

Macro & Micro Nutrient Deficiencies

Plants & Animals

NUTRIENT	FUNCTION	SYMPTOMS OF DEFICIENCY	SUSCEPTIBLE SPECIES
Nitrogen (N)	Nitrogen is the most critical nutrient for optimum farm production. Since it is readily leached from the soil, its level in soil is typically low, however the levels required for optimum crop growth are quite high and thus generous application is typically required. Nitrogen reduces all aspects of crop and pasture production e.g. growth, yield and quality.	Plants which have Nitrogen for only limited growth, may exhibit chlorosis especially in the older leaves. In severe cases, the leaves first yellow and then tan as they die. Some plants (tomatoes, maize) may exhibit a purplish colouration of the stems, petioles and on the underside of their leaves	All Plants.
Phosphorous (P)	Phosphorous is an essential element for cell division and growth. It is required for photosynthesis, sugar and starch production, energy transfer and the movement of carbohydrates within the plant and reproduction.	Plants exhibit stunted growth and leaves are often dark green in colour. Oldest leaves become dark brown as they die. Maturity may be delayed.	All Plants.
Potassium (K)	Potassium is an essential element for protein, carbohydrate and fat synthesis and is required for the proper functioning of chlorophyll and other enzymes involved in photosynthesis, respiration and protein formation. It is essential for cell division, cell electrolyte balance and for the functioning of plant stomates.	Crops suffering this deficiency appear scorched around the edges and surfaces are irregularly chlorotic. In legumes, the chlorotic spots form patterns around the leaf edges. Cereal grains develop weak stalks and their roots may become more prone to infection by root rotting organisms. These two factors may result in collapse of the crop by wind or rain.	
Iron (Fe)	Iron is an essential element required for the synthesis of chlorophyll. It is involved in the activation of many enzymes used in photosynthesis and respiration. In animals, iron is a key constituent of haemoglobin, the species that carries oxygen in the blood. Iron is relatively immobile and is generally in short supply in alkaline soils.	Young leaves develop chlorosis in the interveinal areas which may develop into white leaves with necrotic spots. Stunted growth. In animals, iron deficiency results in anaemia, wasting and eventual death.	Roses, shrubs, fruit trees, maize, sorghum, peas, tomatoes and cereals.
Sulphur (S)			

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Manganese (Mn)	<p>Manganese is an essential nutrient for the growth of both plants and animals. In plants it enhances root growth, disease resistance and the development of fruit. It is required for the synthesis of chlorophyll and assimilation of nitrate. It is involved in the activation of many enzymes involved in photosynthesis and respiration.</p> <p>In animals, manganese is essential for growth, reproduction, skeletal growth and carbohydrate metabolism.</p>	<p>Symptoms vary with species; in cereals – grey – white spots, flecks and stripes may appear in the interveinal areas. In legumes, interveinal chlorosis of young and middle aged leaves and tissue may rapidly become necrotic. Seed disorders e.g. “split seed” or “marsh spot” may develop.</p> <p>In animals, deficiency may result in malformed bones with enlarged joints and may affect the reproductive cycle e.g. fertility.</p>	Beans, Lettuce, Oats, Onion, Peas, Potatoes, Radish, Sorghum, Spinach and Wheat.
Boron (B)	<p>Boron is an essential element in plant nutrition. It is essential for root tip, pollen tube and shoot growth and the synthesis of DNA and RNA.</p>	<p>Leaf blades may be distorted and stems may become brittle and crack e.g. “stem crack” in celery. Shorter intermodal length, retarded growth or necrosis of the terminal buds and youngest leaves. Reduction or failure to seed and fruit. Malformation of fruit.</p>	Lucerne, Clovers, Citrus and Vegetables (especially tubers).
Zinc (Zn)	<p>Zinc is an essential nutrient required for the functioning of a large number of enzymes involved in the growth and reproduction of both plants and animals. It is required for the synthesis and functioning of chlorophyll, is involved in the plant hormone system and as a catalyst for the plant growth regulator, auxin.</p>	<p>In plants, shortened internodes with excessive branching (resetting) of small, dark green deformed leaves. In cereals and grasses – chlorotic bands (yellow, red) may appear either across or within the veins. Stunted growth and necrosis of older leaves.</p> <p>In animals, crusty growths, cracking of skin and loss of hair.</p>	Barley, Onions, Beans, Maize, Sorghum and Citrus Fruit.
Copper (Cu)	<p>Copper is an essential nutrient required for the functioning of a large number of enzymes involved in the growth and reproduction of both plants and animals. It is required for the synthesis and functioning of chlorophyll, is involved in the plant hormone system and acts as a catalyst for the plant growth regulator, auxin.</p>	<p>Young leaves become dark green, twisted and deformed. Necrotic spots may appear. In grains and grasses, seed production is reduced and seed heads may be white and empty.</p> <p>Deficiency in animals may include reduced milk production, infertility, skeletal defects and bone fragility, anaemia, cardiovascular diseases in cattle, rough coats or hair abnormalities e.g. “steely wool” in sheep, “swayback” in lambs and “ill-thrift” in cattle.</p>	<p>Small grains, Maize, Vegetables, Sorghum, Fruit Trees, Ornamentals, Wheat, Carrots and Onions.</p> <p>Sheep, Lambs, Cattle and Dairy.</p>
Molybdenum (Mo)	<p>Molybdenum is an essential element for both plants and animals. In plants, Molybdenum is required for protein synthesis. It enhances both photosynthesis in plants and nitrogen fixation in legumes. In animals, Molybdenum is a constituent of several important enzymes, and plays a role in animal fertility, the estrus cycle, and mammary anti-carcinogenesis.</p>	<p>In plants, reduced and irregular leaf blade formation, interveinal mottling and chlorosis around the edges of older leaves. Necrotic spots at leaf tips and edges, smaller root nodules coloured white or green (not pink), growth inhibition in legumes.</p> <p>Lower reproduction rates in animals.</p>	Oats, Legumes, Radish, Sorghum, Wheat, Onion, Lettuce, Cauliflower and Broccoli.

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Cobalt (Co)	Cobalt is a key constituent of Vitamin B12 and Propionate (the major source of energy in ruminants). Cobalt enhances the nitrogen fixing ability of legumes and improves the efficiency of ruminal digestion.	<p>Small root nodules on legume species. Uniformly pale green – yellow leaves, most severe on old leaves. Some crops may develop red leaves, stems or petioles. Stunted growth – tops may be less leafy. Grain or seed production may be retarded.</p> <p>In animals, loss of appetite, body weight, (emaciation), anaemia, poor growth of heifers, weeping eyes, decreased milk production and white liver disease and salt stick.</p>	Clover, Lucerne and other Legumes.
Selenium (Se)	Selenium is an essential nutrient for animals, but not plants. It is involved in the production of antibodies and in the elimination of unwanted microorganisms and thus plays an important role in disease resistance. It prevents white muscle disease in livestock, exudative diathesis in poultry and liver necrosis in pigs.	White muscle disease, ill-thrift, stiff lamb disease, infertility and embryonic mortality.	Lambs, Calves, Poultry and Pigs.
Calcium (Ca)			
Magnesium (Mg)	Magnesium is an essential nutrient for the synthesis of chlorophyll. It is involved with the functioning of several enzymes associated with photosynthesis, respiration and reproduction.	Interveinal chlorosis of older leaves.	