

Macronutrient Deficiencies

Nutrient	Role in Plant	Plant Available Forms of the Nutrient	Deficiency Symptoms
Nitrogen	Necessary component in ALL proteins. Needed to make chlorophyll molecules that carry out photosynthesis in the plant	Ammonium (NH_4^+) Nitrate (NO_3^-)	General Chlorosis of older leaves Stunted Growth Low protein content of foliage or seeds
Phosphorus	"The root & fruit nutrient". Root development, tillering & seed production. It is needed in virtually all plant parts because it helps drive chemical reactions in the plant. Phosphorus helps drive maturity.	Orthophosphate (H_2PO_4^-) or ($\text{HPO}_4^{=}$)	It is difficult to diagnose because abnormalities don't show up until the deficiency is severe. Severe deficiency can result in purple leaf color, mild cases may actually darken the green leaf color due to a surplus of N. Slow growth and delayed maturity, Poor tillering and low seed yields
Potassium	Acts as a regulator of osmotic water flow from one part of the plant to another. Works as an enzyme activator in many cell reactions. It is especially important in activating enzymes responsible for forming carbohydrates in tubers and seeds	K^+ cation	Potassium is very mobile in the plant so deficiencies appear on old growth first. General chlorosis intensifying to scorched edges and interveinal areas of the older leaves poor stem strength which may lead to lodging and low bushel weight of cereals due to shriveled seeds
Sulfur	It is a component of the two amino acids that make up plant proteins. Legumes have high levels of sulfur containing proteins. Sulfur is needed to produce oils in canola and other oilseed crops	Sulphate ($\text{SO}_4^{=}$)	Deficiency symptoms usually begin in new growth because sulfur is not easily translocated in the plant. General chlorosis of leaves, stunted growth and low seed yields. Sulfur deficiency in canola may also cause low oil content in seeds and produce deformed cup shaped leaves that take on a reddish-bronze coloring.