

SOIL NUTRIENTS

Nutrients reach the soil in many different ways: from decomposed animal waste and dead plants, the atmosphere, weathering of rocks, and bacteria conversions.

To complete their life cycle, plants need **ESSENTIAL NUTRIENTS**, each in **VARYING DEGREES**.

- **CARBON, OXYGEN** and **HYDROGEN** are essential to plant growth and are supplied by **AIR** and **WATER**.
- The other essential elements are referred to as **MINERAL NUTRIENTS** and enter plants almost exclusively through the roots. These nutrients are divided into two groups.
 - **MACRONUTRIENTS** (primary/secondary nutrients) are required by plants in **LARGER** amounts and include nitrogen, phosphorus, potassium, calcium, magnesium and sulfur.
 - **MICRONUTRIENTS** (trace elements) are **TINY** amounts of nutrients that include iron, chlorine, manganese, boron, zinc, copper, and molybdenum.
- **ALL MACRO/MICRO** nutrients are critical to normal plant growth and development; they are simply needed in **DIFFERENT AMOUNTS**.
- **IF** growing conditions are **GOOD**, a plant will absorb nutrients from the soil.
- **IF** a plant experiences extremes in temperature, incorrect light levels, or water-logged or compacted soil, it will have a **LIMITED ABILITY** to absorb nutrients

Relative amounts (out of 100) of the essential nutrients required by most plants:

Primary Nutrients	Amount
Carbon (C)	45
Oxygen (O)	45
Hydrogen (H)	6
Nitrogen (N)	1.5
Potassium (K)	1
Phosphorus (P)	0.2
Secondary Nutrients	Amount
Calcium (Ca)	0.5
Magnesium (Mg)	0.2
Sulfur (S)	0.1
Micronutrients	Amount
Iron (Fe)	0.01
Chlorine	0.01
Manganese (Mn)	0.005
Boron (B)	0.002
Zinc (Zn)	0.002
Copper (Cu)	0.0006
Molybdenum (Mo)	0.0001
Amounts unknown for Nickel (N) and Cobalt (Co)	

References

North Carolina State Extension. North Carolina State Extension Gardener Handbook. Soils & Plant Nutrients, <https://content.ces.ncsu.edu/extension-gardener-handbook/1-soils-and-plant-nutrients>

