Chemical Fertilizers versus Organic Methods

Many people who follow organic lawn and garden care principles whereby they use soil amendments to increase the nutrients in their soil do not feel the need to apply fertilizers. If you plan to use fertilizers on your lawn or garden, then you should be aware of the effects different fertilizers have on the life in your soil and on the environment.

Many people are confused about all the words used to describe the various fertilizers found on the market. The term **organic** is used in many different contexts, leaving consumers wondering as to its exact meaning.

Helpful Definitions

1. **Certified Organic –** when buying vegetables, a sign reading **Certified Organic** means the produce was grown on land that's been chemical free (no synthetic pesticide poisons and no chemical fertilizers) for 5 years
2. **Organic soil material** – includes plant and animal material in a process of decay; supplies nitrogen, potassium and phosphorus plus trace minerals
3. **Organic** – in accordance with industry guidelines for commercial products, it may mean simply that it contains **carbon**
4. **Natural** – refers to anything of plant, animal or mineral origin
5. **Synthetic** – refers to manufactured compounds, usually by-products of industrial processes or mined minerals, and processed chemicals such as euphoric acid
6. **10-15-10** – the three part number refers to the percentage content in fertilizers of **nitrogen (N), phosphorus (P) and potassium (K). Nitrogen** promotes vegetative growth**, phosphorus** is needed for strong roots and flowers and **potassium** is needed for overall growth.

Organic Fertilizers

Organic fertilizers come from plant and animal sources, or from rock powders. These include bone meal, dehydrated manure, cottonseed meal, kelp meal, alfalfa meal, fish products and granite dust. When buying organic fertilizers, check the bag to make sure that the products are derived from plant, animal or rock powders.

- organic fertilizers are ecologically and environmentally safe, as there are no toxins nor pollution
- nutrients are released gradually by microbial activity which provides for a continuous supply of nutrients and trace minerals
- whereas chemical fertilizers use only 3 basic elements: nitrogen, phosphorus and potassium (N-P-K), some organic fertilizers contain as many as 100 trace minerals, which will eventually rebuild the soil mineral base; trace minerals are needed by plants for optimum growth; they provide a constant flow of amino acids and fatty acids where needed; they restore the depleted vitamin and mineral content of the soil
- the evaporation of nutrients is eliminated
- leaching of nitrates into groundwater and bodies of water is non-existent
- organic fertilizers do not use salt as a carrier, so there is no salt damage to soil
- they provide the necessary soil microorganism which assist with the manufacture of organic matter and nitrogen fixation products that are very important to plant production and health
- they help restore dead and unproductive soil

Finished compost is an excellent soil amendment that adds macronutrients to your soil as well as trace nutrients. If your soil is compacted, make sure that you aerate before topdressing with compost.

Combine 2 or 3 of the following for your lawn to get the ideal mix of macro and trace nutrients, organic matter and plant hormones.

- **blood meal** - nitrogen 10-0-0
- **bone meal -** phosphorus, potassium, calcium
- **kelp meal -** nitrogen, phosphorus, potassium, trace minerals, plant growth hormones
- **fish emulsion -** nitrogen, phosphorus, potassium
- **greensand -** potassium, 32 trace minerals
- **rock phosphate -** phosphorus, calcium, 11 trace minerals
- **soybean meal -** nitrogen
- **wood ashes -** potassium
- **eggshells -** calcium
- **dolomitic calcium -** calcium, magnesium

Chemical Fertilizers

It is practically impossible to use chemical fertilizers without damaging the environment. Many chemical fertilizers are either mineral salts or are synthetically derived from coal or petroleum products.

In North America today, soil is eroded **seven times faster** than it is built up naturally (Soil Conservation Service, USA). Today farmers are using the soil as a medium to hold plants so they can be chemically fertilized. This has had disastrous results on the environment as farmers around the world are suffering from the **worst soil erosion** in history. The repeated application of chemical fertilizers kills the essential microbes that are so necessary for a healthy, living soil. Since the plants are no longer able to get nutrients from the dead soil they become dependent on chemical fertilizers for their survival. More energy from fossil fuels is now used to produce chemical fertilizers, which are very harmful to our environment, than to till, cultivate and harvest our farming crops.

Some chemical fertilizers are called slow- release, or synthetic organic. You can usually tell if a fertilizer has slow-release nitrogen because the label will specify **W.I.N. (water-insoluble nitrogen)**. If you can't get an organic fertilizer, this is next best.

- chemical fertilizers need water for their nutrients to be released; this means that nitrogen, phosphorus, and potassium are leached into bodies of water, contaminating them and negatively affecting aquatic life in the lakes
- chemical fertilizers release their nutrients too quickly on grass, promoting excessive top growth before the roots can catch up, thus weakening the grass and requiring frequent cuttings of the lawn
- the salt can easily burn plants; if not watered soon, the salt literally sucks the moisture from grass plants
- chemical fertilizers do not produce basic soil health but weaken soil structure
- plants growing in highly chemicalized soil do not have a natural resistance to disease
- chemical fertilizers kill **earthworms**
- **earthworms aerate** the soil creating good drainage for water, and they expel castings high in time-release nitrogen, phosphorus, potassium, as well as minerals and micronutrients, (free fertilizer)
- earthworms which thrive on organic matter make plants drought, disease, and pest resistant
- if your plants are covered in pests you don't need pesticides (pesticides and chemical fertilizers kill earthworms), you need **more earthworms!**
- the destruction of beneficial microorganisms by chemical fertilizers results in the loss of the soil's ability to retain water and the soil begins to harden and crack
- chemical fertilizers do not put **minerals** into the soil, so crops then contain very few minerals and consumers suffer the consequences
- strong dressings of lime will eat up **humus** which is needed to promote the growth of **funguses** which dissolve and carry minerals to the plant roots
- the **humus** (the organic part of soil formed by the partial decomposition of vegetable and animal matter) is also needed to promote the growth of molds which produce antibiotics which **repel insects**

If you totally rely on chemical fertilizers and synthetic pesticide poisons, it won't be long before you will have a lawn and garden that is literally a toxic waste dump containing dead soil that has no nutrients left to give your lawn and garden. Your lawn and garden now become completely dependent on your spending your hard-earned money on fertilizers and pesticides for their survival.

Eutrophication (Artificial)

This occurs when a body of water becomes so rich in nutrients such as **phosphorus** and **nitrogen** from runoff and sewage water that the natural wildlife is unable to survive.

The **phosphorus** in a lawn fertilizer will make your grass grow; however, this same **phosphorus** has disastrous results when it ends up in a lake. Large concentrations of **phosphorus** cause a population explosion of photosynthetic **blue-green bacteria** and **algae.** Mats of the algae become so thick that those at the top shade the algae at the bottom which will die from lack of sunlight. The **dead algae and bacteria** become food for other bacteria. As these bacteria increase they use more and more of the dissolved **oxygen** in the water. As the **oxygen** in the water becomes depleted the algae, bacteria and fish die. Since fish need more oxygen than bacteria, more of the fish will die than bacteria.

Plants cannot use the **nitrogen** from the atmosphere. However, bacteria in the soil can fix **nitrogen** by combining it with hydrogen to form **nitrates. Chemical fertilizers** provide **nitrogen** to plants in the form of **nitrates.** Unfortunately, much of the **nitrates** is lost through run-off and by leaching into and through the subsoil into the groundwater. **Nitrates** can be toxic to humans and other organisms. Combined with some common pesticides **nitrates** can be **carcinogens.**

As recently as April 3, 2003 it was reported in the Journal Pioneer in Charlottetown that Researchers found the Wilmot River, site of two fish kills last year that claimed thousands of trout, had **nitrate** levels very close to the legal limit of 10 mg per litre. Levels beyond that are considered unsafe to humans. Fish are vulnerable to **nitrates** as low as 2.3 mg per litre. The Wilmot River meanders through farmland where large quantities of chemical fertilizers (the source of **nitrates**) are used.

The Health of Lake Simcoe

According to the Lake Simcoe Conservation Authority (http://www.lsrca.on.ca/), an average equivalent of ten dump trucks of **phosphorus** enters Lake Simcoe every year. An abundance of cold-water fish such as **lake trout**, **herring** and **whitefish** is an excellent indicator of water quality and overall ecosystem health. These fish are referred to as cold-water fish as they require relatively cold and well-oxygenated water. Such conditions have traditionally existed at the bottom of lake Simcoe. Current levels of **phosphorus** entering Lake Simcoe are 3 times the level of the **phosphorus** that would naturally exist. This excess of **phosphorus** has resulted in **eutrophication** whereby the excessive growth of algae and bacteria has killed off cold-water fish like trout. These conditions get worse in the summer months when coldwater fish swim down deep to escape the warmer water on the surface. Without the available oxygen, the fish become sluggish and die.

There was a dramatic decline in the abundance of lake trout in the winter fishery in the 1960's. The failure to reproduce has been linked to the deteriorating water quality associated with eutrophication (artificial). The Ministry of Natural Resources increased their stocking of lake trout in the 1970's resulting in an increase in lake trout after 1975. However, the trout reproduction in Lake Simcoe has not been re-established.

Many of the rivers in southwestern Ontario (the Thames, Grand, Don and Humber) have total phosphorus concentrations that exceed the Ontario's provincial water quality objective for rivers of 0.03mg/L and are considered eutrophic (Basu & Pick, 1996 D. Boyd, Ontario Ministry of the Environment).

There is some good news! Through the Remedial Action plan established by Environment Canada, Collingwood Harbour, previously considered nutrient impaired, is now considered restored. (Environment Canada, 1999c)

Average Annual Deposits of Phosphorus in Lake Simcoe

- **sewage treatment plants - 6%**
- **urban storm water runoff - 25%**
- **soil erosion from crops, stream banks, shorelines and drainage from Holland River - 24%**
- **runoff from manure piles/livestock access to streams - 15%**
- **faulty septic systems - 2%**
- **natural inputs - 28%**

Reducing the loadings entering Lake Simcoe is one of the main objectives of the Lake Simcoe Environmental Management Strategy (LSEMS).

Since eutrophication has been a serious and ongoing problem in Lake Simcoe, it is especially important that residents in Barrie and the surrounding area refrain from using chemical fertilizers which will further contaminate and damage the long-term health of our lake for future generations.

References:

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Lake Simcoe Conservation Authority, 120 Bayview Parkway, Box 282, Newmarket, Ontario L3Y 4X1, http://www.lsrca.on.ca

Organic Landscape Alliance, www.organiclandscape.org