CALCIUM

Actually this nutrient is used by the plant in larger quantities than any other of the above four major nutrients (with perhaps the exception of nitrogen). Calcium occurs in the structure of leaves and roots, and in actively growing stems and root tips. It is not very mobile in the calcium because of its great abundance in most soils.

Fertilises: Slaked lime
Agricultural limestone
Dolamite
Gypsum

FOOTNOTE: Sulphur is sometimes included in the list of major nutrients. It is only needed in small quantities by plants. Sulphur is not really a major nutrient.

If large quantities of sulphur are fed to a plant, the excess sulphur might be taken into the planter at least tolerated by the plant.

The Minor Elements

Many of these are just as essential as the major elements but are not required in as large quantities. A deficiency of a minor element can have just as devastating results as a deficiency of a major one.

IRON

Iron is essential for chlorophyll formation and root respiration. A lack of the small required amount of iron will cause plant growth to cease. Iron deficiencies are more common than any other minor nutrient problem. Plants that commonly suffer iron deficiencies include Banksias, Proteas, Grevilleas, Citrus, Azaleas, Daphne etc. Iron can be fed to a plant by applying Iron Chelate, Iron Sulphate or even some old rusty nails.

Iron is the only minor element that commonly causes problems in horticulture. Other minor element problems occur, but rarely.

DEFICIENCIES AND TOXICITIES

Problems are far more common with nitrogen than any other nutrient. Iron deficiency is also common, but only on certain plants (e.g.: Proteaceae plants). Potassium and phosphorus deficiencies are the next most common. Calcium and magnesium are usually only problems in hydroponics.

Most minor element problems are relatively rare. Here is a guide to where different nutrient problems are most likely to occur:

Nitrogen – deficiencies and toxicities occur in all soils.
Potassium – problems are more common on acid or sandy soils.
Phosphorus – Toxicities are more common with Australian native plants (particularly Grevilleas, Banksias, Hakeas, Telopeas and other Proteaceae plants).
Calcium – toxicity is associated with over-liming.
Magnesium – deficiency is normally only on sandy soils.
Iron – deficiency is more common with container plants, or in sandy soils.

INDICATORS OF DEFICIENCY AND TOXICITY

ELEMENT	DEFICIENCY	TOXICITY
Nitrogen	Yellow between veins of old leaves (may gradually spread to newer leaves), top and root growth reduced, young shoots thin and short.	Burning of leaves and tips, low ratio of root to top growth, susceptible to wilt.
Phosphorus	Leaf colour not as likely to change, sometimes autumn tints. In older leaf, growth reduced, absence of flower, short and narrow stalks.	Can inhibit iron availability.
Potassium	Leaf edges go pale, then scorch. Leaf tips burn first usually, stalks sometimes slender.	Can cause boron deficiency.
Magnesium	Growth can reduce, older leaves yellow at margins.	Rolling and curling of leaves, and eventual death of tips.
Calcium	Tips and young leaves twist and die. Back, root and top growth greatly reduced.	Excess calcium will take up of potassium, magnesium and some minor elements.
Iron	Young (and maybe all) leaves yellow between veins, stalks shorten, overall growth reduced.	Inhibits uptake of manganese and maybe phosphorus.

PLANT HEALTH

Plant Pathology is the area of botanical science that is concerned with diseases and troubles in plants. The two main areas of concern in plant pathology are:

FIRSTLY – Identifying what a problem is!

SECONDLY – Treating the problem (to either affect a cure or at least prevent spread of the problem to other plants).

To identify a problem you must first become familiar with ALL of the possible things that can go wrong with a plant. These can be classified as follows:

1. PARASITIC PROBLEMS

A. **Fungi** – e.g.: Damping off; wood rots, root rots powdery mildew, brown rot black spot, peach leaf curl etc.

B. **Bacteria** – Similar to fungi but far less common, e.g.: Bacterial canker, bacterial rots etc.

C. **Virus** – Common in some plants, including Daphne, gladioli, carnation, chrysanthemum, strawberry, passionfruit, tulip etc. Virus causes malformation, stunting, discolouration of leaves etc.

D. **Insects** – e.g.: Grubs, caterpillars, aphids, scale, thrip, moths, bugs, beetles etc.

E. **Other Small Animals** – e.g.: Snails, slugs, mites (such as red spider), millipedes, slaters etc.

F. **Larger Animals** – e.g.: Possums, dogs, cats, etc. Can usually be picked easily because damage is much less subtle.

G. **Plants** – e.g.: Mistletoe, Cherry Ballarat etc.

2. NON PARASITIC

A. **Nutritional Disturbances** – Plants can either have too much or too little nutrients; OR in some instances, though ample nutrient might be in the soil, some condition (such as extreme acidity) might stop the plant from absorbing it.

B. **Poor Environment** – e.g.:

- Heat (too hot or too cold)
- Frost
- Hail
- Unfavourable light
- Soil (Poor drainage, drains too freely, insufficient support or the plant, bad pH)
- Atmospheric Impurities (pollution).
- Plant Competition (weeds)

Control of Problems

REMEMBER, "PREVENTION IS ALWAYS THE BEST CURE"!

For Parasitic Problems:

- Biological Controls (i.e.: introducing some other organism that will deter the parasite).
- Mechanical Control (i.e.: physically removing the parasite and/or infected parts of a plant).
- Chemical Control.

For Non Parasitic Problems:

- Identify the problem and then adjust the environment accordingly.

AVOIDING FROST

There is always a certain amount of protection from frost next to or underneath other structures. Some plants are highly susceptible to frost, and need very good protection to avoid being killed. Other plants will be burnt by a frost, but rarely killed. Frost-hardy plants are not affected at all.

Many plants are very sensitive when young, but once established, are frost-hardy.

- The canopy of a tree above plants will usually protect them from slight frosts.

- Frosts are usually worse in low spots (i.e.: depressions or the bottom of a hill).

- The space that is protected by a wall, fence or some other structure can be roughly calculated as follows: measure the height of the structure. Measure a distance out from the base of the structure that is equal to half the height of the structure. Take a line from this point (out from the wall) to the top of the structure. Anything growing within the space confined by this wall and the imaginary line should be protected.

- If a plant is burnt by a frost, do not remove the burnt leaves until after the frost period (they will protect the centre of the plant from further burning).

- If the plant is only frost tender when young, hessia or plastic can be tied to stakes around it for protection until it is past the frost tender age.

- Plant in containers and simply move the plants under cover in the cooler months.

AVOIDING WET

If you have a very wet garden, or you wish to plant plants that are particularly susceptible to waterlogging, the following ideas can be a solution:

- Plant in containers (tubs, baskets etc).

- Create mounds of earth (even a half metre above the surrounding area can be very helpful).

- Build raised garden beds. Using brick, stone, railway sleepers or power poles etc, create a walled area a half metre or so high. Fill the inside with well-drained, but not too sandy soil.

- Plant on a slope. Camellias and Azaleas often grow well in a heavy soil when planted on the side of a hill, but if planted in the same soil at the bottom of the hill, can suffer badly from waterlogging.