

# Appendix D

## Plants nutrient deficiency

### Nitrogen deficiency:

- Leaves to show effects first: Old plant
- Entire plant turns yellow green, and the older leaves become more yellowish than the younger.
- Older leaves do not die unless deficiency is extreme.

### Phosphorus:

- Leaves to show effects first: Old plant
- Plant stops growing and becomes darker green or stays green.
- Some species may become purple with excess anthocyanin pigments building up.
- Other species do not produce excess anthocyanins and just stay green and small.
- Premature leaf drop-off.
- Similar to nitrogen deficiency.

### Potassium:

- Leaves to show effects first: Old plant
- Small dead areas appear in older leaves. These can start like little pinpoint spots and grow. In some species, like *Ceratopteris*, the older leaves stay green while the little dead spots grow. The new leaves are reduced in size and leaf area, looking a bit 'singed'. In other species the older leaves can turn yellow before they die, but they do not have green persisting along the major veins as in magnesium deficiency.
- Yellow areas, then withering of leaf edges and tips.

### Sulphur:

- Leaves to show effects first: New plant
- Similar to nitrogen deficiency

### Calcium:

- Leaves to show effects first: New plant
- Mild deficiency: Smaller, distorted new leaf growth. Reduced leaf tissue, with the central vein persisting.
- Leaves often cupped, rather than flat
- Moderate deficiency: Often sudden bends or twisting of leaf, which is now much reduced in size.
- White streaks or white edges in new growth. Roots are stubby and twisted. Root tips may die.
- Leaves of *Vallisneria* are strongly crinkled as though they have tried to grow and got jammed in a small space.
- Severe deficiency: New growth almost entirely white. Leaves are tiny deformed stumps. Growing points for both shoot and root die.