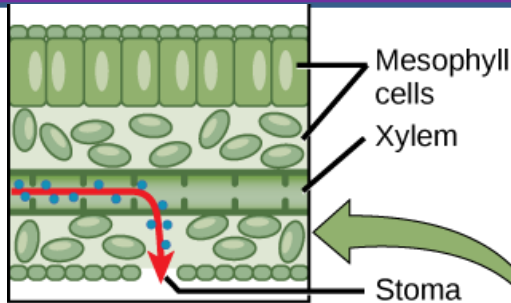


# การลำเลียงน้ำ, สารอาหาร, อาหารของพืช



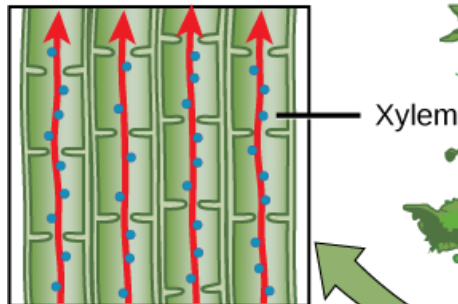
# ลำดับการลำเลียงน้ำในพืช

3



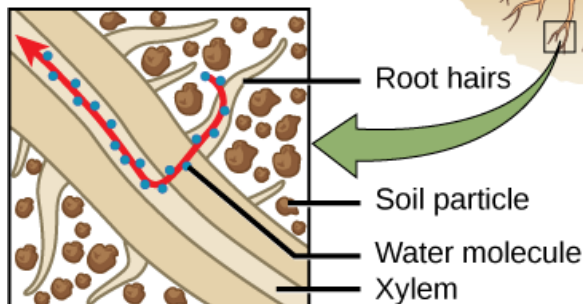
Transpiration draws water from the leaf.

2

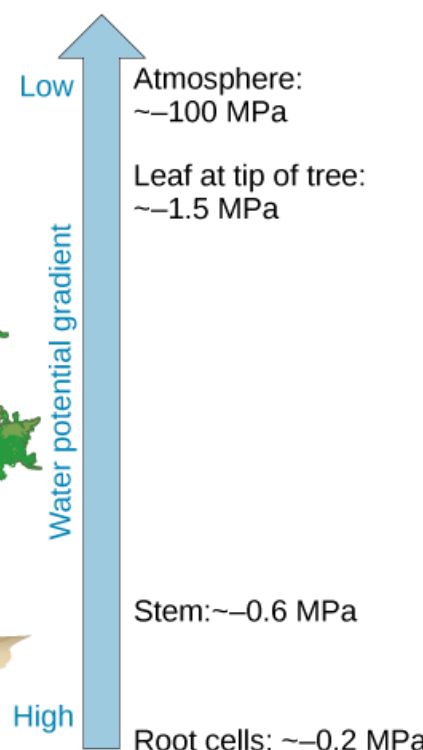
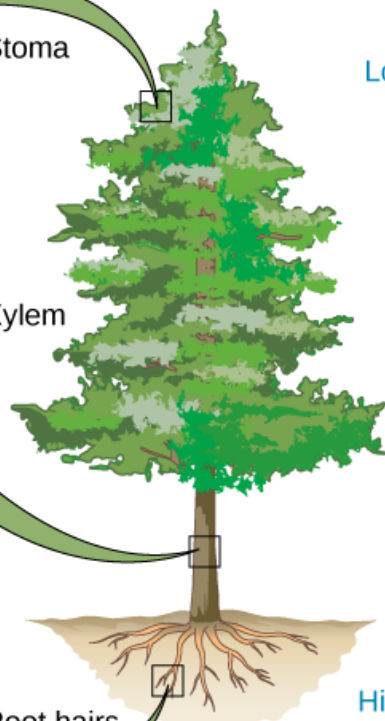


Cohesion and adhesion draw water up the xylem.

1



Negative water potential draws water into the root.

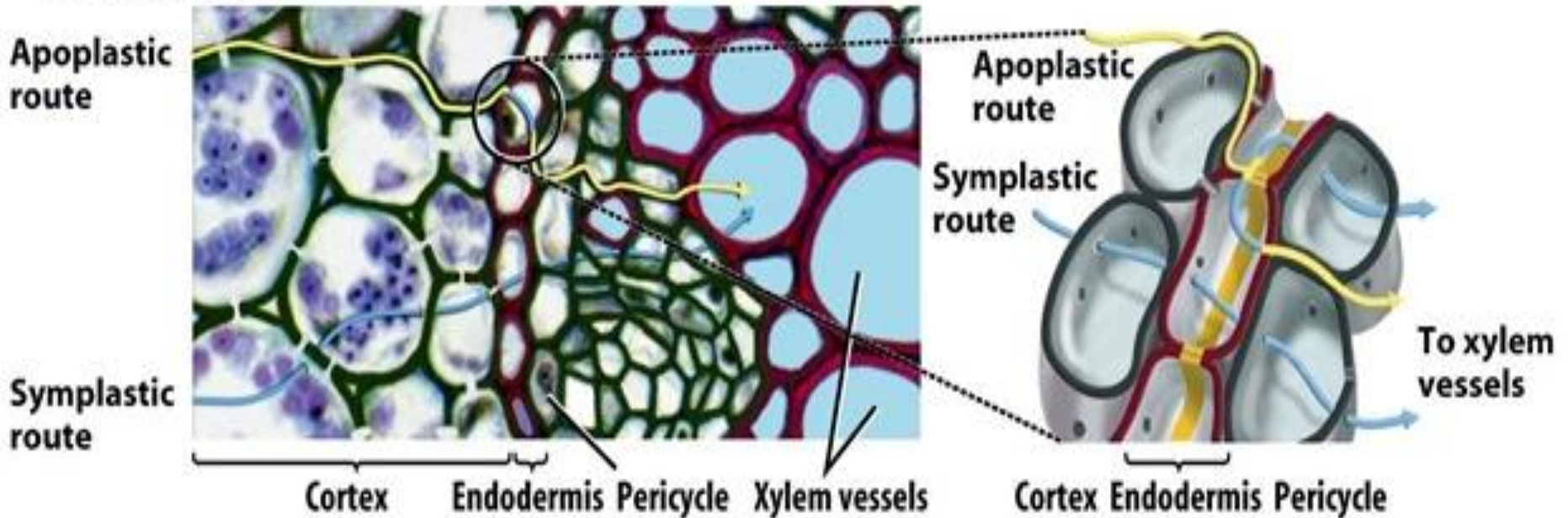


# 1. การลำเลียงน้ำจากขนรากไปที่ท่อไซเล็ม

Apoplast

Symplast

Water travels from root hairs to xylem via two routes.



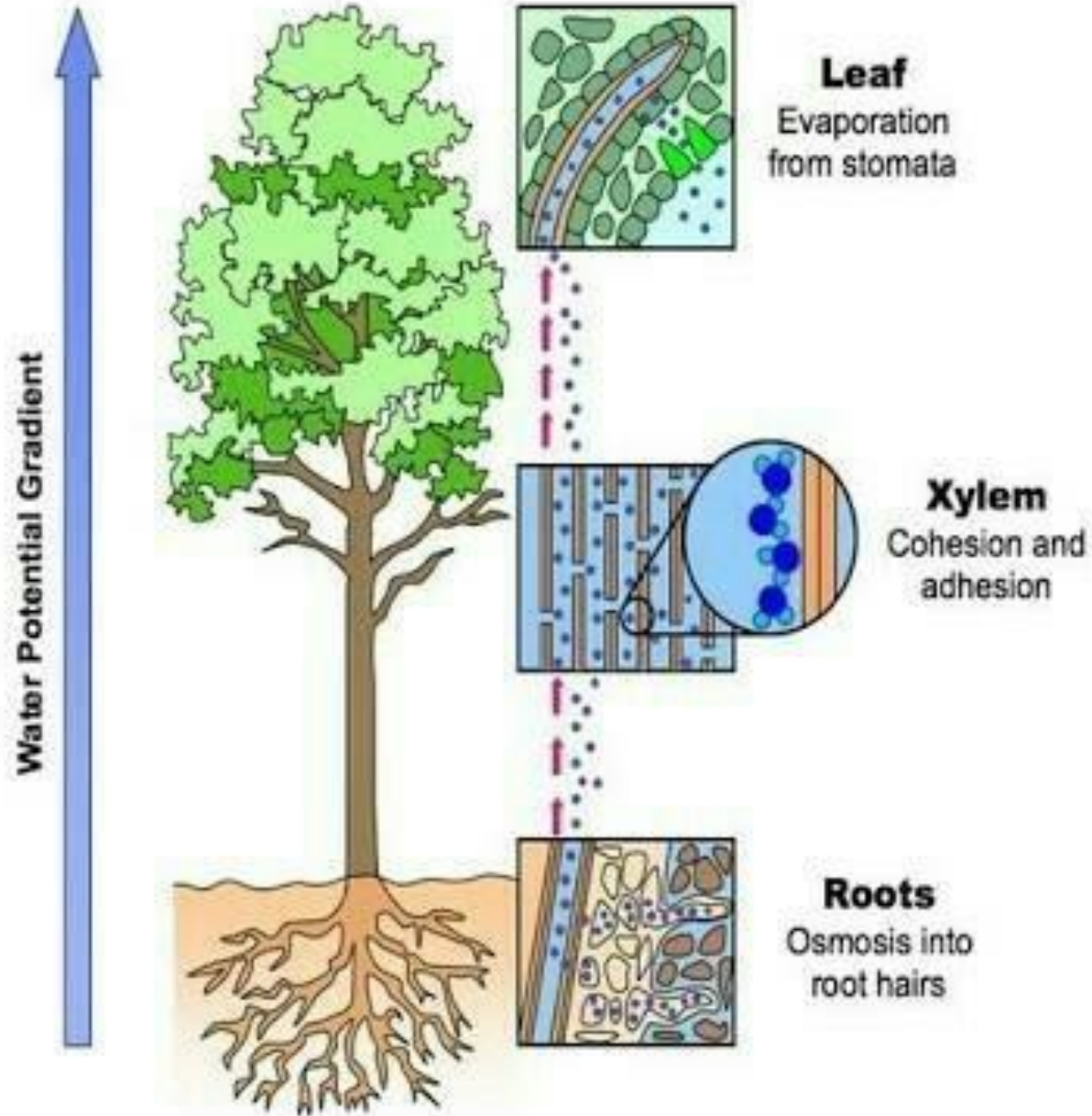
## 2. การลำเลียงน้ำจากท่อไซเล็มโคนไปปลายยอด

Transpiration pull

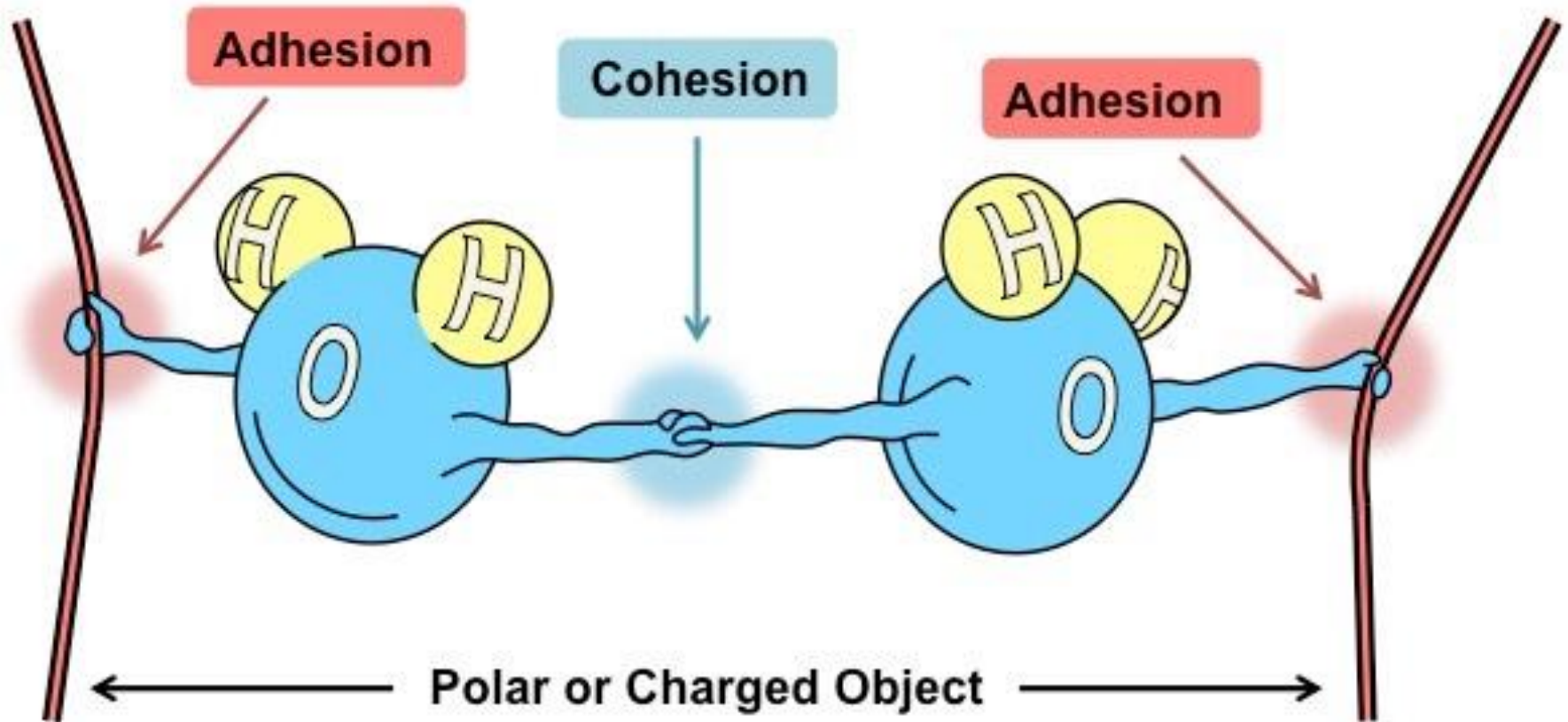
Cohesion, Adhesion

Root pressure

# Transpiration pull



# Cohesion, Adhesion



# Root pressure



# การลำเลียงสารอาหารในพืช

## *Hierarchy of Elemental Nutritional Requirements for Plant Life*

These basic nutrients are generally available to plants in sufficient quantities simply through air, soil, & water

### BASIC NUTRIENTS



Primary macronutrients (NPK's) are the primary foci of most traditional fertilizer application programs.

### PRIMARY MACRONUTRIENTS



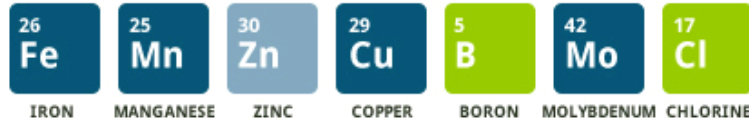
Secondary macronutrients and micronutrients are often grouped together for classification and identification. While they are not generally the foci of fertilization programs, they are absolutely essential for successful and healthy plant growth.

### SECONDARY MACRONUTRIENTS



While not widely considered to be essential components of plant nutrition, these elements are known to be required by certain plant types in certain environmental circumstances.

### MICRONUTRIENTS



### OTHERS



Color-Coding Key:  
Elemental  
Classifications

NONMETALS

ALKALI METALS

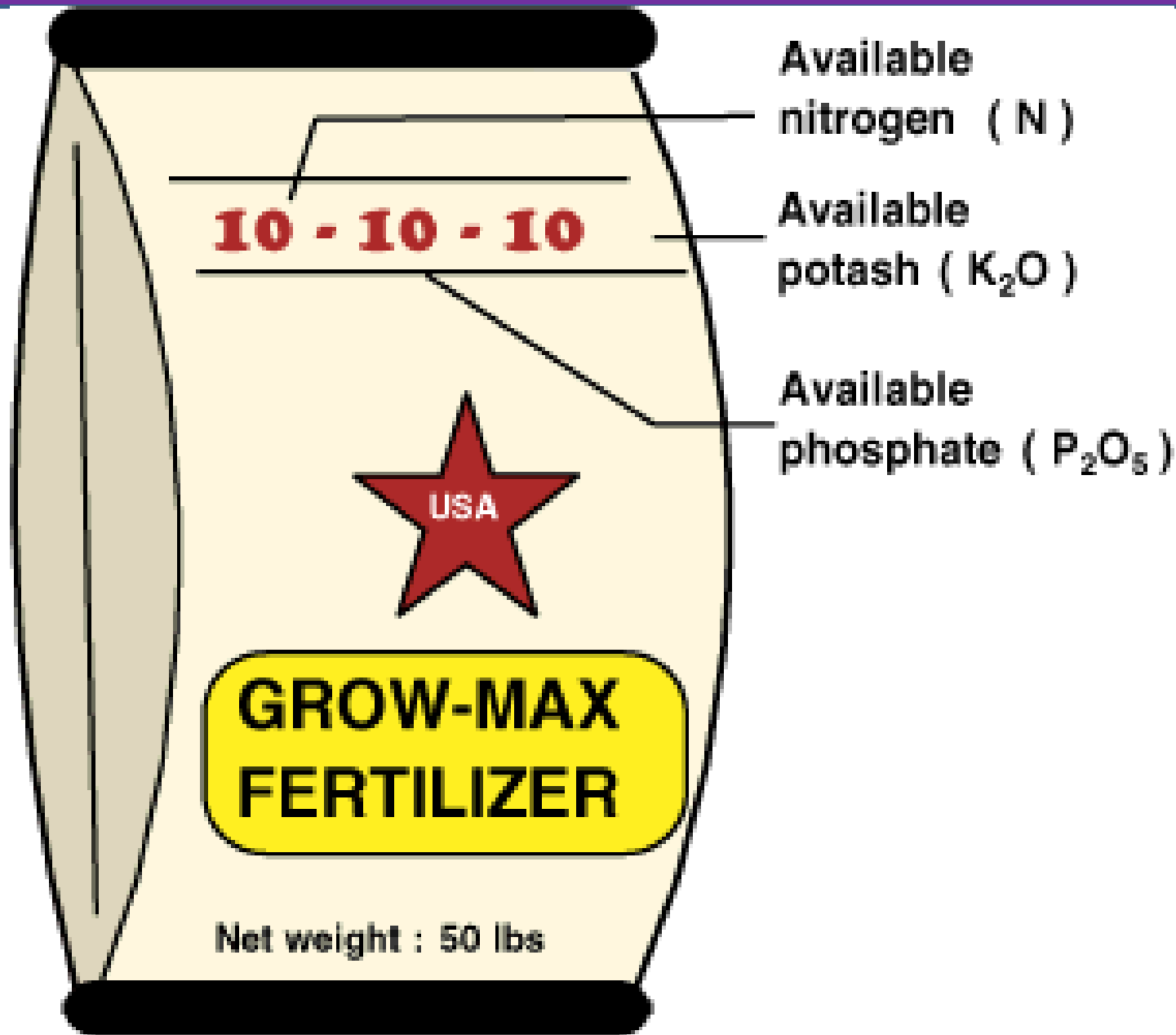
ALKALINE  
EARTH METALS

POOR METALS

TRANSITION  
METALS



# เกรดยุ่ย



# การขาดธาตุอาหารของพืช

## Nutrient Deficiency in Plants

- N

- P

- K

-Mg

-Ca

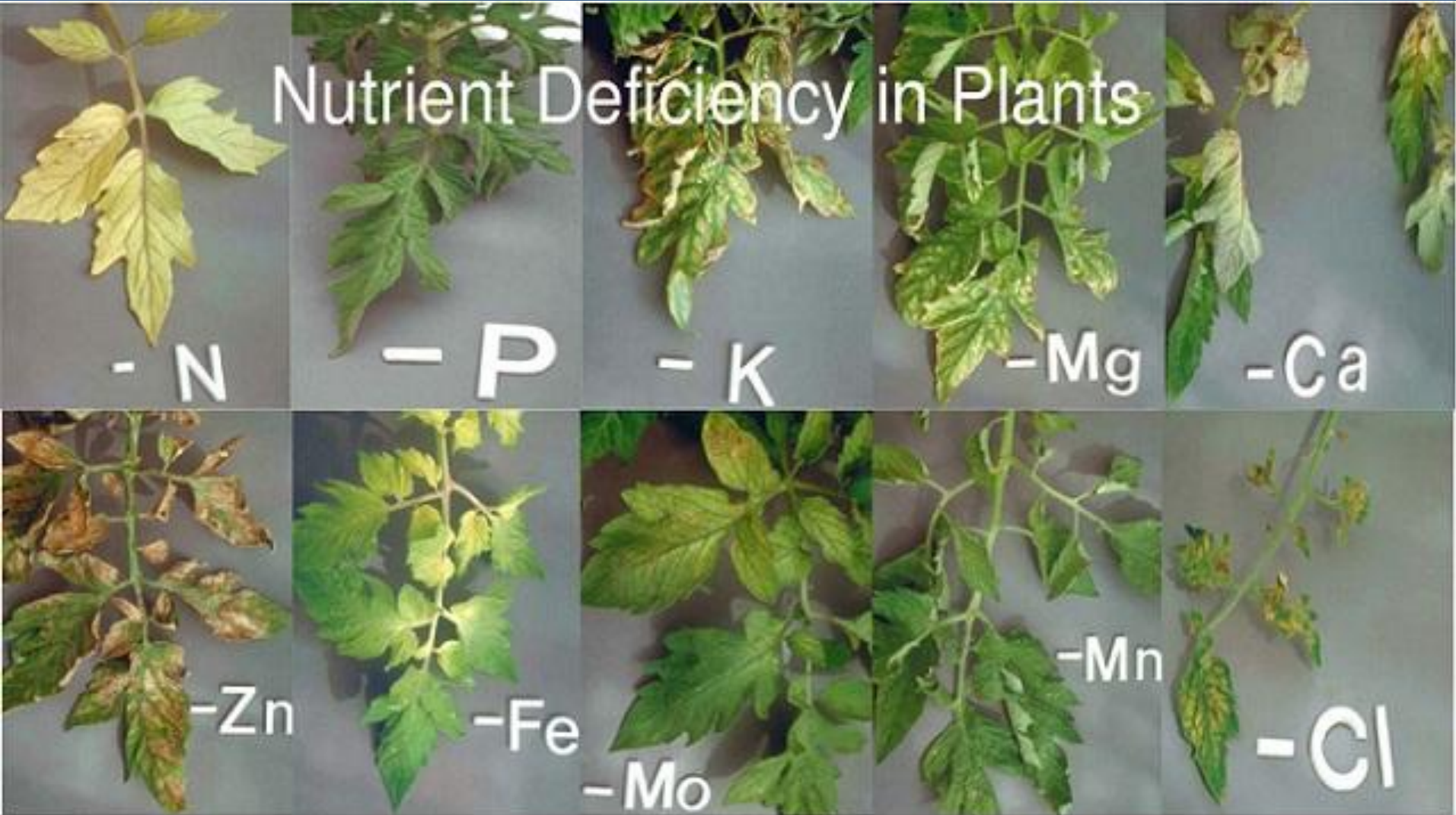
-Zn

-Fe

-Mo

-Mn

-Cl



# ลองพิจารณาดูว่า พืชขาดธาตุใด



# ลองพิจารณาดูว่า พืชขาดธาตุใด



# ลองพิจารณาดูว่า พืชขาดธาตุใด



# ลองพิจารณาดูว่า พืชขาดธาตุใด



# ลองพิจารณาดูว่า พืชขาดธาตุใด



# ลองพิจารณาดูว่า พืชขาดธาตุใด





# ลองพิจารณาดูว่า พืชขาดธาตุใด



# Hydroponics



# การลำเลียงอาหารในพืช

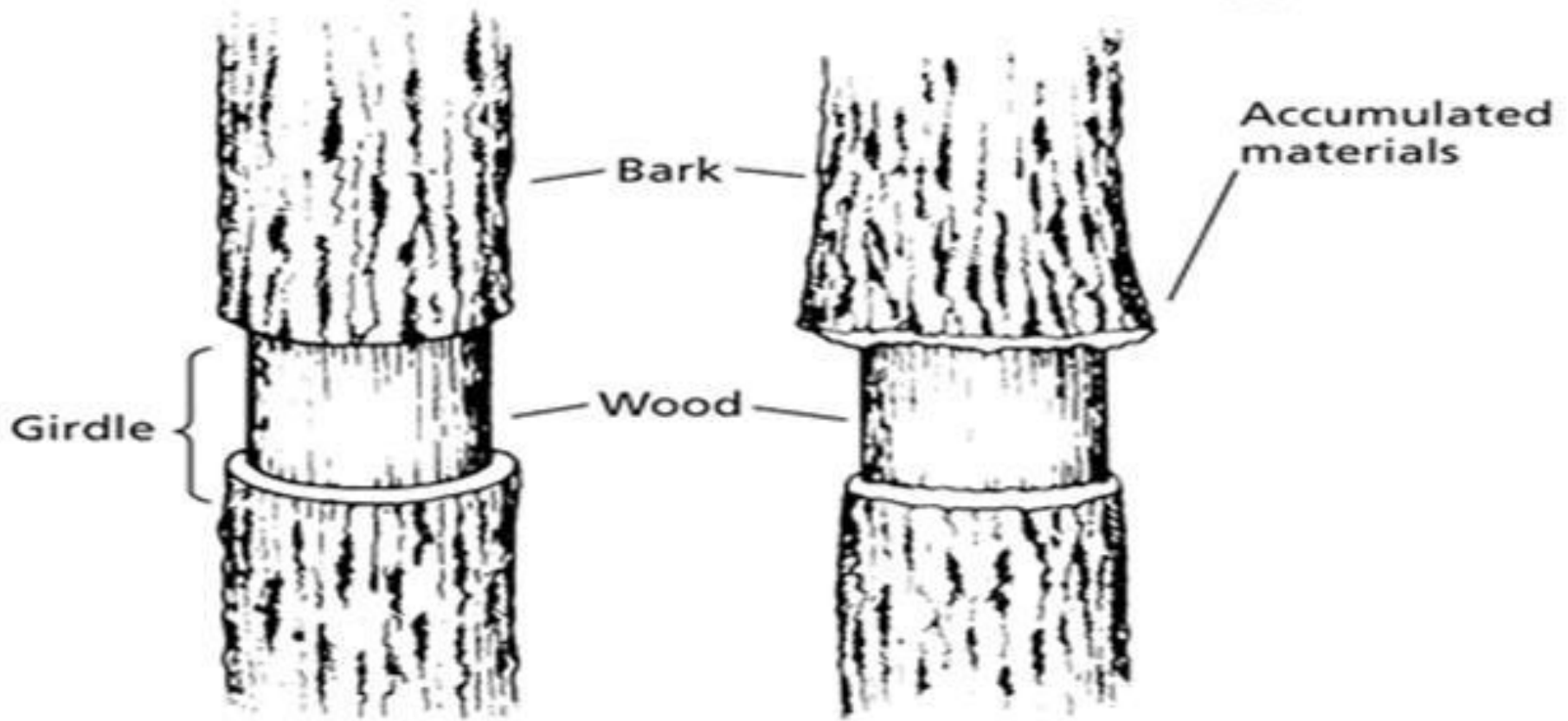


Fig: Ringing Experiment

# การลำเลียงอาหารในพืช



## PLANTS

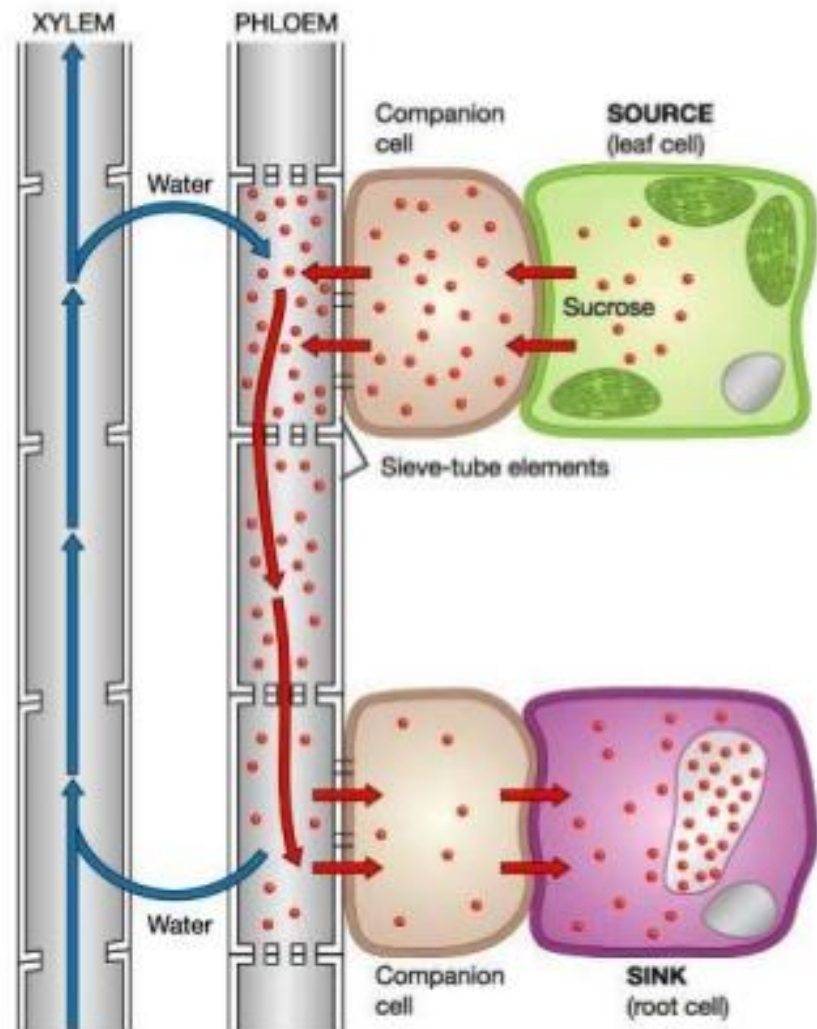
### Vascular tissue

### How does sugar move through the phloem?

Both **active** and **passive** transport from source cells to sink cells.

**Source cells:** Cells with high concentration of sugar (i.e. leaf cell)

**Sink cells:** Cells with low concentration of sugar (i.e. root cell)



# การลำเลียงอาหารในพืช

