variety of habitats. While most people associate this organism with water, algae can also occupy desert sands. Fossil records have dated it back approximately 3 billion years.
The importance of algae is multi-layered. It provides oxygen for other aquatic life forms, is the chief creator of organic matter for the lower members of the food chain and can contribute to the human economy directly as a source of food, medicine and other products. When an algal bloom occurs (due to excess nutrients), algae contribute to mass mortality of other marine organisms.

[D] HYPOXIA

"Hypoxia means an absence of oxygen reaching living tissues. In coastal waters, it is characterized by low levels of dissolved oxygen, so that not enough oxygen is available to support fish and other aquatic species. Nutrients, such as nitrogen and phosphorous, are essential for healthy marine and freshwater environments. However, an over overabundance of nutrients can trigger excessive algal growth or eutrophication."

The algae plants eventually die, sink to the bottom, and use up oxygen during their decomposition. While the surface layer of Long Island Sound stays oxygenated through contact with the atmosphere and photosynthesis, the oxygen cannot penetrate down into deeper water due to a barrier, which prevents the mixing of surface and bottom waters, known as a pycnocline (a separation between two layers of different densities). The

respiration of bottom dwelling animals combined with the oxygen depleting process of decomposition uses up oxygen at a rate faster than can be replenished. This creates a deficiency in the amount of oxygen that reaches the tissues of bottom dwelling animals. The name for this condition is Hypoxia. In Long Island Sound, hypoxia has been connected to: the reduction in the number and variety of adult finfish, reduction in the growth rate of juvenile lobsters and winter flounder, and desolation of slow moving species (lobster, starfish, bay anchovy, menhaden, cunner, tautog, and sea robin). As a result, the portion of the local economy that depends upon the harvest of these species suffers.



United States Environmental Protection Agency: Mississippi River Basin Challenges- http://www.epa.gov/msbasin/hypoxia.htm

E **NATIVE PLANTS**

Cultural Management

Select a lawn seed mix containing a variety of grass species and cultivars to make best use of the disease-resistant qualities of each and to reduce susceptibility to pest damage. Check with your nursery or look at the bag for the brands with the most variety.

- For example, **endophyte-infected grass mixtures** – a combination of specific cultivars of tall fescue, perennial ryegrass, and fine fescues are being developed to allow sustainable, organic lawn care. The symbiotic relationship between the plant and fungus promotes vigorous growth with reduced susceptibility to stress conditions. These grasses are also resistant to many insect pests

Native Plants

In the Northeast the following work well with climate and rainfall:

- Little bluestem *(Schizachyrium scoparium),*
- broomsedge *(Andropogon virginicus),*
- sideoats grama *(Bouteloua curtipendula),*
- red top *(Agrostis alba),*
- yellow Maryland aster *(Chrysopsis mariana),*
- blue-eyed grass *(Sisyrinchium angustifolium),*
- pussytoes *(Antennaria plaginifolia),*
- crested iris *(Iris cristata),*
- wild geranium *(Geranium maculatum),*
- bird's-foot violet *(Viola pedata),*
- butterfly weed *(Asclepias tuberosa)*

In Connecticut:

Perennials:

- Wild red columbine (Aquilegia Canadensis)
- Bearberry, kinnickinick (Arctostaphylos uva-ursi)
- Wild ginger (Asarum canadense)
- Butterfly weed (Asclepias tuberosa)
- White wood aster (Aster divaricatus)
- Wild geranium (Geranium maculatum)
- Foamflower (Tiarella cordifolia)

Ferns:

- Marginal woodfern (Dryopteris marginalis).
- Cinnamon fern (Osmunda cinnamomea).
- Christmas fern (Polystichum acrostichoides).

Trees:

- Red maple (Acer rubrum)
- River birch, black birch (Betula nigra)
- Redbud (Cercis canadensis)
- Flowering dogwood (Cornus florida)
- White oak (Quercus alba)

Shrubs:

- Sweet pepperbush (Clethra alnifolia)
- Mountain laurel (Kalmia latifolia)
- Rosebay, Great Laurel (Rhododendron maximum)
- Swamp azalea (Rhododendron viscosum)

[F] ORGANIC FERTILIZERS

Bat Dung and Seabird Guano

Guano is a natural fertilizer that can provide both fast and slow release nutrients. It is a versatile fertilizer that can be used either used indoors or out. Read the package instructions for application amounts, as homeowner gardens and lawns require less than would be used if it were other types of manure.

- nitrogen guano for growth,
- phosphorus guano for budding and
- all guano for your plants general health and well being.
- Used it combined with topsoil before laying sod or grass seed and while planting trees and shrubs or add to your growing mix for a supercharged potting soil.
- If you are a hydroponic grower, combine it with water for a natural replacement for chemical solutions

Liquid Seaweed or Liquid Kelp

This is a plant food is that is diluted with water. Liquid seaweed is used to improve growth, increase yields and result in healthier, more productive plants

- Apply it directly to the soil
- Use as a foliar spray for a fast-acting enhancer.
- Research at major universities has shown that seeds soaked in seaweed extract germinate more rapidly, have larger root mass, stronger plant growth and higher survival rate

Also look for the following natural ingredients when purchasing fertilizers:

- sea bird guano, oat bran, sea kelp, bat guano, natural potash, steamed bone meal, rock phosphate, blood meal and feather meal

G COMPOST

Compost is a mixture of decomposing plants and other once-living remains that, in time, become a rich, dark, dirt-like substance, full of nutrients available for soil-borne organisms and living plants. Decomposition occurs naturally. It is what happens in the forest when plants die and leaves disappear into the forest floor.

In the residential yard, the use of compost is a cost-effective way to minimize garbage, keep gardens and houseplants looking their best, and keep unwanted pests away from these living things. Compost enriches soil that helps plants to grow strong and to resist diseases.

Many different materials can be added to a compost pile. Yard materials such as grass clippings, leaves, sticks, woodchips and other plant materials make a great base for compost. Indoor waste can be added to compost as well. Kitchen scraps such as vegetables, and fruits, coffee grinds, tea bags, and eggshells can help create rich compost. Although many of these organic materials should be put into your compost, some organic materials should not. Most animal-based materials should not be added to compost. These include pet droppings, meat, bones, grease, and dairy products. The disposal of these materials into a compost pile could invite unwanted rodents and pose health hazards such as the spread of disease. It is best to throw animal-based materials into a garbage receptacle.

It is important to have a balance of nutrients within a compost pile. Three basic elements are important for the decomposition process - air, water, and heat. In addition to these elements, a balance of nitrogen and carbon within the pile will help the pile decompose quicker, prevent foul odors, and will provide a nutrient-

filled additive for soil. Nitrogen and carbon are found in many of the suggested compost items.

Nitrogen, which is found in green, herbaceous materials such as grass, weeds, and vegetables, is food or 'protein' for microbes within a pile. Nitrogen is also found in other non-green items such as horse manure, vegetables and fruits, coffee and tea. The other important ingredient, carbon, can be thought of as the 'brown stuff' that comprises dead plant materials such as autumn leaves, wood chips, dried plants, hay and straw. This element acts as the energy, or the 'carbohydrates' for microbes. So when adding materials to a pile think of the colors brown and green and you will be on your way to having a balanced pile.

Compost piles can be constructed in many different ways. There are many different types of containers available, including products for both indoor and outdoor use. However, it is not necessary to purchase a compost container; you can construct a simple, inexpensive, sturdy, compost container at home!

Tips for Building a compost container

- Consider the size of your yard, flowerbeds and gardens, the amount of trees on your property, and the type of yard wastes you may put into the compost pile.
- Consider the number of people who live in your home. Think about the types and quantities of items you may put in your pile. Remember to avoid placing meat- based materials in your compost pile.
- The overall design of a compost bin should be rather short and narrow (about three feet wide by three 3 feet tall and as long as you feel necessary for your needs. These dimensions are good because they help retain heat, which helps speed up the decomposition process. If you feel this may be too small, build your compost bin larger but keep in mind that air is important for decomposition too. You want your bin to be narrow enough so that air will reach the pile's center.
- You want your compost pile to feel moist because this, too, helps in the decomposition process. When planning the location of your container, choose a shady area of your yard.

Tips for adding ingredients

- When starting your pile you want to remember three factors: air, moisture and temperature. Start your pile in layers. Try adding coarse materials such as sticks for the base of your pile. This will allow air to get beneath your pile.
- Next, add nitrogen-rich materials such as herbaceous plant leaves, grass clippings, and fruit and vegetable scraps. This will act as a good base for microorganisms to start working. These materials also act as a source of water to your pile, which will help keep it moist.
- On top of this, add some soil. By adding soil, you are speeding up the process of decomposition because you are bringing the microorganisms, which live in soil, into the pile. However, if you decide not to do this, don't worry, microorganisms will find the pile!
- Add leaves, wood chips, and/or sawdust. This will add carbon to your pile, which acts as additional food (energy) for microorganisms. These materials help add air to the soil because of their bulkiness.
- After you have a base, remember to try to keep your compost in balance with these ingredients. This does not necessarily need to be a conscious effort because if you add all of these ingredients at one time or another your pile should stay in balance.

Final Product

The ingredients are fully decomposed when the pile looks like a very dark soil, and feels soft.

Duration

COMPOST PILES WILL DECOMPOSE AT VARIOUS RATES DEPENDING UPON THE SIZE OF THE PILE, THE INGREDIENTS AND THE ENVIRONMENTAL CONDITIONS – AIR, MOISTURE, AND TEMPERATURE. MOST BASIC COMPOST PILES BEGIN TO DECOMPOSE AFTER A FEW WEEKS. PILES BEGIN TO DECOMPOSE QUICKER DURING WARMER MONTHS. COMPOST PILES SHOULD BEGIN TO DECOMPOSE WITHIN A FEW WEEKS IN WARMER AREAS. A COMPOST PILE IN A WARM CLIMATE MAY TAKE ANYWHERE FROM A FEW MONTHS TO HALF OF A YEAR TO DECOMPOSE, WHEREAS PILES IN COOLER CLIMATES TAKE MONTHS TO YEARS TO DECOMPOSE.

Troubleshooting Tips

- If your pile begins to stink, add more carbon-based materials such as leaves and wood chips.
- If your pile is not holding heat, add more nitrogen-based materials such a grass clippings and plant matter.
- If your pile is not getting enough air, you can add aeration tubes with holes drilled down each side and create layers by using twigs and sticks.
- If you notice that your pile does not seem to be decomposing quickly enough, (after you have taken into account weather conditions and compost ingredients) you can try stirring or turning your pile. This helps aerate the pile. Try to do this gently and not too often because you don't want to destroy the decomposing ecosystem within the pile.
- If you live in a cold area, and you notice that your compost pile is not decomposing quickly enough, don't worry. Cold air and freezing temperatures will slow or halt the decomposition process however; it will start up again when temperatures warm.

More information

www.mastercomposter.com/pile/alternat.html

www.epa.gov/epaoswer/non-hw/compost/index.htm

H INTEGRATED PEST MANAGEMENT

The first step to successful pest management is accurate pest identification. If you cannot identify the problem by inspection, have a sample of the damaged plant analyzed for a correct diagnosis of the problem.

Many problems can be avoided by preventative maintenance, including selecting appropriate plants for your site and keeping the soil healthy to establish a proper growing environment. Regular monitoring promotes early detection of any problems, and correct identification of the pest will dictate treatment options.

Integrated Pest Management, or **IPM**, employs non-toxic or the least toxic means available for pest control. Plan your "**IPM**" strategy in this order:

➢ ***Step 1: Physical Controls***

- Plug, patch or caulk holes; these may provide shelter for pests and allow them to proliferate
- Mulch between plants to reduce weed growth
- Hand pick weeds; but make sure you dig out the root, otherwise the weed will reappear
- Corn gluten prevents weeds from reseeding and fertilizes your lawn at the same time
- Hand pick all visible insects and eggs off plant surfaces and soil
- Remove aphids from plants with a strong jet of water
- Knock Japanese beetles off plants into a bucket of soapy water
- Employ physical barriers (such as weed cloth or row covers) to keep pests out
- Spread diatomaceous earth around plants to create a barrier that slugs and other crawling insects cannot cross
- Use electronic pulse gadgets to rid your lawn of animals
- Sticky traps and pheromone traps are useful for attracting and monitoring pests, but not for control of many caterpillar and beetle species

Still needs more deterrent?

➢ ***Step 2: Biological Controls*** **(utilizing beneficial organisms to provide pest control)**

- Use Predatory insects; however, be sure to use the correct organism and release it at the appropriate time for maximum benefit
  - Green lacewings to rid your yard of aphids
  - Lady Beetles will feed on aphid insect eggs and small larvae
  - Aphid Midges also feed on aphids
  - Hempiptera eats thrips, mites, and small larvae
  - Mirid Bugs consume whiteflies
- Bacterial insecticides
  - *Bacillus thuringiensis* (Bt) kills leaf-eating caterpillars

- Beneficial nematodes kill fungus gnats and other soil-dwelling larvae

- Other controls
  - Plant natural insect repellents such as tansy, marigolds and nasturtiums
  - Horticultural oils can be used to control aphids, mealybugs, scales, whiteflies, and spider mites
  - Milky spore controls the damage done by Japanese beetle grubs

Still more?

➢ ***Step 3: Chemical Controls - <u>Your Last Resort</u>***

- Use these least-toxic products, restrict treatment to the problem area and avoid using combination fertilizer-pesticide products that require treatment of the entire lawn.
  - If you think it is time for commercial chemicals, but have not yet tried organic methods, try ORGANIC Fertilizers and Pesticides
  - Least toxic chemical controls include: inorganics (boric acid, insecticidal soap); botanicals (neem, pyrethrum)
  - Be sure to read the entire label carefully and follow directions precisely. To find which product is safest, consult your local nursery.
  - For proper disposal of pesticides call 1-800-CLEANUP.

[I] **<u>ORGANIC PESTICIDES/INSECTICIDES</u>**

Bacillus thuringiensis

B. thuringiensis (known as 'Bt') is an insecticidal bacterium, marketed worldwide for control of many important plant pests - mainly caterpillars of the Lepidoptera (butterflies and moths) but also for control of mosquito larvae. The bacteria produces a large protein that is actually a protoxin that must be activated before it has any effect. It is activated in the conditions commonly found in the mid-gut of lepidopteran larvae. For

this reason, Bt is a highly specific insecticidal agent so it is entirely safe to humans, higher animals and most insects. It is applied to leaves or other environments where the insect larvae feed.[I]

Neem Oil

Neem oil works in the following manners: disrupts hormonal balances which causes death before the next life stage molt, suppresses insects' appetite, which can lead to starvation, and repels in those areas sprayed with the oil.

- Neem oil can be used on both vegetable and fruit and will either kill or repel: aphids, armyworms, bean leaf beetles, bollworms, budworms, codling moths, Colorado potato beetles, corn ear worms, cucumber beetles, cutworms, diamondback moths, European corn borers, grape leaf skeletonizers, hornworms, imported cabbageworms, leafminers, leafrollers, loopers, melonworms, Mexican bean beetles, pickleworms, pinworms, squash bugs, tent caterpillars, thrips, tomato fruitworms, twig girdlers, vine borers, weevils
- Use on the following crops: almonds, anise, apples, apricots, artichokes, asparagus, basil, beans, beets, bok choy, broccoli, brussels sprouts, cabbage, cantaloupes, carrots, cashews, cauliflower, celery, cherries, chives, collard greens, collards, corn, cucumbers, dill, eggplants, figs, garlic, ginger, kale, kohlrabi, lemons, nuts, marjoram, melons, mint, mustard greens, mustard, onions, oranges, parsley, peaches, peanuts, pears, peas, pecans, peppers, pistachios, plums, potatoes, pumpkins, radishes, rosemary, rutabaga, sage, spinach, squash, sweet bay, sweet potatoes, tarragon, thyme, tomatoes, turnip greens, turnips, walnuts and wintergreen, to prevent whiteflies

Highly refined mineral oil

"Controls adelgids, aphids, lace bugs, leafhoppers, leafminers (larvae), mealybugs, mites, plant bugs, psyllids, sawfly larvae, scales, thrips, whitefly and eggs of aphids, mites and certain caterpillars on landscape trees, plants, shrubs and flowering plants, houseplants, vegetables, fruit and nut trees, and home greenhouse plants. Effective and safe for indoor and outdoor summer use."[I]

Insecticidal soap

Made from plant oils, insecticidal soap is a contact insecticide that has no residual activity. The soap is broken down by light easily and works by

disrupting the waxy outer skin of soft-bodied insects (this cause dehydration followed by death).

Milky Spore Bacteria

For an overabundance of Japanese beetles and Grubs: use milky spore. The grubs are susceptible to milky disease which kills it after causing their normally clear blood to become milky in appearance. Milky disease bacteria do not infect nor harm other insects, earthworms, birds, warm-blooded animals, humans, or plants.

J **MAKE YOUR OWN!**

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We try very hard to make sure that all recipes are 100% accurate but typos and other errors may occur, therefore, you use the recipes and information provided within this site **at your own risk**, we bear no responsibility for the results of possible errors.

When following a recipe, always try it on a small area first to test for colorfastness and material durability. Always wear gloves! We tried to provide you with safer alternatives than traditional products, however, some individuals may suffer from allergies or sensitivities, so please exercise personal care when making or using items listed.

Insecticides/ Pesticides

- ***(source: http://mama.essortment.com/homemadeinsecti_rvxg.htm:***

    - Combine one teaspoon of hot pepper or Tabasco sauce, 4 cloves of garlic and a quart of water. Blend well in a blender and strain, with cheesecloth

or nylon mesh before placing in your sprayer. This will repel many insects including whiteflies, aphids, spider mites and caterpillars.

- Mix 1/8-1/4 cup of hydrated lime with one quart of water. This creates an effective spray against many insects, especially spider mites. Add a drop of non-detergent soap to act as a sticking agent and insecticide. Lime can cause serious harm to plants if you use too much, so always spray a test plant first and watch it for a few days, to check for any adverse effects on plants.
- Take one ounce of tomato leaves and add to one quart of water and blend thoroughly. Strain the resulting liquid and use to repel insects. This works well on white cabbage butterflies too.
- Take a copious amount (as many as you can collect) of the insect you wish to repel and grind their corpses up into a powder. Mix the resulting powder with one quart of water and, spray as a repellent for the insect that you ground up for the powder.