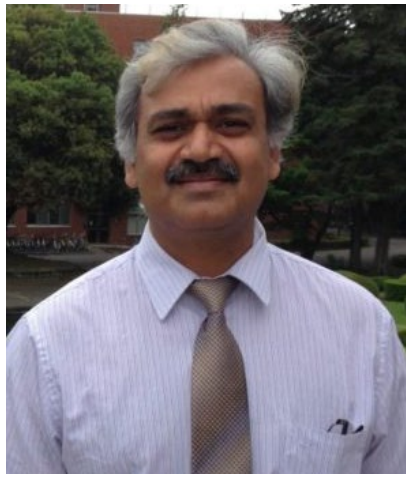
Identifying Nutrient Deficiencies of Greenhouse and Indoor Grown Crops



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Essential Elements for Plants

- There are 14 essential elements

Primary macronutrients

Nitrogen (N)
Phosphorus (P)
Potassium (K)

Secondary macronutrients

Calcium (Ca)
Magnesium (Mg)
Sulphur (S)

Micronutrients

Iron (Fe)
Manganese (Mn)
Molybdenum (Mo)
Boron (B)
Copper (Cu)
Zinc (Zn)
Nickel (Ni)
Chlorine (Cl)

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Optimal percentage of different elements in the plant tissue

Primary

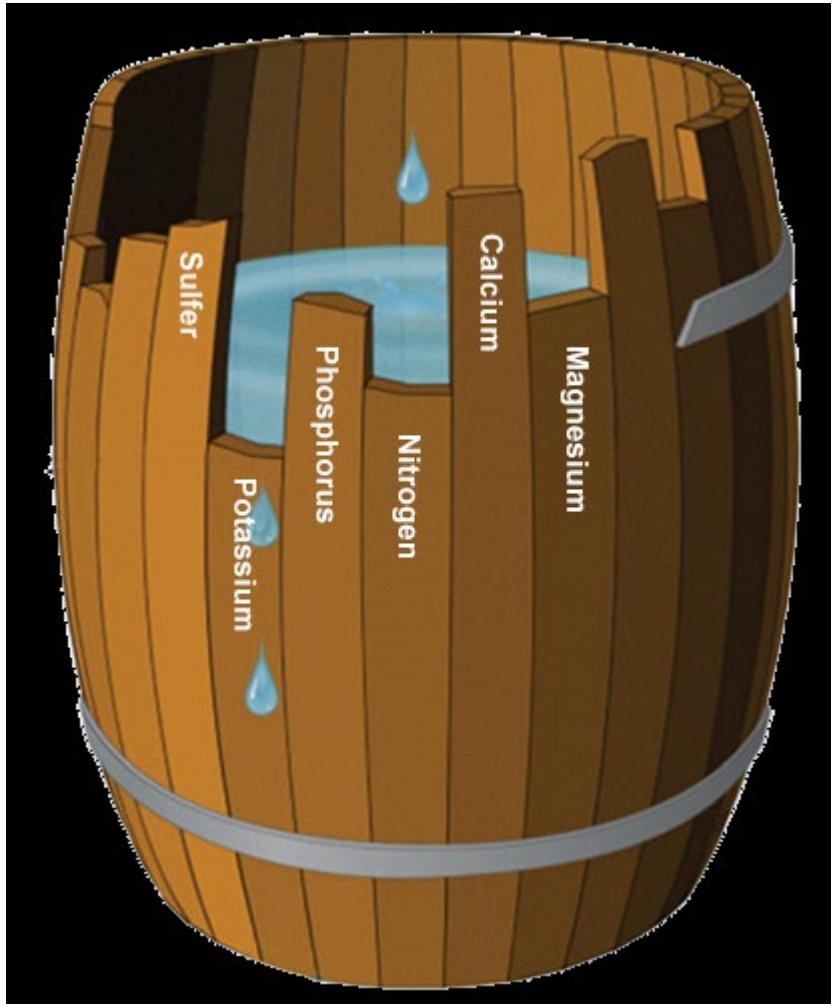
N	P	K	
4.5	0.5	5	%

Secondary

Ca	Mg	S	
0.5	0.3	0.3	%

Micros

Fe	Zn	Mn	B	Cu	Mo, Ni, Cl,	
0.0015	0.0005	0.0005	0.0003	0.0002	trace	%



Law of minimum: Yield determined by the most deficient element

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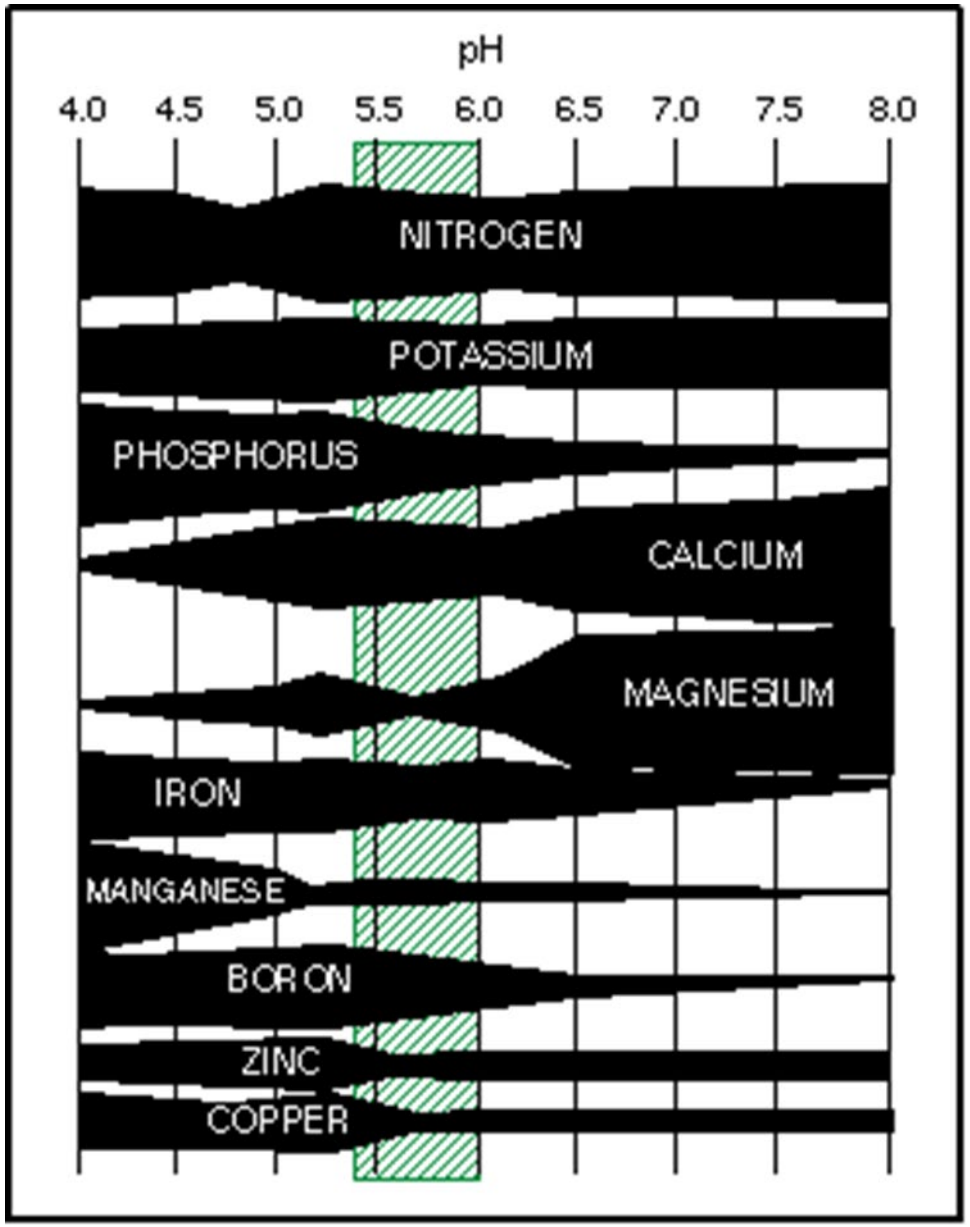
Many causes for nutrient deficiencies

- pH issues
- Low substrate temperature
- Excess irrigation
- Diseases affecting roots
- Fertilizer injector issues
- Interaction among elements



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What are these?

Bacterial leaf spot

Viral mosaic

Tomato spotted wilt virus

Fungal leaf spot

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Excess fertilizer (EC) can cause burnt symptoms along margins

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Terminology

Chlorosis: Yellow color on leaves

Interveinal Chlorosis: Yellow color between veins

Necrosis: Brown to dark brown color, dead tissue

Old leaves

- Purple color (Phosphorus)
- Chlorotic/necrotic margins (Potassium)
- Yellow leaves (Nitrogen)
- Chlorotic or necrotic spots along margins (Molybdenum)
- Interveinal chlorosis (Magnesium)

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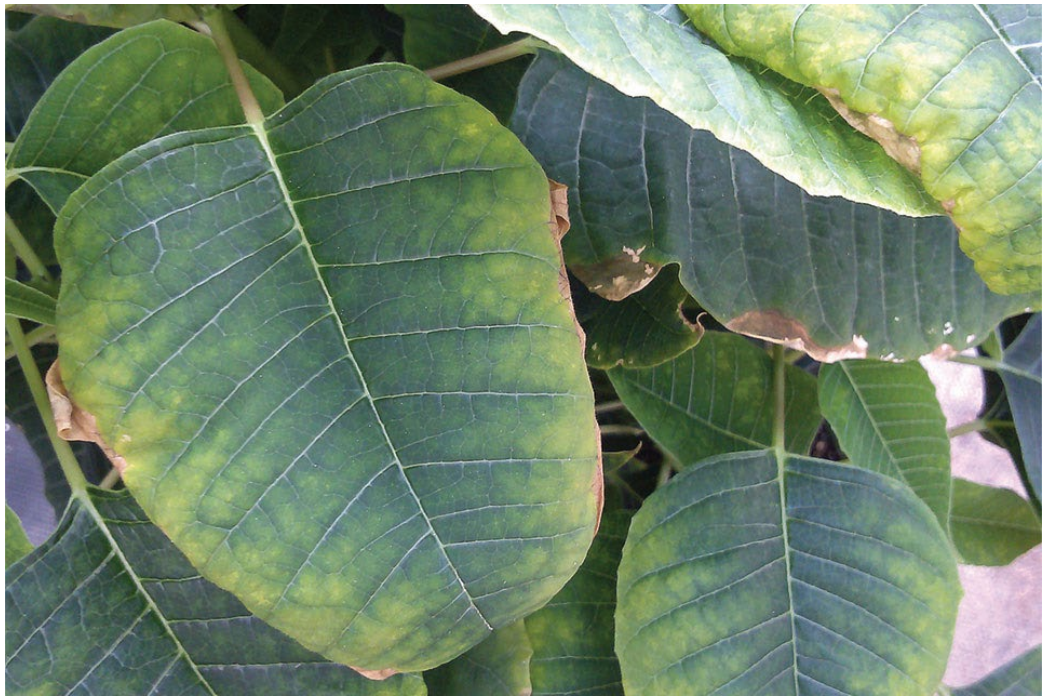

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New Leaves

- Growing point dies (Calcium)
- General yellowing (Sulfur)
- Sharp interveinal chlorosis (Iron)
- Dull interveinal chlorosis (Manganese)

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