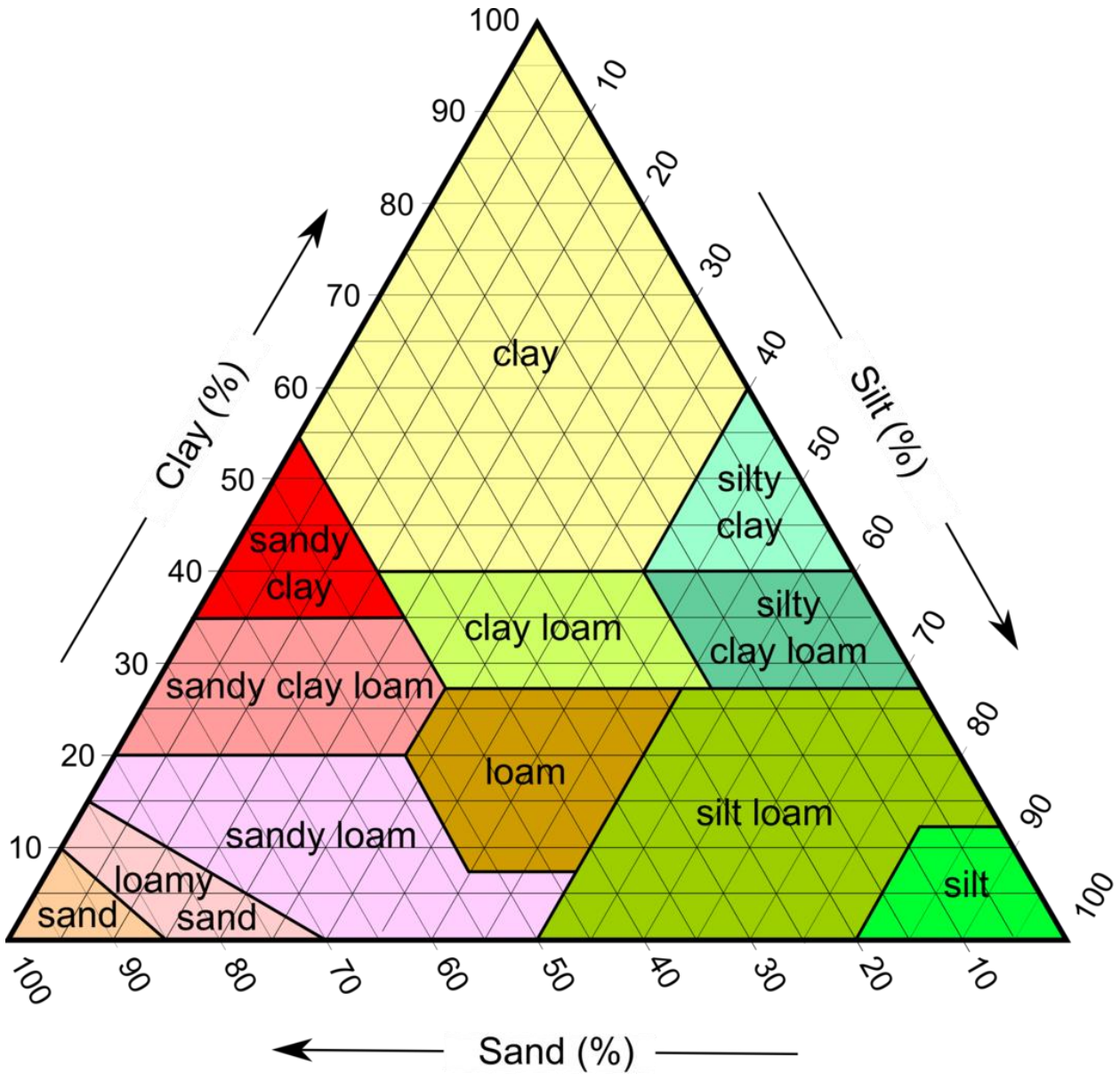
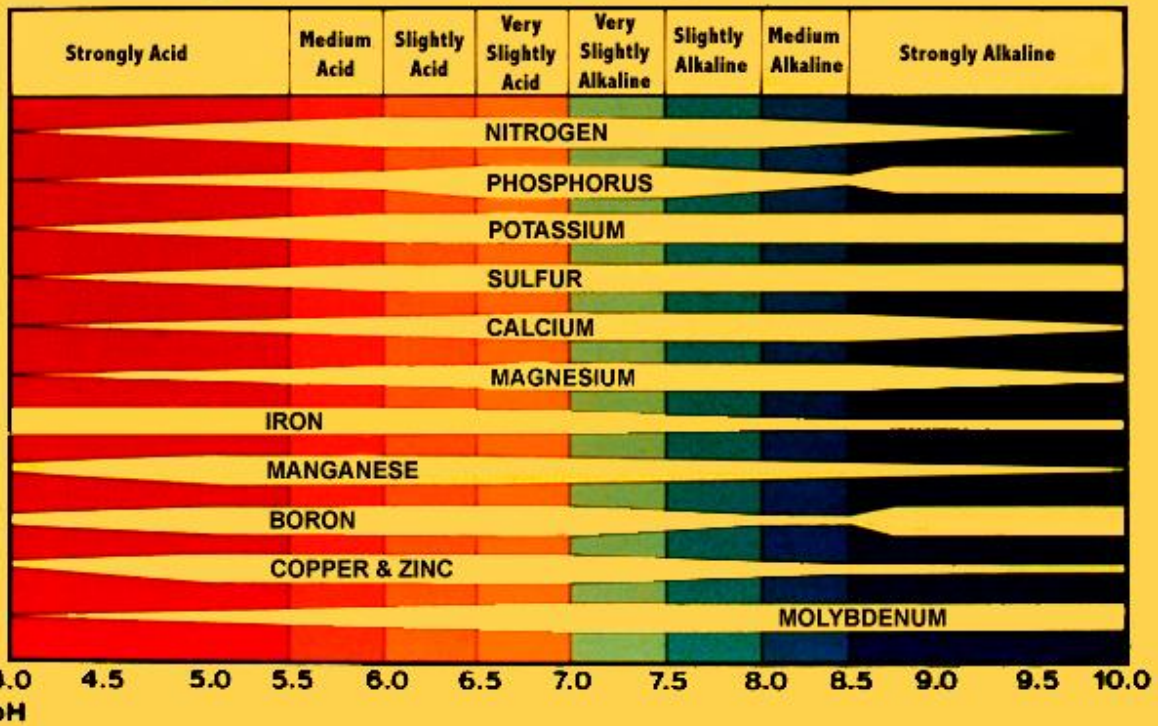


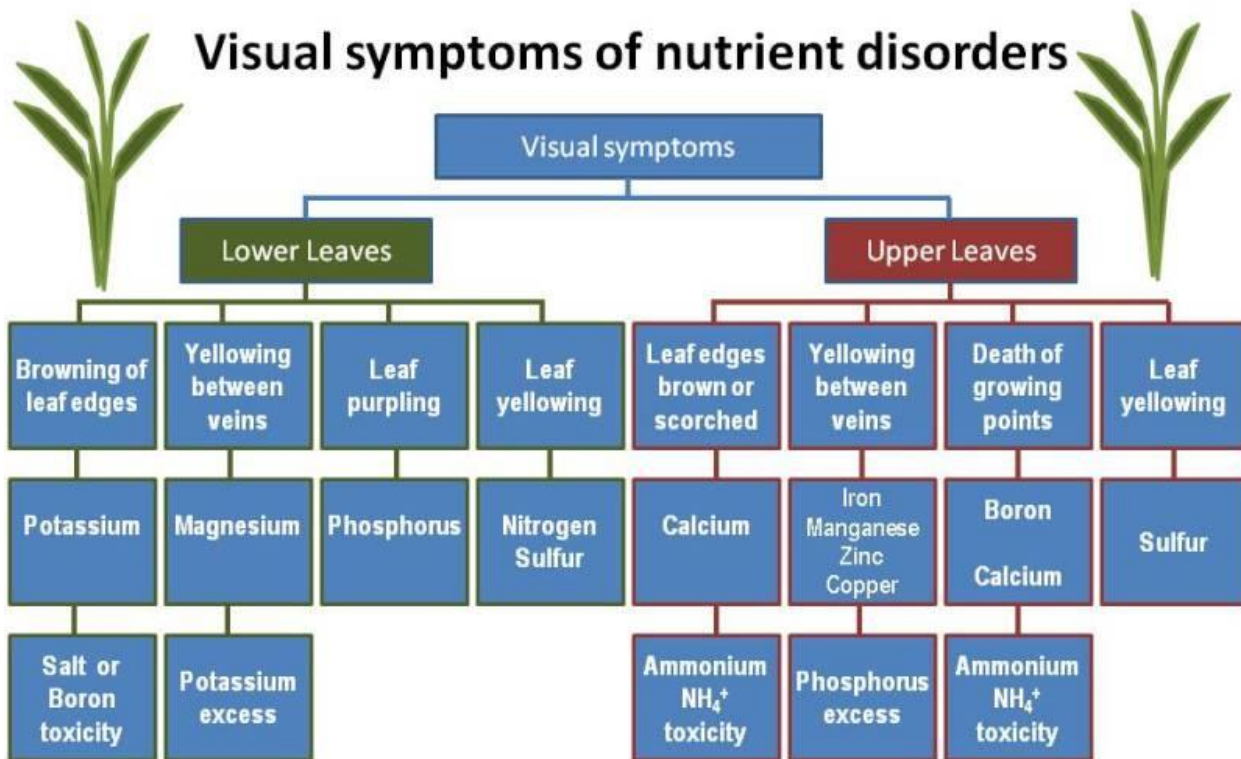
# Soil Triangle:



# How Soil pH Affects Availability of Plant Nutrients

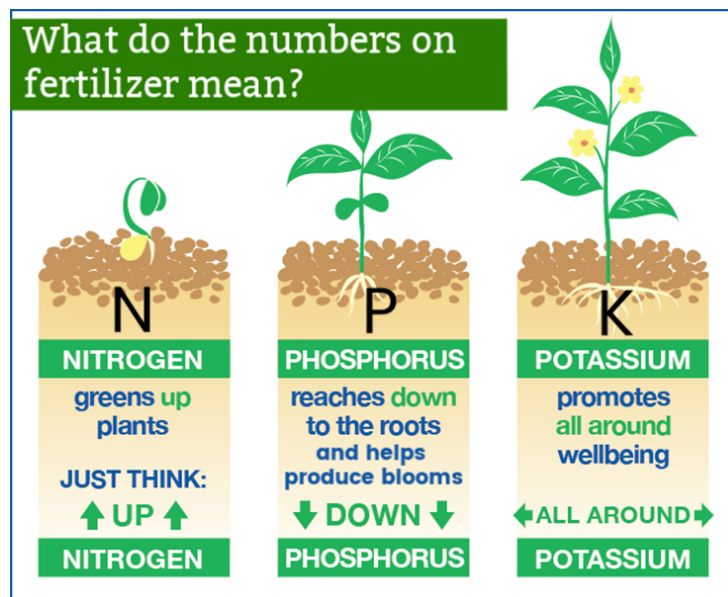


Name/per plant req.	Symbol
<b>Primary Nutrients:</b>	
Nitrogen 1 - 4%	N
Phosphorus 0.1 - 0.3%	P
Potassium 0.5 - 4%	K
<b>Secondary Nutrients:</b>	
Sulfur 0.15 - 0.3%	S
Calcium 0.1 - 0.2%	Ca
Magnesium 0.05 - 0.15%	Mg
<b>Micronutrients:</b>	
Zinc 10 - 30 ppm	Zn
Iron 10 - 75 ppm	Fe
Copper 2 - 10 ppm	Cu
Manganese 10 - 20 ppm	Mn
Boron 1 - 10 ppm	B
Molybdenum 0.1 - 0.7 ppm	Mo
Chlorine 25 - 1,000 ppm	Cl
Nickel trace amounts	Ni

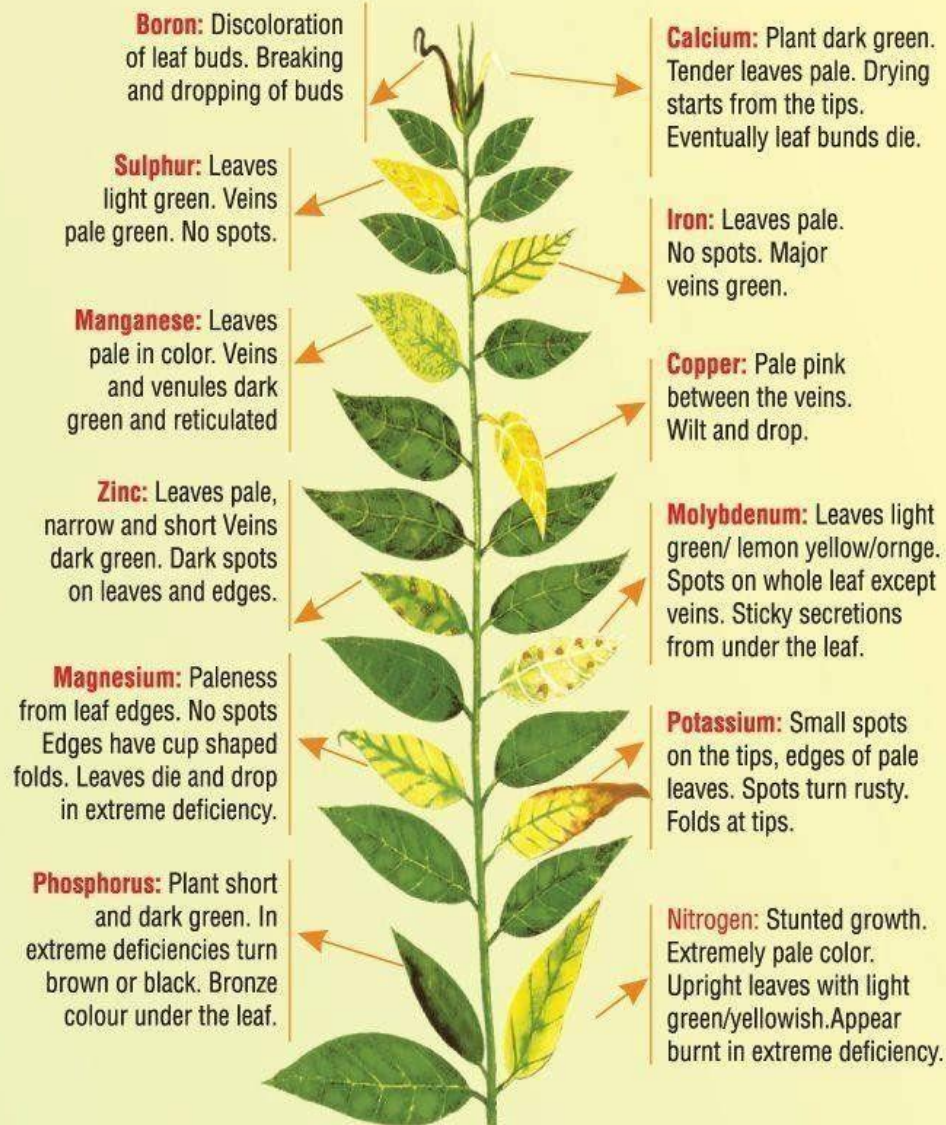


**Note:** Symptoms can be caused by other factors – e.g., drought can also cause browning of leaf edges

**Source:** Modified from T.H. Fairhurst, C. Witt, R.J. Buresh, and A. Dobermann (eds). 2007. *Rice: A Practical Guide to Nutrient Management (2nd edition)*. IRRI, IPNI and IPI, Singapore.



## Deficiency Chart of Micronutrients



**THE COLOUR REPRESENTED ARE INDICATIVE.  
THEY MAY VARY FROM PLANT TO PLANT**

Average nutrient concentrations and rates of availability for various organic materials:					
Material	% N	% P	% K	Availability	Notes
Alfalfa hay	2 – 3	0.5 – 1	1 – 2	Moderate	
Bone meal	1 - 6	11 – 30	0	Moderate	alkaline
Blood meal	12	1 – 2	0 – 1	Rapid	acidic
Canola meal	6	2	1		
Cottonseed meal	6	3	1	Slow	acidic
Composts	1 – 3	1 – 2	1 – 2	Moderate	alkaline
Crab shell meal	4	1.5	0		
Feather meal	12	0	0	Moderate	
Fish emulsion	3 – 5	1	1		
Fish meal	6 – 12	3 – 7	2 – 5	Rapid	acidic
Grass clippings	1 - 2	0 – 0.5	1 – 2	Moderate	
Green sand	0	0	3.7		
Hoof/horn meal	12 – 14	1.5 – 2	0	Moderate	alkaline
Kelp	1 – 1.5	0.5 – 1	5 – 10	Moderate	zinc, iron
Leaves	1	0 – 0.5	0 – 0.5	Slow	
Legumes	2 – 4	0 – 0.5	2 - 3	Moderate	
Manures: cattle	2 – 3	0.5 – 1	1 – 2	Moderate	weedy
horse	1 – 3	0.5 – 1	1 – 2	Slow	weedy
swine	2 – 3	0.5 – 1	1 – 2	Rapid	
poultry	3 – 4	1 – 2	1 – 2	Rapid	high in salts
sheep	3 – 4	0.5 – 1	2 – 3	Moderate	weedy
Pine needles	0.5	0	1	Slow	acidic
Rock phosphate	0	25 – 30	0	Very slow	use only in acidic soils
Sawdust	0 – 1	0 – 0.5	0 – 1	Very slow	Ties up N
Sewer sludge	2 – 6	1 – 4	0 – 1	Moderate	zinc, iron
Seaweed extract	1	2	5	Rapid	zinc, iron
Straw/corn stalks	0 – 0.5	0 – 0.5	1	Very slow	ties up N
Wood ashes	0	1 – 2	3 – 7	Rapid	high in salts

**References:**

**WSU:**

- <https://today.oregonstate.edu/news/know-what-your-plants-need-fertilizing>
- <https://s3.wp.wsu.edu/uploads/sites/2071/2014/04/Home-Vegetable-Gardening-in-WA-EM057E.pdf>
- [https://www.co.thurston.wa.us/health/ehcsg/pdf/CSG\\_VegeGarden\\_sg1pg.pdf](https://www.co.thurston.wa.us/health/ehcsg/pdf/CSG_VegeGarden_sg1pg.pdf)
- WSU Master Gardener Training Manual

**Oregon State University:**

- <https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec871.pdf>
- **DIY Tests:** <https://extension.oregonstate.edu/gardening/techniques/mechanical-analysis-soils-jar-test>

**Texas A&M:**

- <https://agrillifeextension.tamu.edu/library/gardening/fertilizing/>

**Tennessee State University:**

- **DIY Tests:**  
[https://extension.tennessee.edu/Williamson/Horticulture/Consumer%20Horticulture/DIY%20Soil%20Drainage%20Perk%20Test%20for%20Your%20Yard%20\(2016\).pdf](https://extension.tennessee.edu/Williamson/Horticulture/Consumer%20Horticulture/DIY%20Soil%20Drainage%20Perk%20Test%20for%20Your%20Yard%20(2016).pdf)

Tuesdays at Noon		Wednesday at 6 P.M.	
3 - 09	Raspberries	3 - 10	Rain Barrels
3 - 16	Strawberries	3 - 17	Right Plant, Right Place
3 - 23	Who Gets Grandma's Yellow Plate	3 - 24	Choosing Fruit Varieties for West WA
3 - 30	Composting	3 - 31	Worm Composting
4 - 6	April Garden Tasks	4 - 7	Advanced Composting
4 - 13	Beneficial Insects	4 - 14	Rejuvenating your Lawn
4 - 20	Preparing & Sharpening Tools	4 - 21	Weed Control for Lawn/Landscape
4 - 27	Seed Saving Starting the Journey	4 - 28	Preparing the Garden for Planting

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