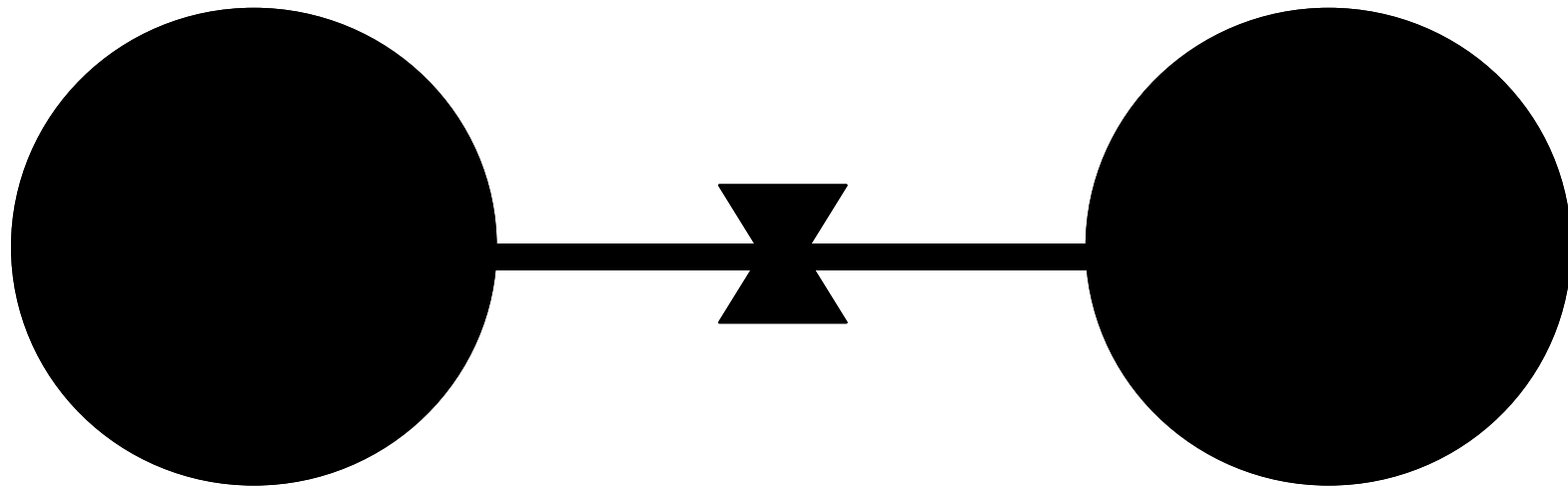


# SOIL MINERAL BALANCING

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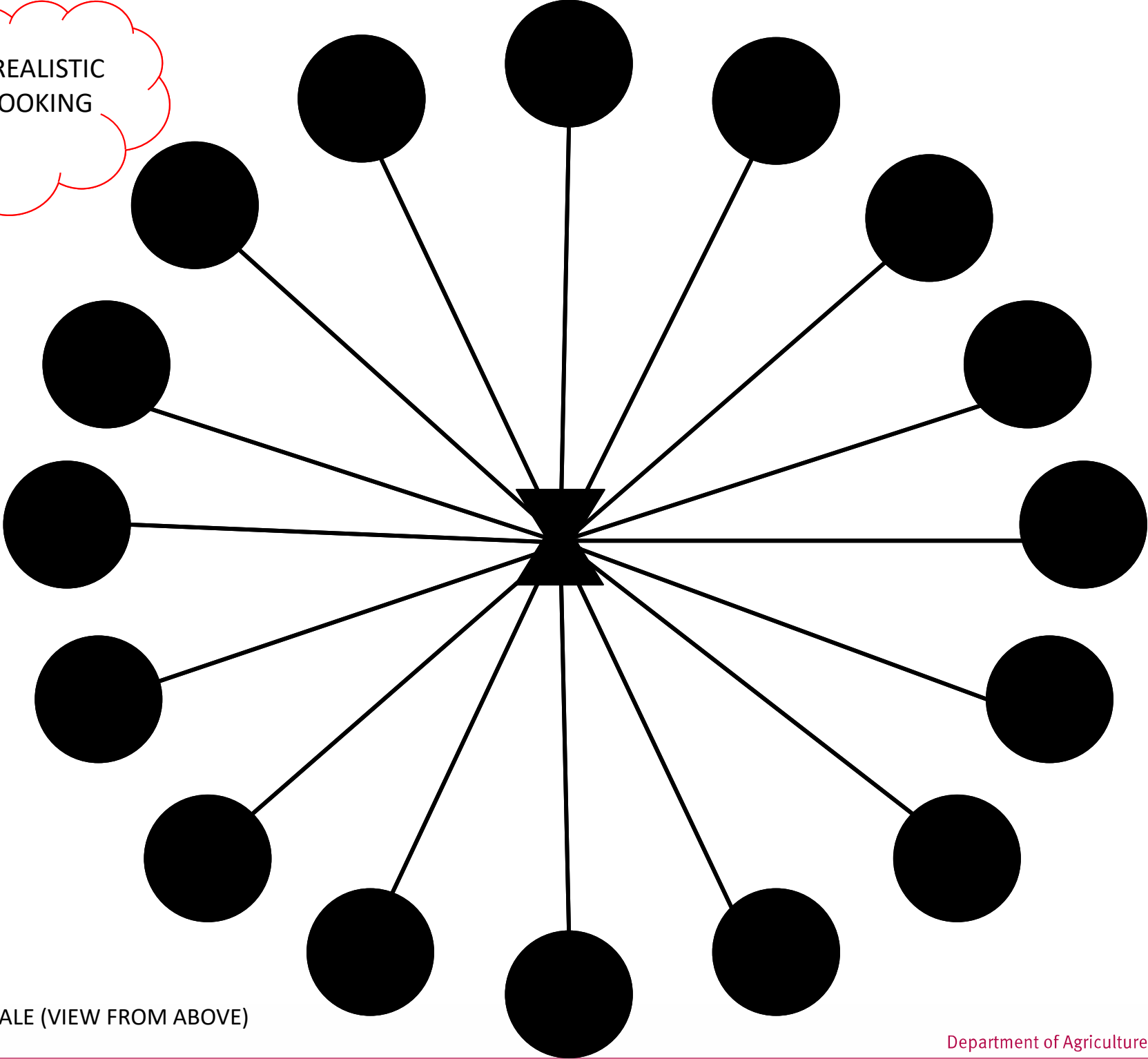


What one could normally think of! Given the word "Balancing"




BALANCING SCALE (VIEW FROM ABOVE)

A MORE REALISTIC  
WAY OF LOOKING  
AT IT (?)



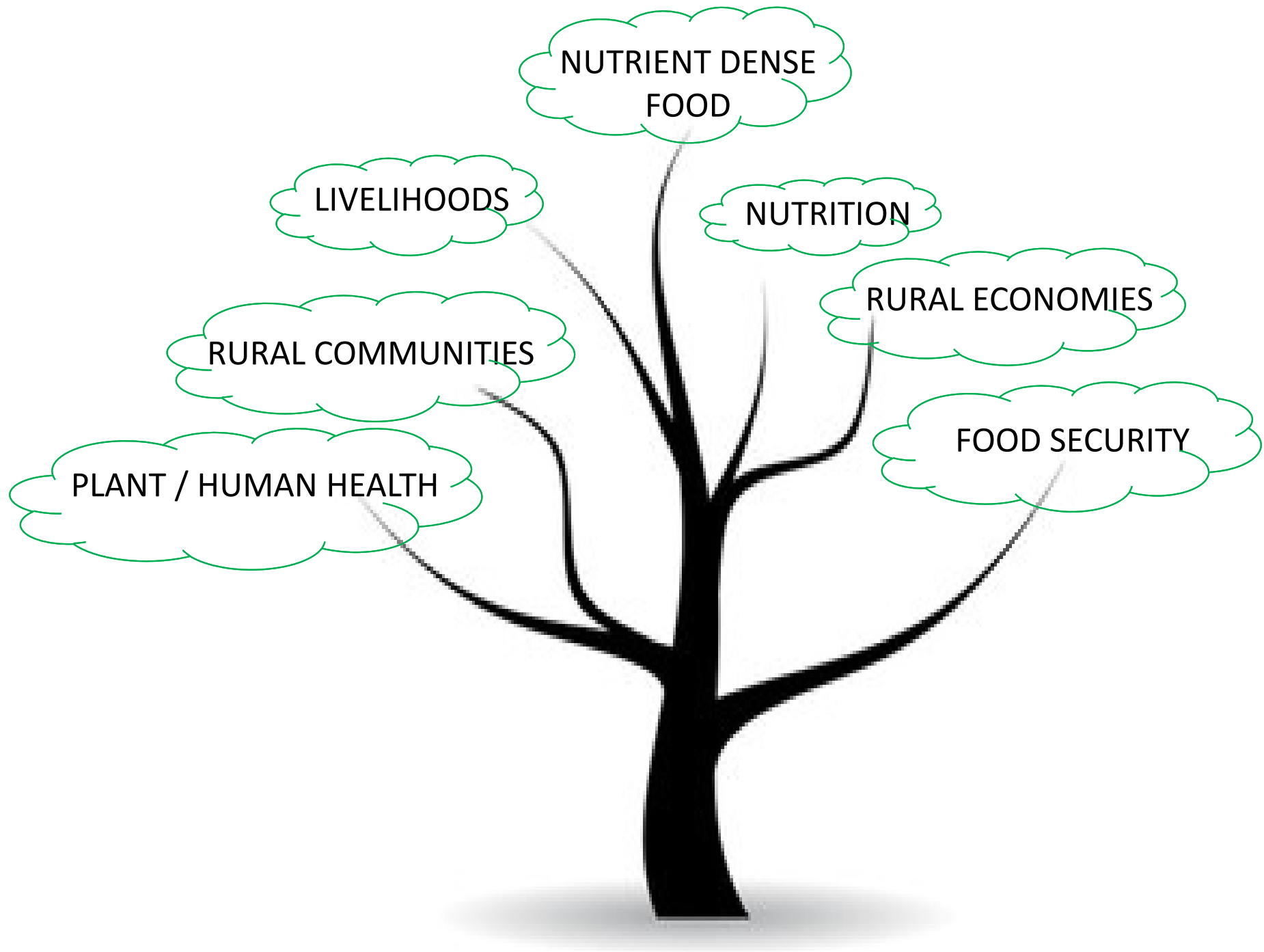
BALANCING SCALE (VIEW FROM ABOVE)





The way I think it  
actually is!!

Especially because of all  
the other “branches”  
that come off it

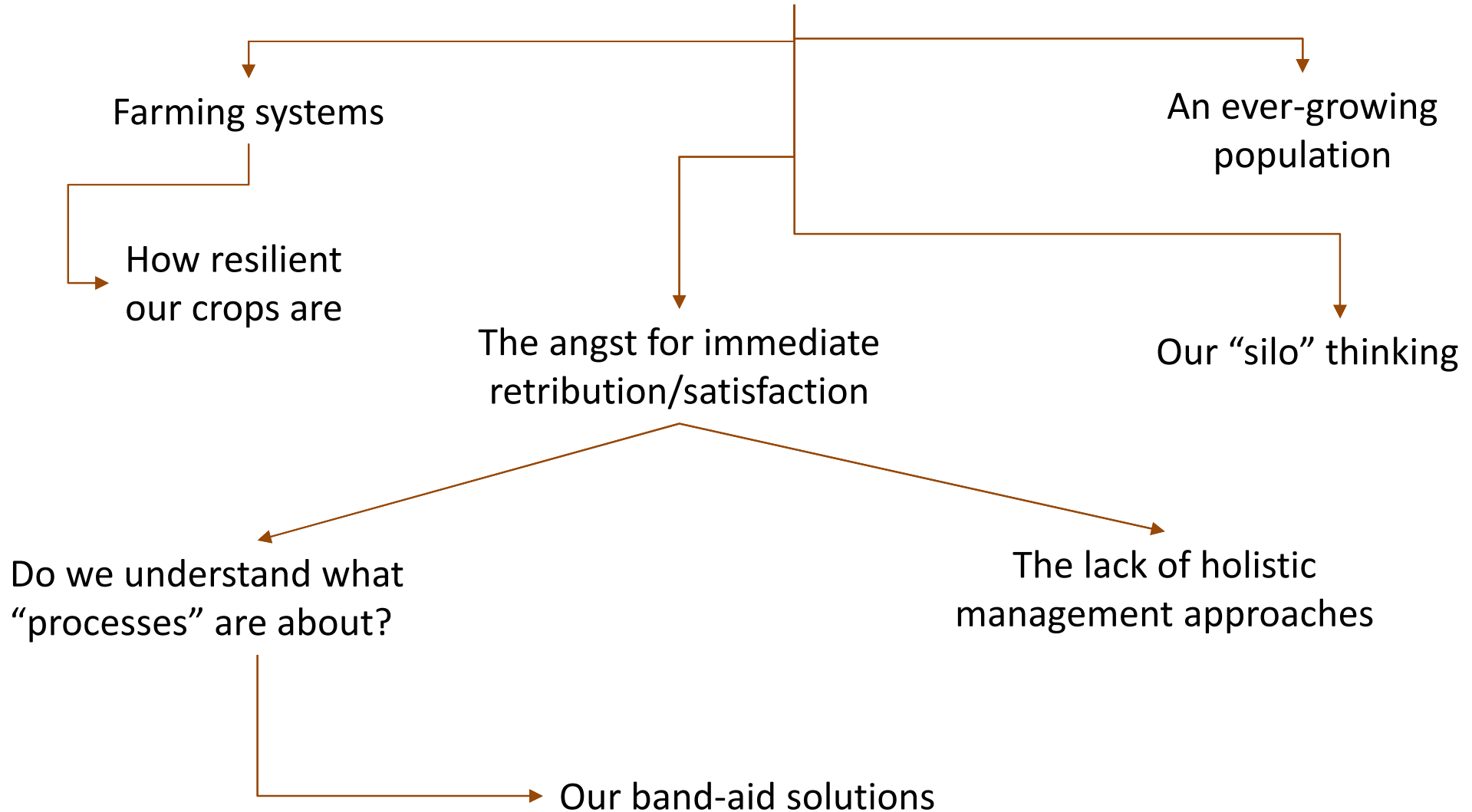





# WHAT'S OUR SOILS CURRENT STATUS???



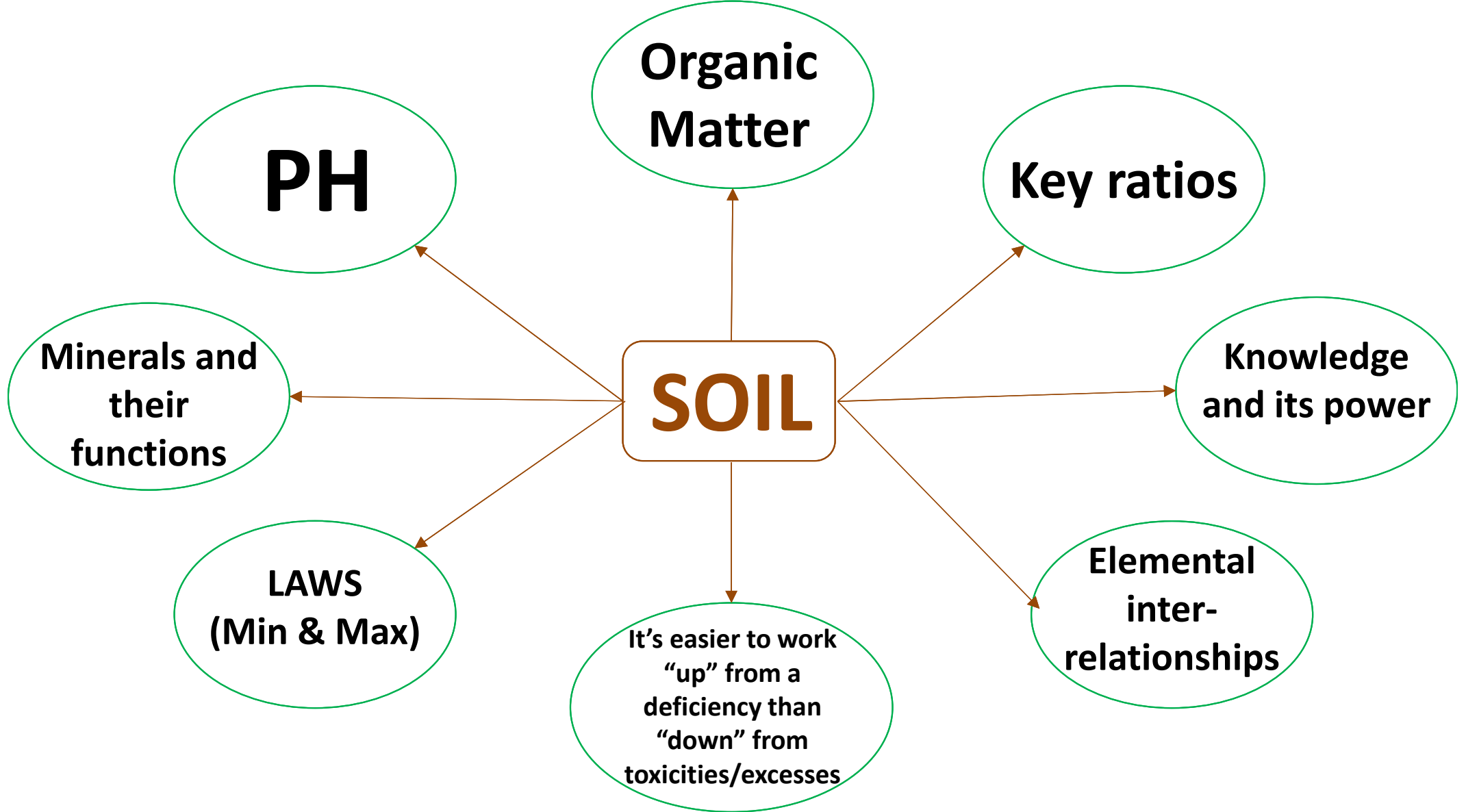
# BACKGROUND ISSUES





AND WHAT WE NEED TO  
UNDERSTAND IN ORDER  
FOR IT TO BE HEALTHIER  
AND MORE  
PRODUCTIVE!





**WHICH NEED TO BE COMPLEMENTED BY REGULAR SOIL AND LEAF TESTING**

**+**

**MANAGEMENT PRACTICES**

# ORGANIC MATTER

```
graph TD; OM(ORGANIC MATTER) --> IWI[Improves water infiltration]; OM --> ISAHN[Improves soil's ability to hold nutrients / CEC]; OM --> EWHC[Enhances water holding capacity]; OM --> CAPH[Can affect pH]; OM --> IDBD[Important driver of biological diversity];
```

Improves water infiltration

Improves soil's ability to hold nutrients / CEC

Enhances water holding capacity

Can affect pH

Important driver of biological diversity

# PH

**MUST NOT DICTATE OUR CALCIUM NEEDS**

A soil might be alkaline due to high magnesium levels

pH plays a pivotal role in the nodulation ability of plants (e.g. soybeans)

Most nutrients are readily available in neutral soils:

- As soil pH decreases, nutrients such as Ca, Mg and P become increasingly unavailable. Others such as Al and Mn become toxic and nodulation is poorer

Addition of lime to correct low pH is possible, whilst also providing calcium and reducing the potential of **Al** toxicities

Can affect CEC

When CEC is affected, nutrient deficiency symptoms start to appear



# SOMETHING TO KEEP IN MIND!!

Mobile Nutrients: can be transferred from older tissues to youngest tissues within the plant. Examples are:

Nitrogen  
Phosphorus  
Potassium  
Magnesium

Deficiency symptoms are noticeable first on lower, oldest leaves.

Immobile Nutrients: are not easily transferred within the plant. Examples are:

Boron  
Calcium  
Copper  
Iron  
Manganese  
Molybdenum  
Sulphur  
Zinc

Deficiency symptoms occur first on upper, youngest leaves.

First and foremost: NOT ONLY N P K

# Minerals and their functions

## MAGNESIUM (Mg)

Chlorophyll formation

Photosynthesis

IT TAKES ALMOST 16 ELEMENTS TO GROW A PLANT/CROP

## CALCIUM (Ca)

Cell strength

Directly impacts the uptake of 7 different minerals

## POTASSIUM (K)

Stomata opening

Stem strength  
Sizing up of grain and fruit

## BORON (B)

Calcium synergist

Glucose translocation to roots

## ZINC (Zn)

Leaf size

## SULPHUR (S)

Protein formation

## COPPER (Cu)

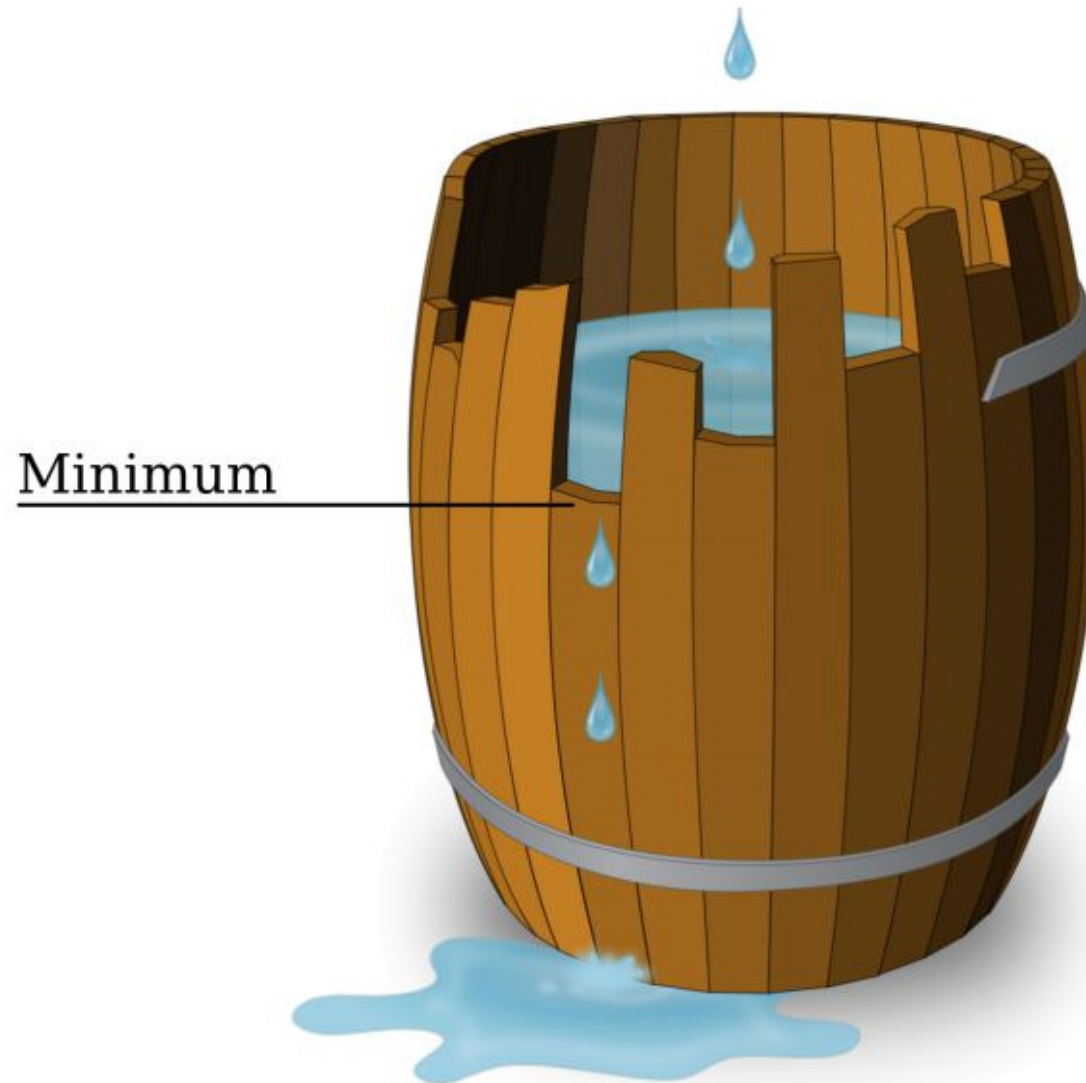
Stem strength  
Photosynthetic capacity

## SILICON (Si)

Strength of cell wall

Nutrient movement

# LAW of the Minimum





# LAW of the Maximum

Acknowledging that

Total growth of a crop/plant depends on many different factors

Such as

Nutrients + Nutrients interaction + Soil physico-chemical characteristics + Biology + Weather + Management practices

Without the correction of the limiting growth factors, resources are not fully used

**OPTIMUM GROWTH**

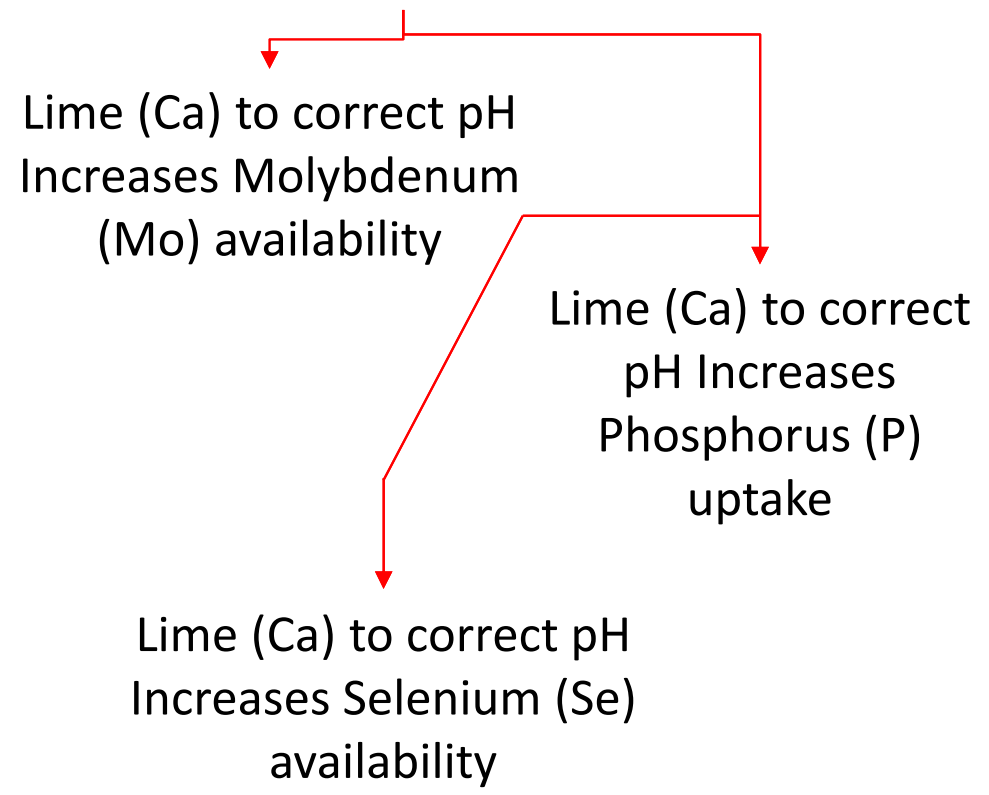
We move from the “desired” level of nutrient supply to a “luxury” level

And those **NOT** fully-utilised resources can become toxic

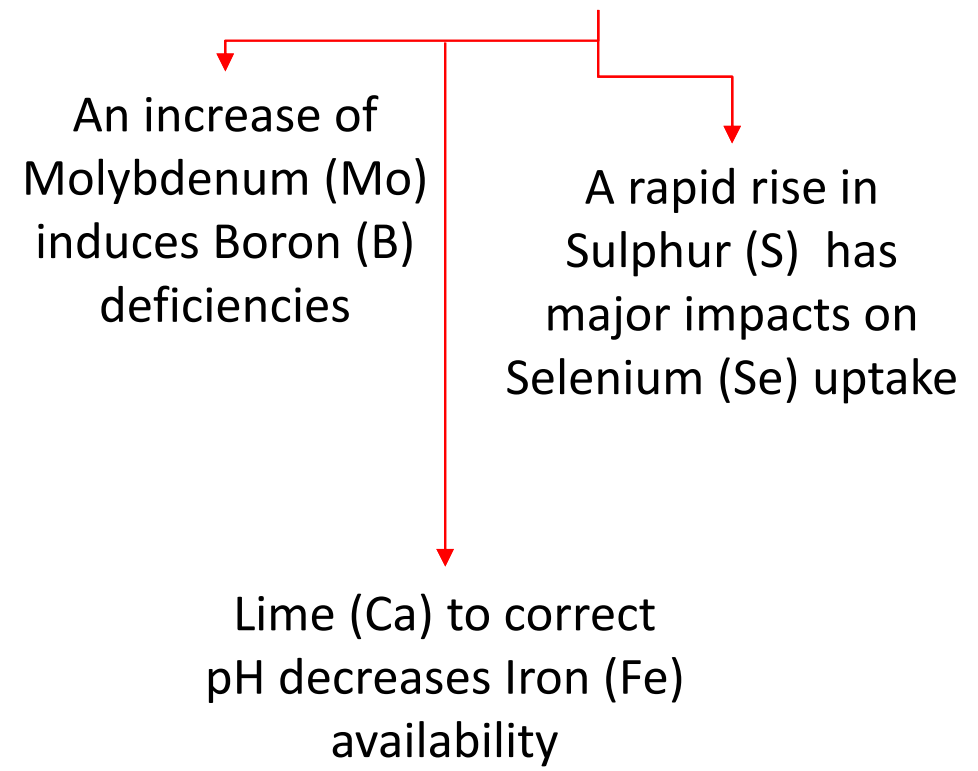
**It's easier to work  
“up” from a  
deficiency than  
“down” from  
toxicities/excesses**



## **SYNERGIES**



## **ANTAGONISMS**





# Knowledge and its power

**A GOOD UNDERSTANDING  
MAKES A HUGE DIFFERENCE**



**KEY RATIOS**

**CALCIUM (Ca) - MAGNESIUM (Mg)**

5.5:1 (Yet, 7:1 Heavy – 3:1 Sandy)

Soil structure

**MAGNESIUM (Mg) – POTASIUM (K)**

1:1

Photosynthesis

Equal parts = Good uptake of both + P

**PHOSPHORUS (P) – SULPHUR (S)**

Equal parts = Good uptake of both

1:1

Photosynthesis / translocation of H<sub>2</sub>O and nutrients

**IRON (Fe) – Manganese (Mn)**

2:1

Plant resilience

**PHOSPHORUS (P) – ZINC (Zn)**

Equal parts = Good uptake of both + P

10:1

Photosynthesis / energy / disease and insect resistance / Growth hormone production / leaf size

**POTASIUM (K) – SODIUM (Na)**

4:1

Photosynthesis / Breathing / stem strength / grain fill

**REGULAR SOIL AND  
LEAF TESTING  
+  
MANAGEMENT  
PRACTICES**

