Periodic Graphics

A collaboration between C&EN and Andy Brunning, author of the popular graphics blog *Compound Interest*

THE ELEMENTS OF FERTILIZERS

What elements do plants need so they can grow and bloom? How do fertilizers deliver them? This graphic inspects your garden’s fertilizer.

**ESSENTIAL ELEMENTS FOR PLANTS**

**ELEMENT SOURCES**

AIR, SOIL, WATER

SOIL, FERTILIZER

**ELEMENT**

C H O

N P K

Ca Mg S

**COMMON FORMS**

Fertilizers contain mostly nitrogen, phosphorus, and potassium. What a fertilizer is used for dictates its ratio of N, P, and K. Inorganic fertilizers are manufactured or obtained from mineral deposits and are often highly concentrated. Organic fertilizers are derived from plant or animal sources and release nutrients slowly.

**FOR PLANT GROWTH**

Example ratio: **N** 16, **P** 6, **K** 4

Nitrogen helps plants grow. It’s important for making amino acids, proteins, and the chlorophyll a plant uses to carry out photosynthesis. Sulfur can also be added to fertilizers to help plants grow.

**FOR FRUITS AND BLOOMS**

Example ratio: **N** 3, **P** 20, **K** 20

Phosphorus encourages plant flowering and fruiting. It also strengthens plant roots and stems. Potassium regulates water and nutrient movement and protects plants from disease.

**OTHER KEY ELEMENTS**

**Fe**²⁺ More acidic

Fe**³⁺** Less acidic

Well absorbed

Poorly absorbed

Acidic soils have better nutrient availability. Iron, needed to make chlorophyll, is more readily absorbed by plants in acidic soils.

**B** Boron is important for flowering, and calcium stops fruit from falling off stems before it’s ripe.

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