POSSIBLE CAUSES FOR PLANT NUTRIENT LEVELS ABOVE OR BELOW THE SUFFICIENCY LEVEL

	Above Sufficiency Level	Below Sufficiency Level
NITROGEN (N)	1) Excessive application of nitrogen fertilization 2) High rate of nitrification at the time 3) Shortage of other elements	1) Inadequate nitrogen fertilization 2) Low nitrification rate or perhaps denitrification 3) Low soil phosphorus level
PHOSPHORUS (P)	1) High soil phosphorus 2) Excessive application of phosphate fertilizers 3) High soil pH (7.5)	1) Low soil phosphorus level or inadequate phosphorus fertilization 2) Wet soils 3) Low soil pH (5.5) 4) Low organic activity in soil
POTASSIUM (K)	1) High soil potassium level or excessive application of potassium fertilizers	1) Low soil potassium level or inadequate potassium fertilization for crop needs
SULFUR (S)	1) Excessive available soil sulfate level from natural or applied sources	1) Low available soil sulfate level 2) Excessive available nitrogen in low organic matter soils 3) Inadequate sulfate fertilization or excessive leaching of sulfates 4) Low organic activity in soil
MAGNESIUM (Mg)	1) Diseased or dead tissue 2) Poor K availability 3) Old plant tissue in sample	1) Low soil magnesium level (can be due to low soil pH, continuous use of high calcium lime on low magnesium soils, or naturally calcareous soils low in Mg) 2) High soil nitrogen availability 3) Low calcium availability
CALCIUM (Ca)	1) Diseased or dead tissue 2) Old plant tissue sample	1) Low soil calcium level (can be due to low soil pH or highly leached, low exchange capacity soils) 2) Low soil potassium levels in plant tissue 3) High soil nitrogen availability

	Above Sufficiency Level	Below Sufficiency Level
IRON (Fe)	1) Reduced soil conditions from very wet or flooded soils 2) Zinc deficiency 3) Soil or dust contamination	1) High soil pH 2) Excessive zinc, phosphate, copper or manganese availability
MANGANESE (Ma)	1) High nitrogen or phosphorus applications on acid, low organic soil 2) Low soil pH 3) Soil or dust contamination 4) Contamination from certain fungicide sprays	1) Low soil manganese content 2) Low natural soil manganese content 3) Low availability due to high soil pH (7.0 or above), high soil moisture and very low organic matter content
BORON (B)	1) Excessive or improper boron fertilization	1) Low soil availability (can be caused by high soil pH or high leached sandy soils, or low organic matter soils)
COPPER (Cu)	1) High soil copper content (may be caused by previous year's pesticide sprays or dust now contained in soil)	1) Low soil availability (associated with high soil pH, high organic matter content, high concentrations of iron and manganese, and highly leached soils)
ZINC (Zn)	1) High soil pH 2) Contamination from brass	1) Low soil content 2) Low soil availability (due to leached soils, soil pH, high phosphorus, areas with low organic matter content or certain muck soils)
MOLYBDENUM (Mo)	1) High soil pH 2) Potassium deficiency in some cases	1) Low soil pH (5.5) 2) High phosphate levels
SODIUM (Na)	1) High sodium content in soils	1) Seldom, if ever, deficient except possibly for sugar beets or spinach
ALUMINUM (Al)	1) Low soil pH 2) Reduced conditions associated with wet or flooded soils 3) Soil or dust contamination	1) Cannot be deficient (not an essential element)