

Fertilizer: The Basics

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By definition, a fertilizer is "any organic or inorganic material of natural or synthetic origin which is added to a soil to supply elements essential to the growth of plants." (Brady, Soils, 1974)

What exactly does that mean? Organic means something that is or was alive. Animal manures were once living plants. Bonemeal, a by-product of slaughter houses, is composed of ground- up bones of animals. Inorganic means from non-living sources. Rock phosphate, a common source of phosphorus, comes from rocks, a non-living material. The term natural describes the manure, the bonemeal, and the rock phosphate. All are naturally occurring. The term synthetic describes such products as nitrogen fertilizer manufactured by combining natural gas with nitrogen from the air.

Bonemeal, rock phosphate, manure, or manufactured nitrogen fertilizer may be added to soil to supply elements essential to the growth of plants. As long as these elements are supplied in adequate amounts it makes little difference to the plant if they are organic, inorganic, natural or synthetic. Inorganic fertilizer, however, is immediately available to plants, whereas organic fertilizer must be converted by micro-organisms in the soil to an inorganic form before it can be used by the plants.

The Numbers on the Bag

On a fertilizer bag, you will find three or four numbers with hyphens separating them. The numbers indicate, in order, the percentage of **nitrogen (N)**, **phosphorus (P)**, **potassium or potash (K)**, and **sulfur (S)** - the letters in parentheses are the chemical symbols for the elements. Here are some common fertilizers and the proportion of the elements they contain.

Percentage of N P K S

Fertilizer	N	P	K	S
11-48-0	11%	48%	0%	0%
16-20-0-14	16%	20%	0%	14%
34-0-0	34%	0%	0%	0%

A "complete" fertilizer contains nitrogen, phosphorus, and potash. If one of these three elements is missing, the fertilizer is not "complete."

Beside the major nutrients (N, P, K, S) there are also "micro-nutrients," or trace elements, which are needed by plants in very, very small amounts. But if these are missing, the plants will not be able to complete their life cycle. Among these micro-nutrients are iron, zinc copper, calcium, manganese, and magnesium. Complete house-plant fertilizers usually contain the major nutrients as well as the micro-nutrients. Read the label prior to purchase to ensure this.

Nitrogen

Nitrogen is needed for the green, leafy, vegetative growth of plants. When an element is lacking, the plant will show deficiency symptoms. Deficiency symptoms for nitrogen include an overall pale yellow color of the leaves, and plants that are dwarfed or stunted. Nitrogen is mobile in the plant; that is, it moves from the older growth to the newer growth, where it is most needed. Therefore deficiency signs will appear first in older leaves.

Nitrogen moves easily through the soil in the soil water. For this reason it is said to be very "mobile." It is easily "leached" or washed downward by rain or irrigation water. If it is washed below the root zone of the plants, it will not be available for plant use. Therefore, it is the fertilizer element most often lacking and most often needing replacement.

Because of complex bacterial interaction, nitrogen is usually not "available" for plant use until the soil has warmed up in the spring and the soil temperature has reached 59° F. This is why plants may appear yellow and stunted in early spring when the soil is still cold, even if nitrogen fertilizer has been applied. As soon as the soil warms up, they will appear green and vigorous.

Too much nitrogen or a nitrogen imbalance can delay flowering, fruiting and seed set. The resultant growth is soft and succulent and may be more vulnerable to fungal and bacterial infection. As well, nitrogen can desiccate or "burn" the roots of plants if placed too close to seeds, seedlings or newly planted plants.

Phosphorus

Phosphorus is said to promote root growth, root branching, stem growth, flowering, fruiting, seed formation, and maturation. When phosphorus is lacking, stems and foliage often have a red or purplish tinge. This is particularly noticeable on tomatoes and corn. Deficiency signs are seen in new growth first.

Phosphorus is very stable and non-mobile within the soil, so it is not easily leached by soil water. When used moderately, it may be placed fairly close to seeds and seedlings and will not "burn" or desiccate them.

Potash or Potassium

Potassium enables the plant to more readily withstand "stress" such as drought, cold, heat and disease. (In a lawn such "stress" may be in the form of human and pet traffic.) It also stimulates flower color and promotes tuber formation and a strong root system.

When potassium is lacking, leaves appear dry and scorched on the edges and have irregular yellowing. This is seen on older leaves first.

Potassium is usually readily available in Saskatchewan soils and therefore seldom needed as a fertilizer application. But sandy garden soils may show deficiencies. Corn deficient in potassium may be susceptible to fusarium infections.

Sulfur

Sulfur is essential to plant growth and metabolism. It contributes to the unique taste and flavor of cabbage, broccoli, Brussels sprouts, cauliflower, and other members of the mustard family.

Plants that do not have enough sulfur are stunted, thin- stemmed and spindly. The younger leaves are light green or yellow. Fruit and seed maturity may be delayed when sulfur is lacking.

Various forms of sulfur may be added to basic soils to acidify them (or lower the pH).



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