
KKU
KHON KAEN UNIVERSITY
Lily
Pharma
LILYNANO AGROSCIENCE
Lily nano liquid fertilizer
On Demand & Environmental Friendly

Types of general fertilizers

- **Classified based on physical form:**
  - ➢ **Solid fertilizer (Granular)**
  - ➢ **Liquid fertilizer**

Solid Fertilizers

Straight fertilizers

- **Urea (46-0-0)**
- **KCl (0-0-60)**

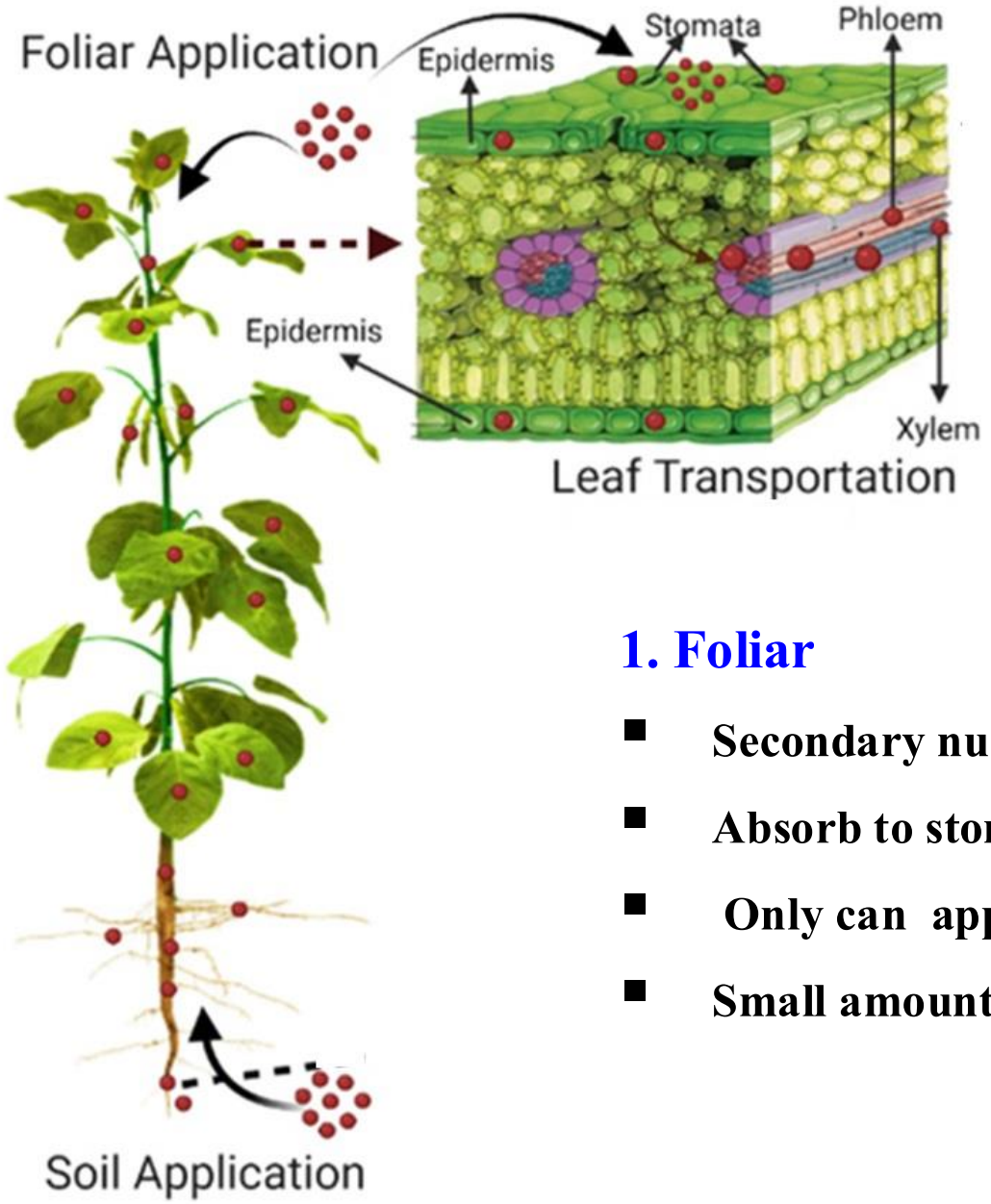
Compound fertilizers

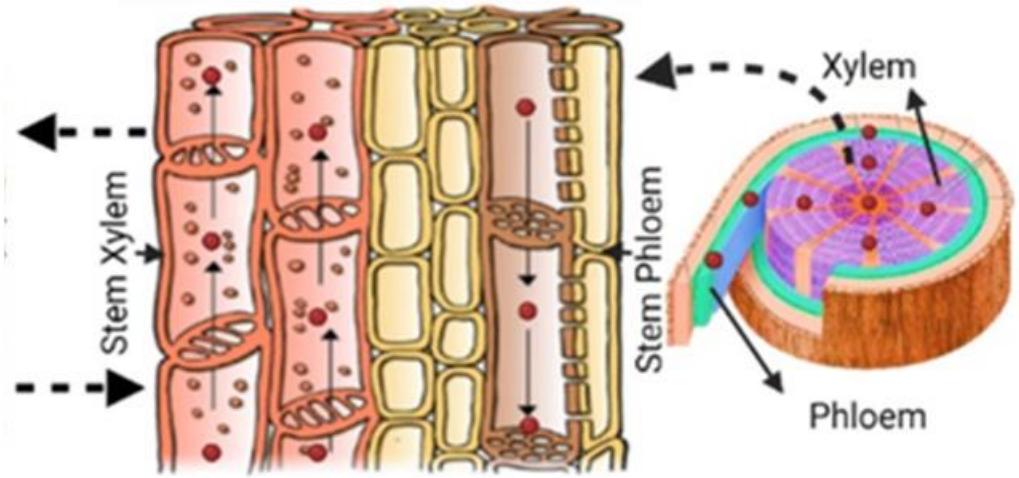
- **DAP (20-53-0)**
- **KNO_3 (13-0-46)**

Mix fertilizers

- **physical mixtures of straight and compound fertilizers and filler (NPK)**

Fertilizer uptake in plants





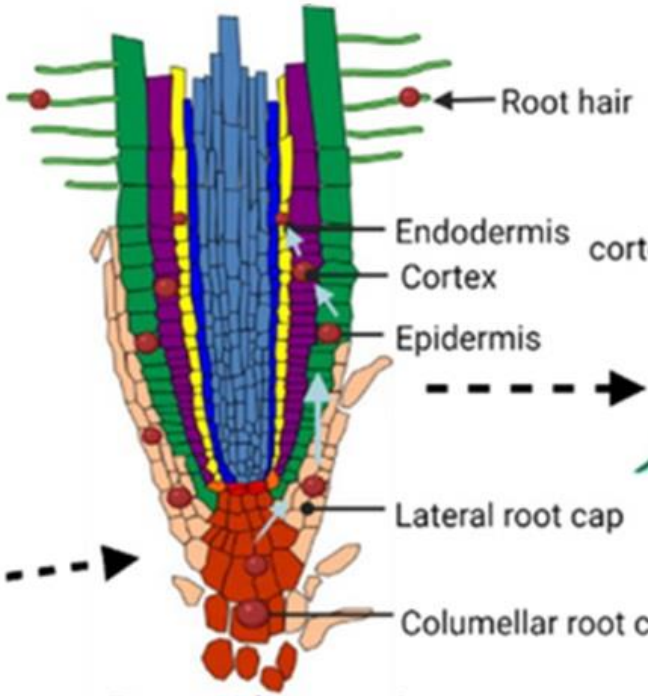
1. Foliar

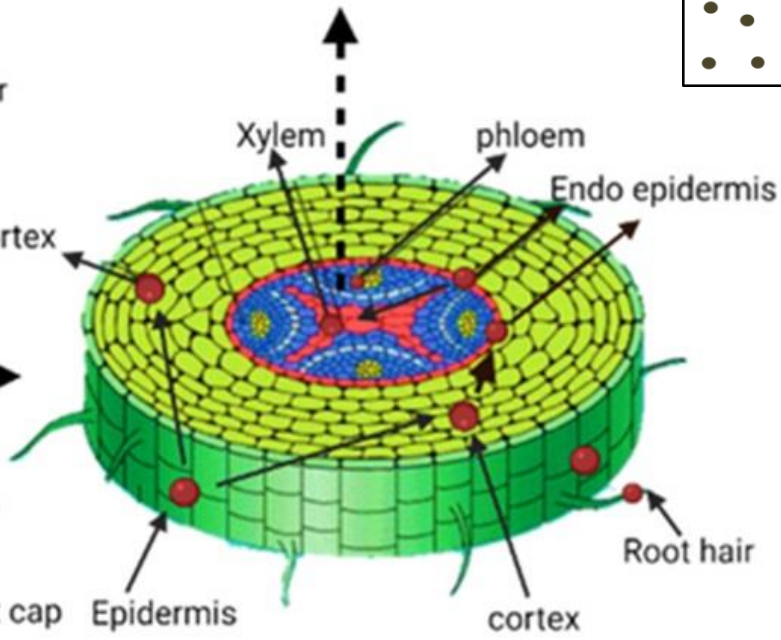
- Secondary nutrient uptake
- Absorb to stomata which are located on the lower leaves
- Only can apply when stomata opening; Ex. in the morning
- Small amount absorption

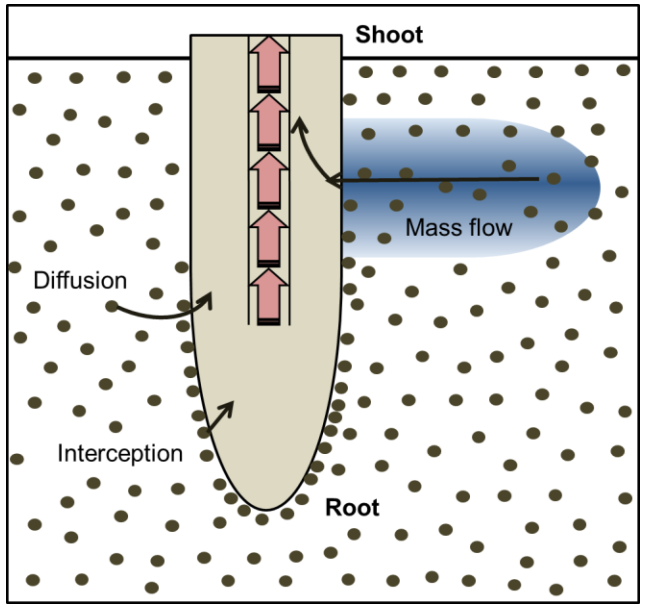
Fertilizer uptake in plants

2. Soil

- Primary nutrient uptake
- Absorb by root in 3 ways; Mass flow, Diffusion and Interception (Membrane)
- Major absorption







Soil Application

Root Absorption

Root Transportation

Macro-Nutrient Functions

Nitrogen (N)

- Plays a vital role in nitrate reduction to converts nitrate for synthesis amino acids.
- Produces necessary enzymes and structural parts of the plant.
- Stored proteins in the grain.
- Works with chlorophyll to utilize the sunlight as an energy source.

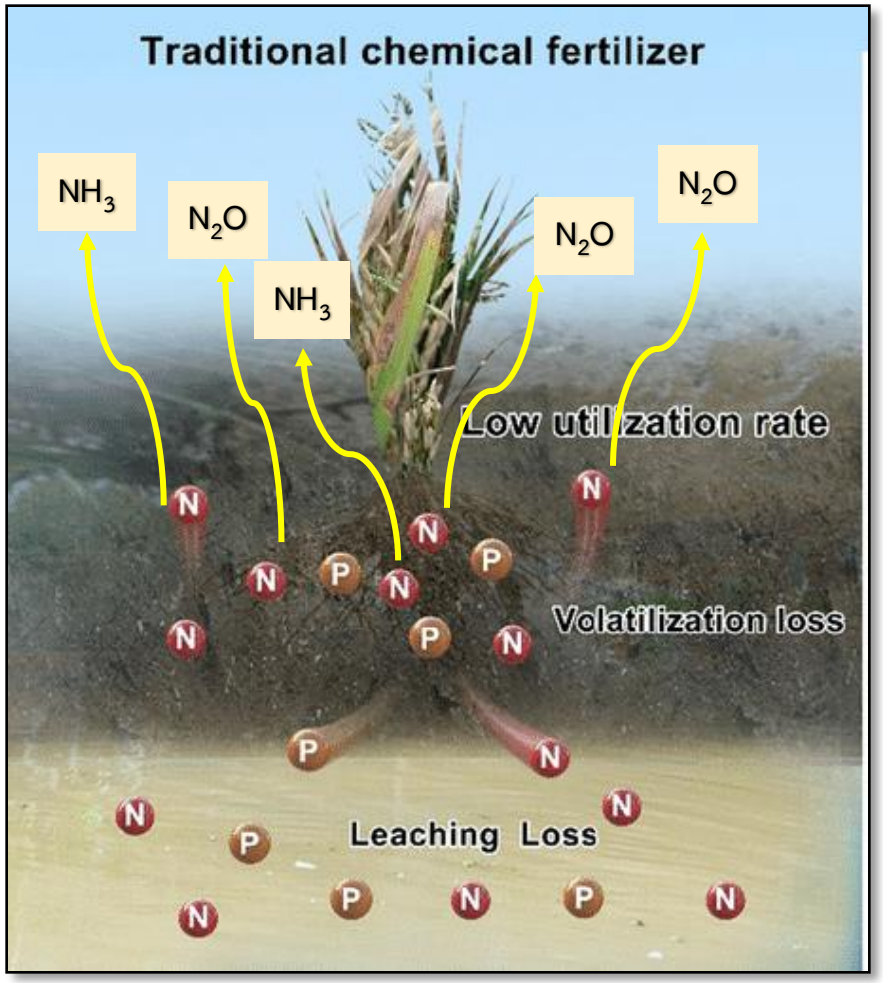
Potassium (K)

- Plays a vital role in photosynthesis
- Regulates water use with stomatal activity
- Keeps transportation systems functioning normally
- Required for protein synthesis and starch synthesis
- Enhances quality by improving disease resistance and stress management

Phosphorus (P)

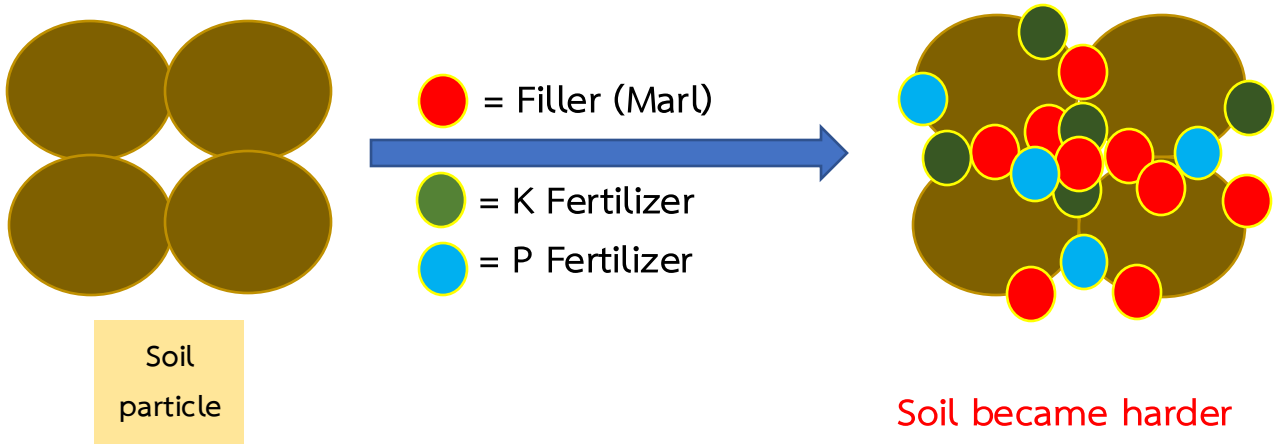
- Needs to be available during early development for max yield potential
- Needed for strong root development
- Encourages early plant growth for longer growing seasons
- Provides required energy for nutrient transport
- Plays a vital role in photosynthesis
- Essential in providing the genetics for all plant growth and development

The problem of granular fertilizer used

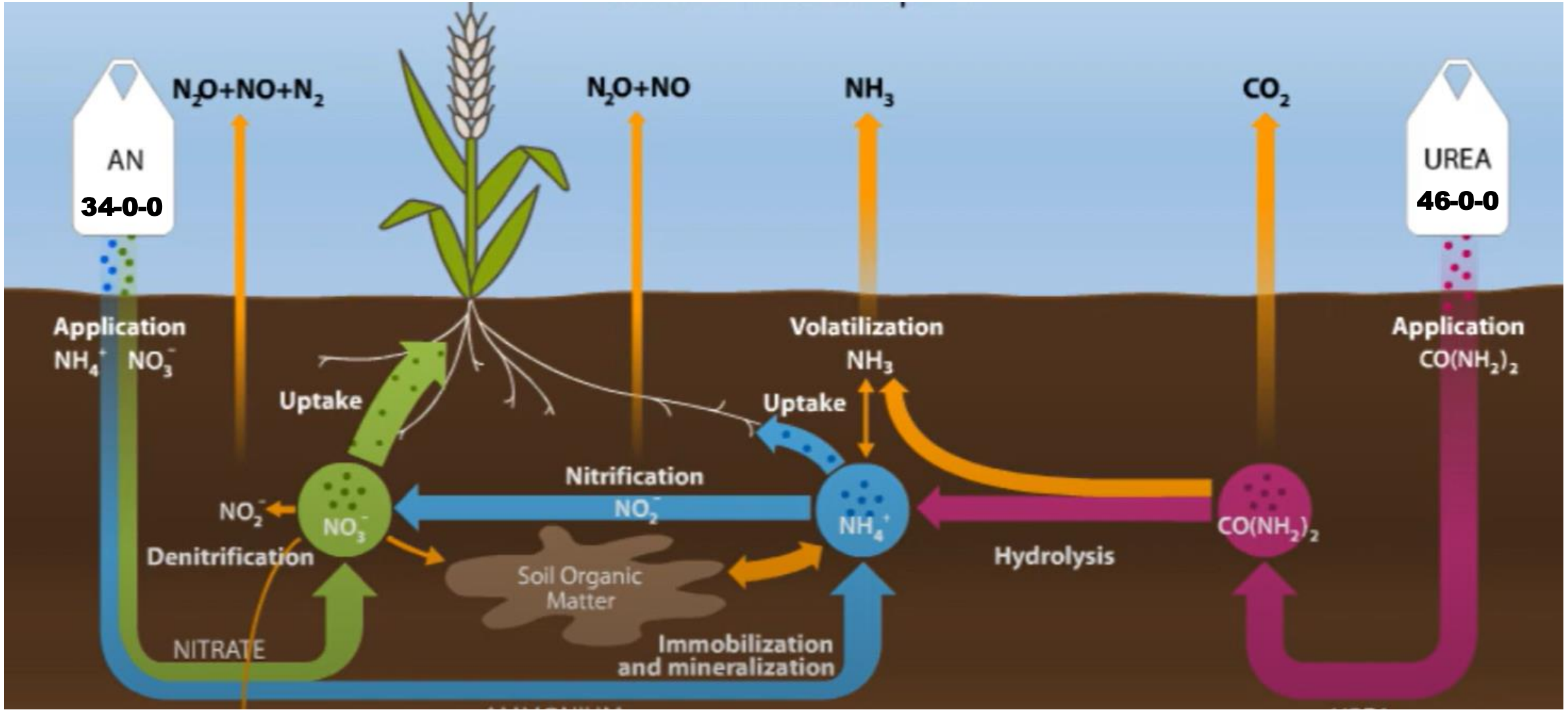


Nutrition loss

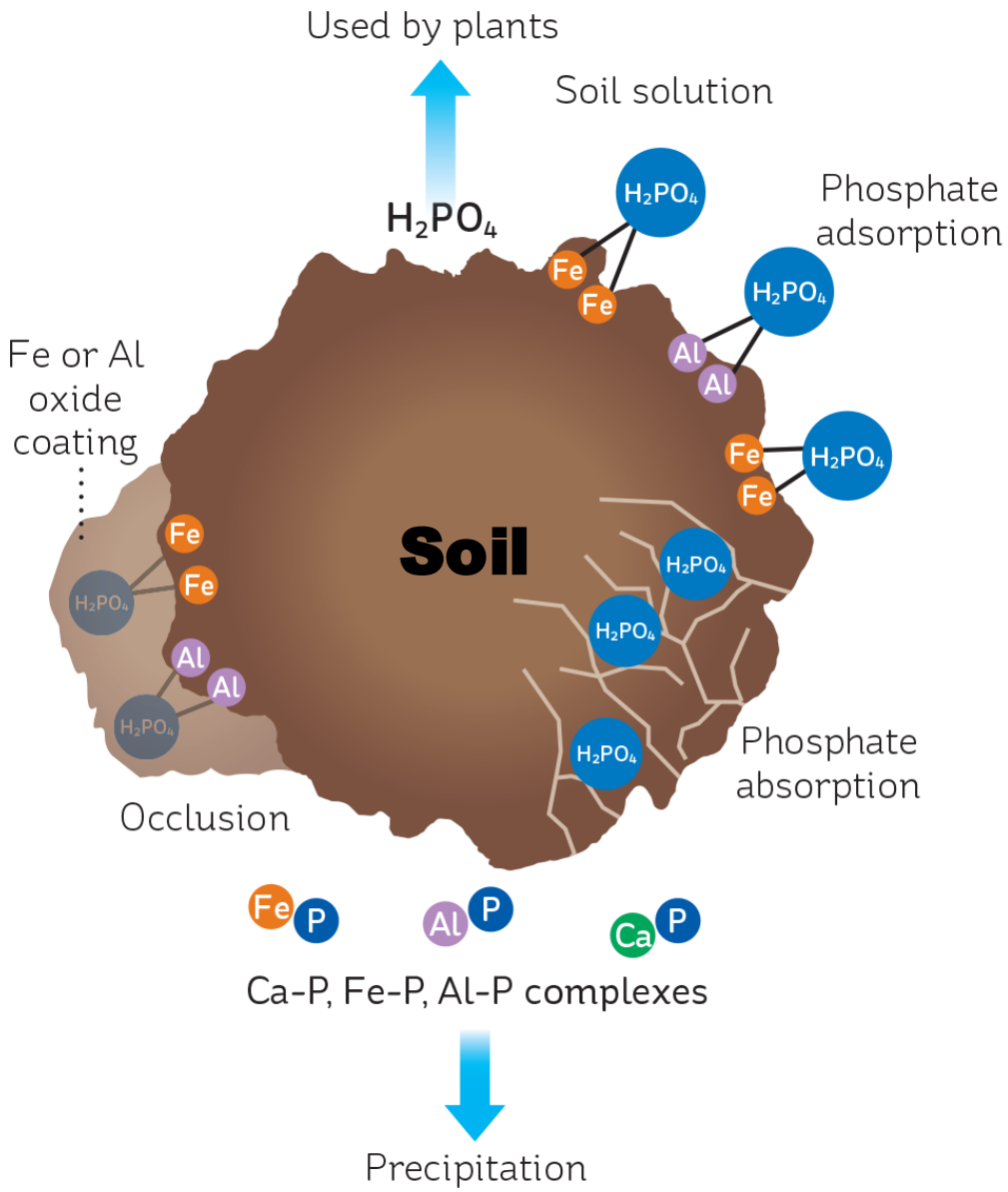
- Nitrogen (N): Approximately 40-70% is lost to the atmosphere in the form of NH_3 (ammonia) and N_2O (nitrous oxide), or leaches into rivers as NO_3^- (nitrate) and NO_2^- (nitrite)
- Phosphorus (P): About 80-90% reacts with micronutrients and is retained in the soil.
- Potassium (K): Around 50-90% undergoes ion exchange with the soil and is retained in the soil.



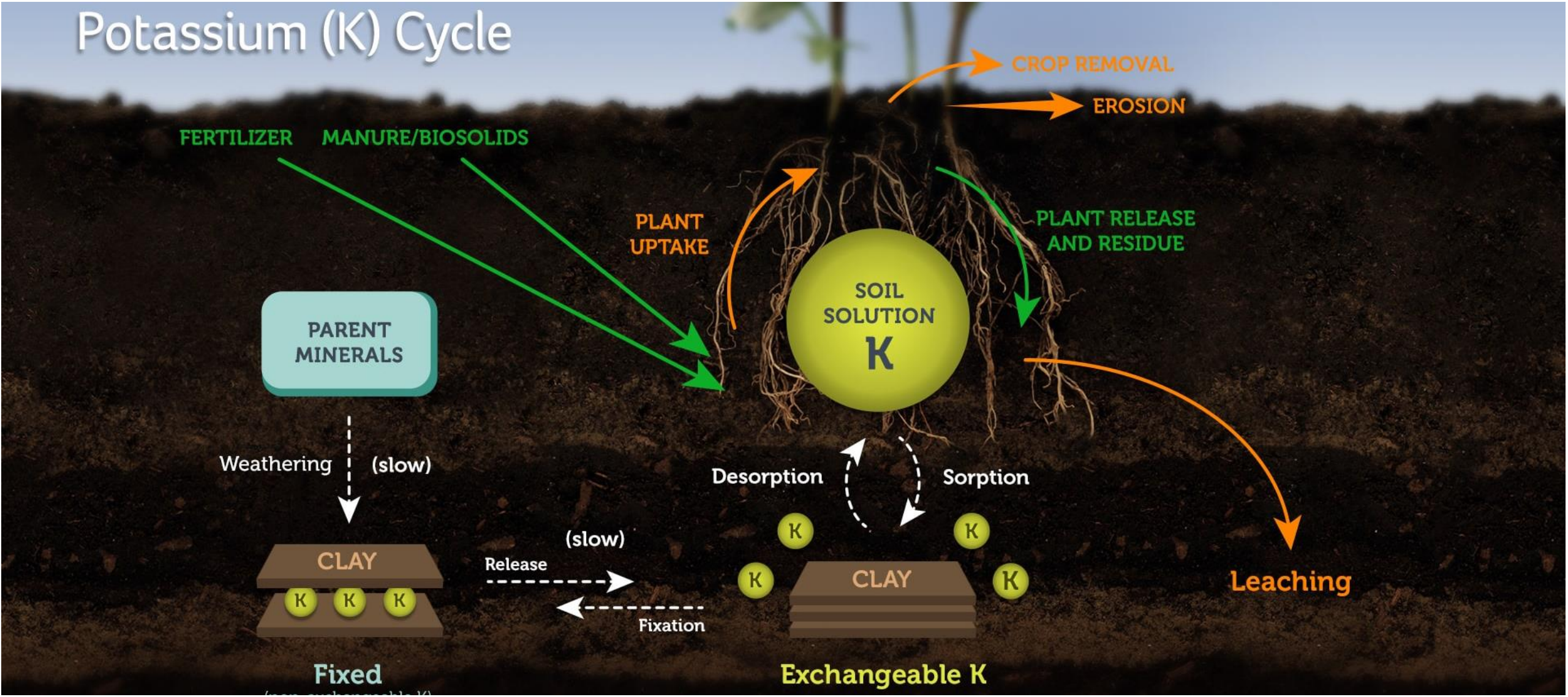
Nitrogen (N) cycle



Phosphorus (P) cycle



Potassium (K) cycle



Approach to Problem Solving

1. Increase nutrient uptake
2. Reduce environmental impacts
3. Prevent nutrient loss

Objectives

Outcome

- Reduced production cost
- Improved yield
- Increased resilence
- Improved nutrient uptake
- Improved agricultural sustainability
- Improved quality

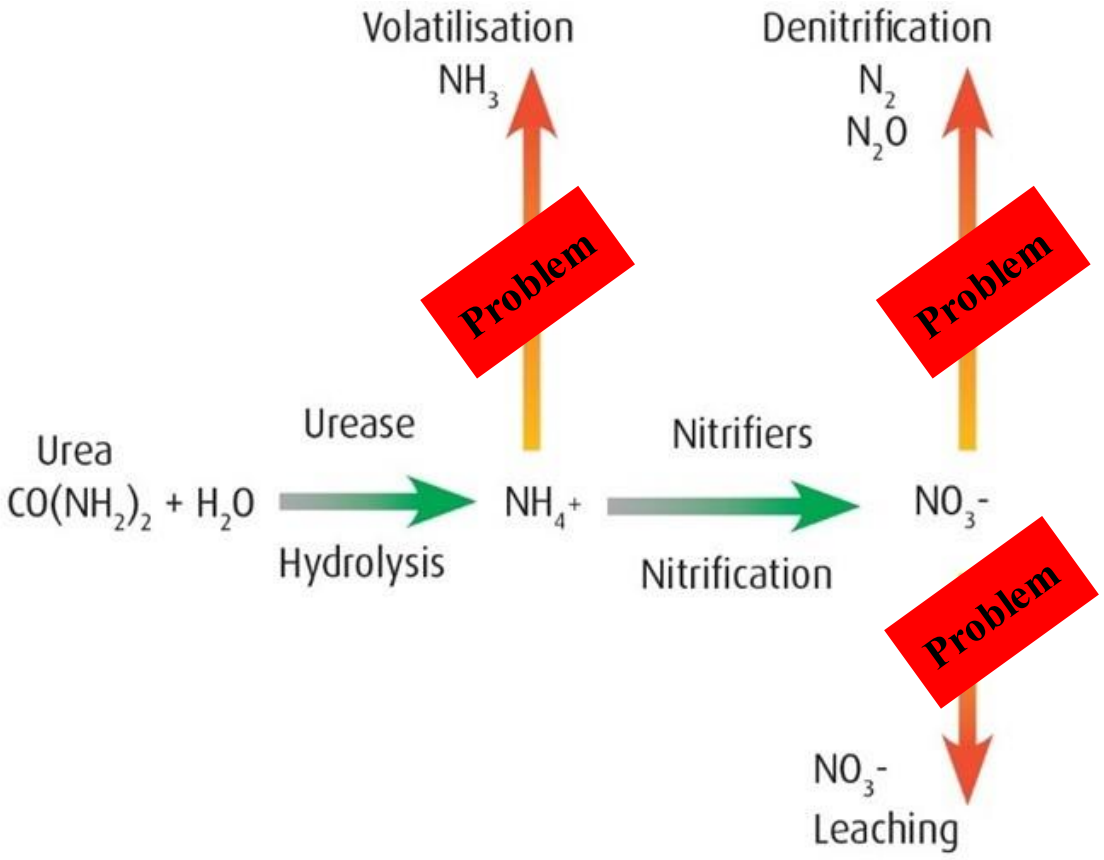
Crops

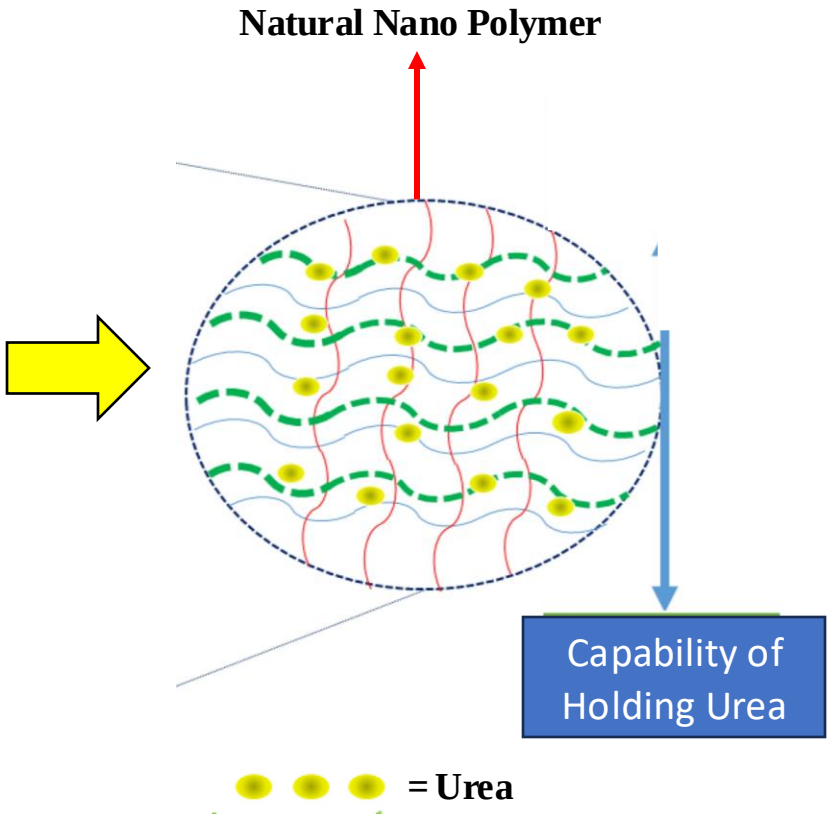
Soil & Environment

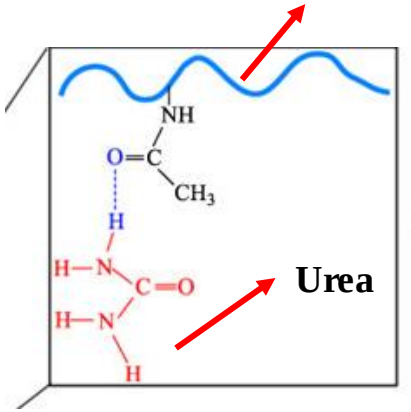
- Reduced environmental impact
- Reduced nutrition loss
- Improved water efficienty

Approach to Problem Solving

N **Nitrogen**

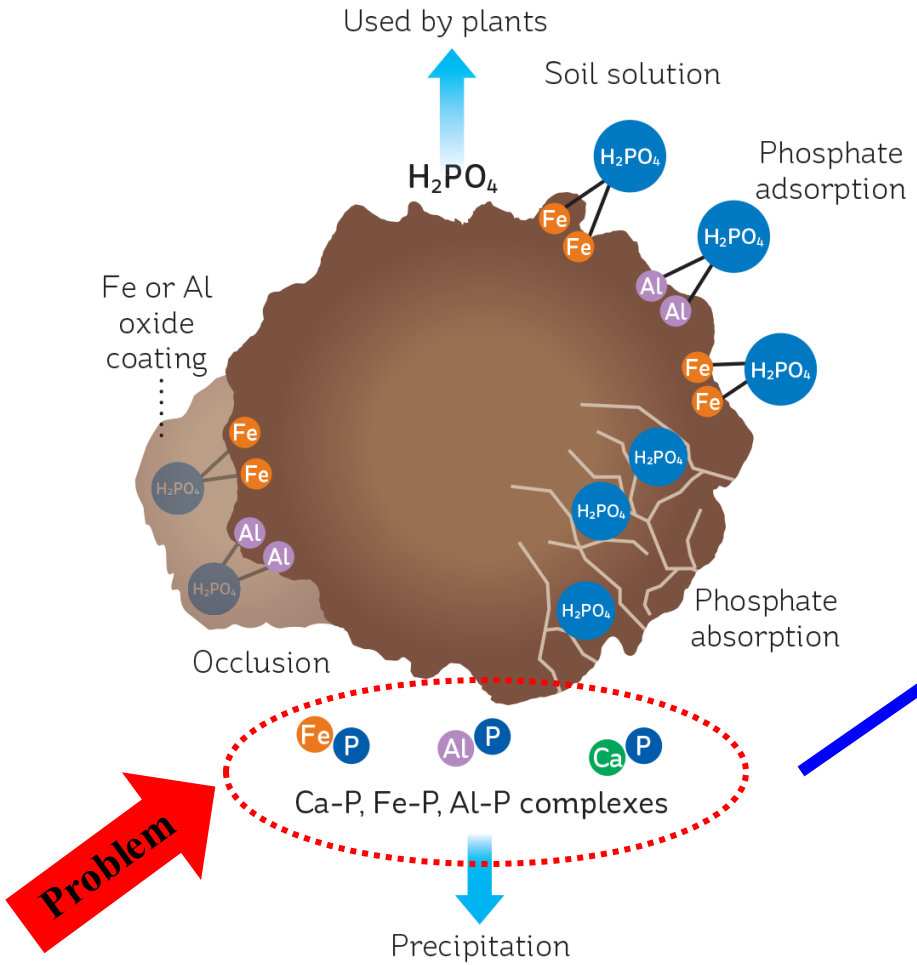




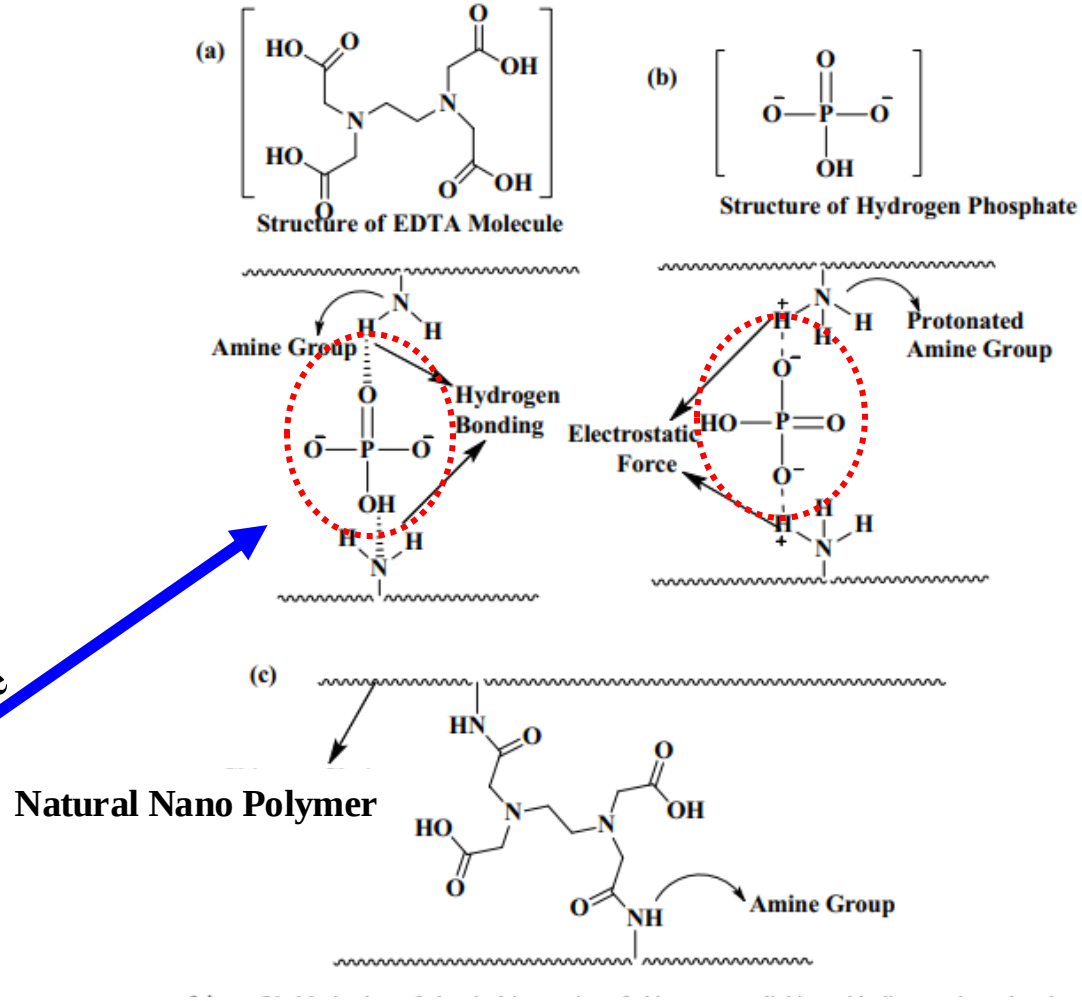


Approach to Problem Solving

P Phosphorus



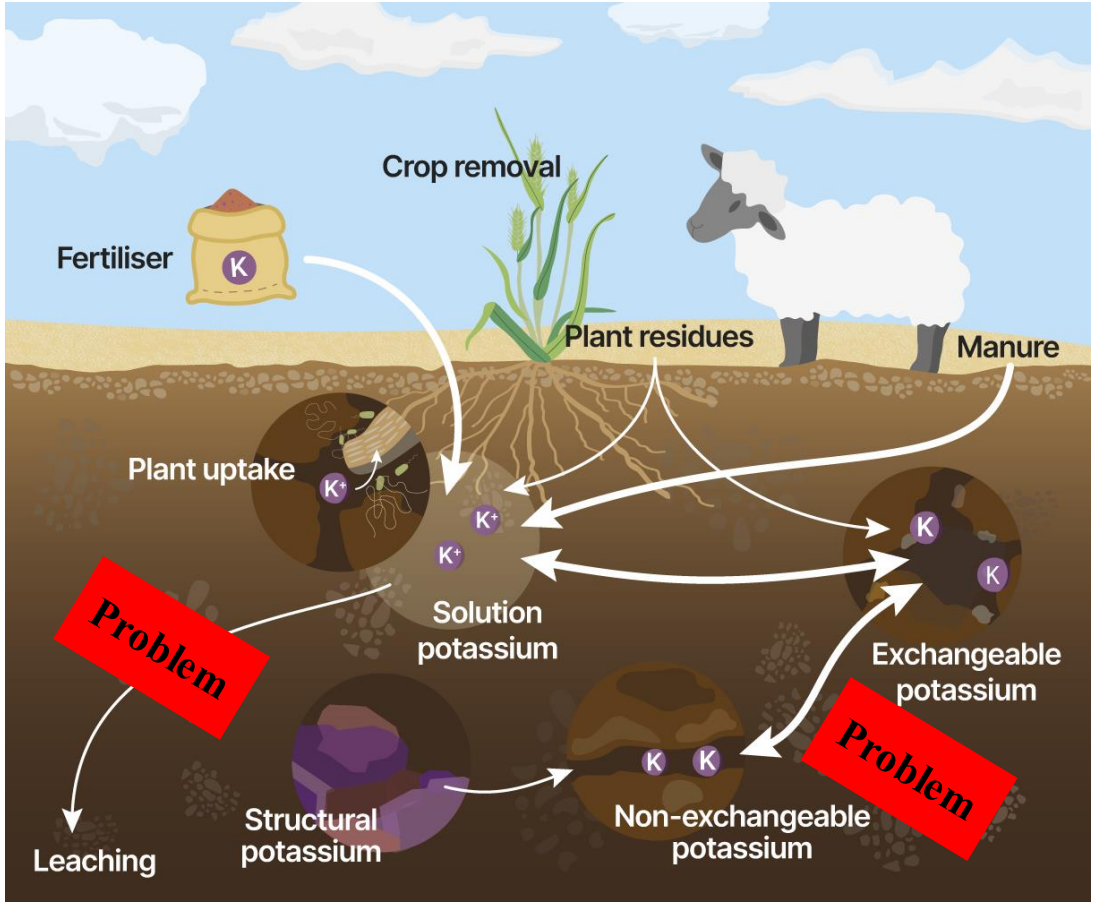
Improve

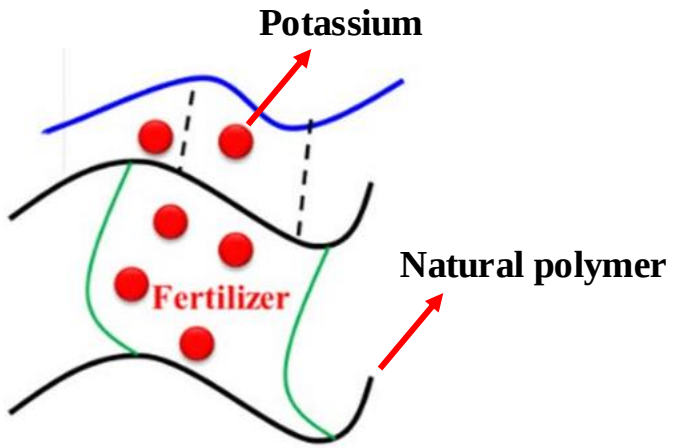


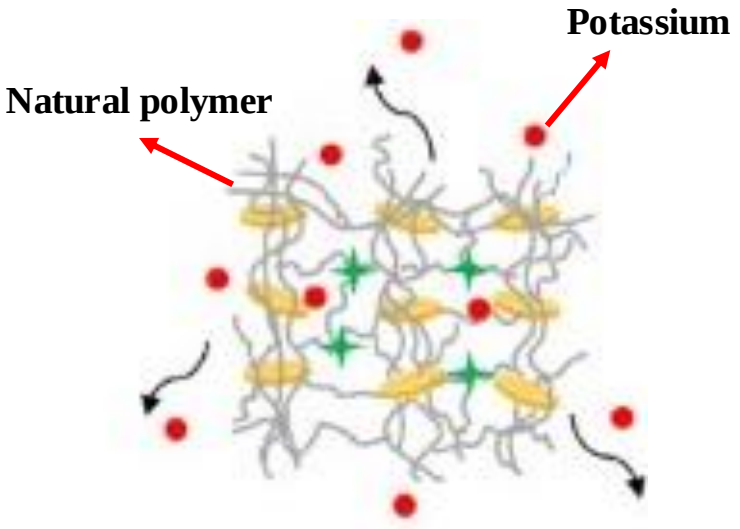
Reference: Topics in Current Chemistry (2021) 379:19. https://doi.org/10.1007/s41061-021-00331-z

Approach to Problem Solving

K Potassium

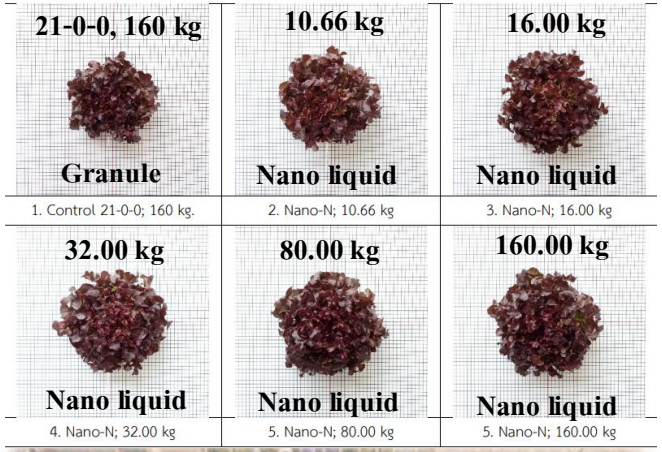






Comparison the efficiency of conventional and Nano liquid fertilizer

Test in red oak- Mar. 2024

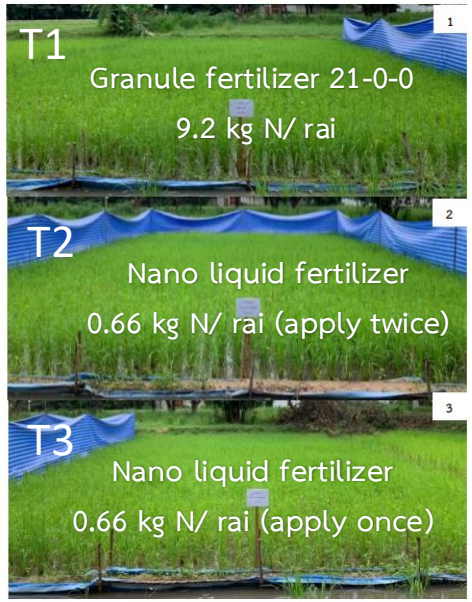


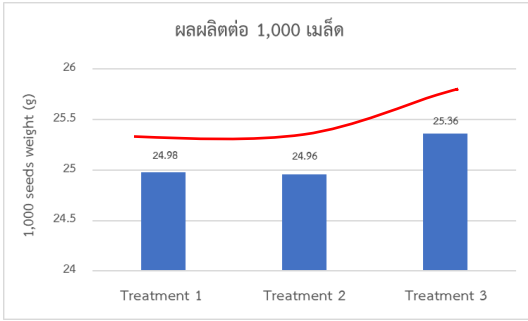
- Use <15 times
- plant can grow out door
- plant can grow out off season
- plant grows better

Test in hemp-Apr. 2023

- Use < 2 times
- plant can grow out door
- plant can grow out off season
- plant grows better

Test in rice-Oct 2023

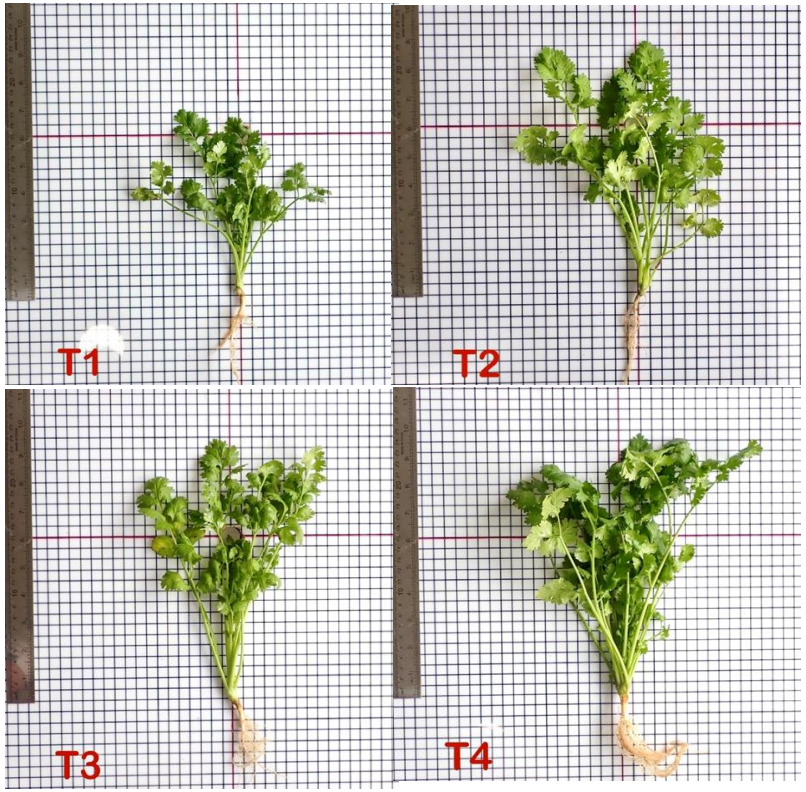




- The production equal with granule fertilizer but use N less than 13-14 times

Comparison the productivity of conventional and Nano liquid fertilizer

Test in Coriander-Jun 2024



T1 ==Conventional 21-0-0
N=160 kg/rai
****
T2 = Nano liquid fertilizer
N= 10.66 kg/rai (N <15 times)
****
T3 = Nano liquid fertilizer
N= 16 kg/rai (N < 10 times)
****
T4 = Nano liquid fertilizer
N=160 kg/rai
****

- Coriander was applied with Nano liquid fertilizer at 10.66 , 16 and 160 kg/rai taller than applied with conventional fertilizer at 160 kg/rai 119.15, 148.62 and 293.65 % and dried weight was higher than conventional fertilizer 116.68, 141.89 and 177.56 % respectively.

Test in Chinese celery –Jun 2024

T1 ==Conventional 21-0-0
N=160 kg/rai
****
T2 = Nano liquid fertilizer
N=10.66 kg/rai (N < 15 times)
****
T3 = Nano liquid fertilizer
N=16 kg/rai (N < 10 times)
****
T4 = Nano liquid fertilizer
N=160 kg/rai
****

- Chinese celery was applied with Nano liquid fertilizer at rate 10.60 , 16 and 160 kg/rai taller than conventional fertilizer 110.16, 128.11 and 140.27% and wet weight was also higher than conventional fertilizer 156.29, 207.46 and 315.88 %.

Experiment on green house gas (GHG) emission (On process)

Project responsibility

Faculty of Agriculture, Khon Kaen University

Measurement

1. Gas emission : N_2O and CO_2
2. Growth

Testing plants

Cassava

Sugarcane

Rice

Cherry tomato

Holy basil

List of our fertilizer products

Formulas

- 22-0-0
- 4-0-18
- 12-3-9
- 15-5-5
- 7-7-7

Hormone & PGR fertilizer

- Rubber tree Micronutrient
- Rubber tree Hormone
- Immune booster
- Durian Micronutrient
- Palm Micronutrient
- 3% nano Chitosan

Conclusion

Lily nano liquid fertilizers offer several advantages:

1. Enhanced Nutrient Absorption: The nano-sized particles facilitate more efficient uptake by plants, leading to improved growth and development.
2. Reduced Environmental Impact: By minimizing nutrient loss through leaching and volatilization, these fertilizers decrease the risk of environmental pollution.
3. Increased Crop Yields: The efficient delivery of essential nutrients supports higher productivity and better-quality harvests.

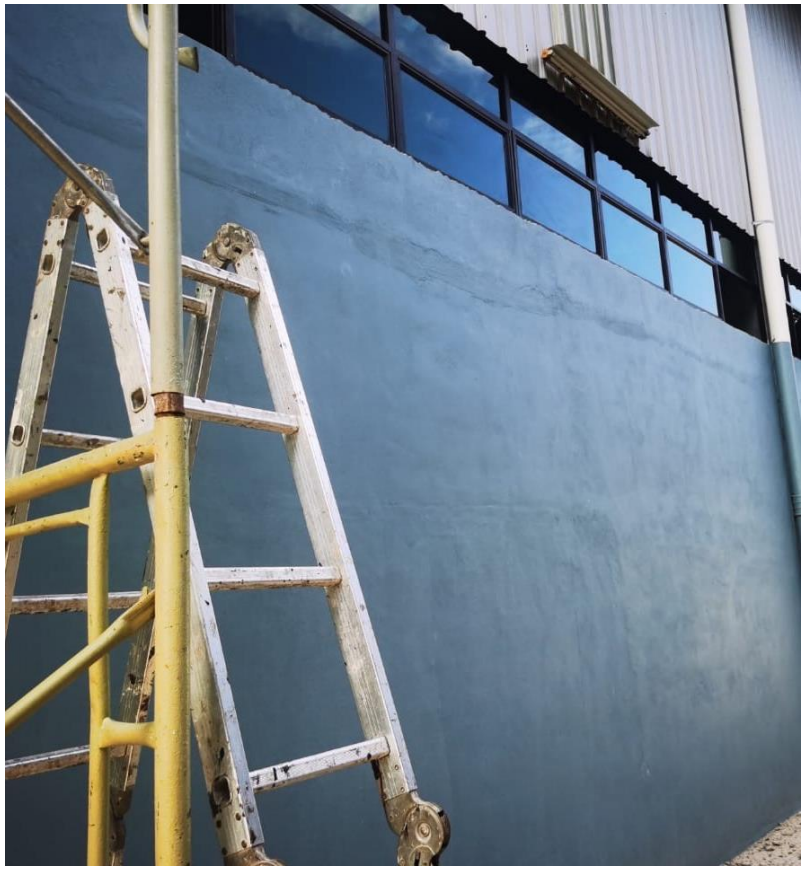
Conclusion

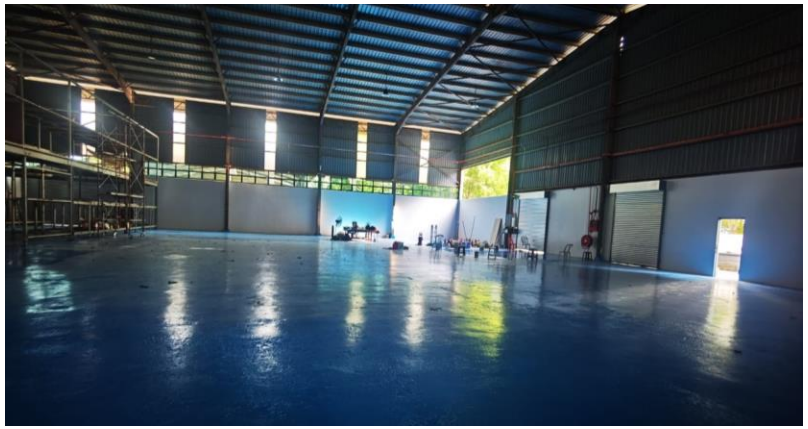
4. Cost-Effectiveness: Due to their high efficiency, smaller quantities are needed compared to traditional fertilizers, resulting in cost savings.
5. Versatility: Suitable for a wide range of crops, these fertilizers can be tailored to meet specific plant nutritional requirements.
6. Improved Soil Health: They help maintain soil integrity by preventing nutrient buildup and reducing the risk of soil degradation over time.
7. Simplified Application: Lily nano liquid fertilizers can be applied directly to plants without the need for prior soil testing, streamlining the fertilization process.

Lily Pharma Mechanical Workshop, Pathum Thani

Lily Pharma Mechanical Workshop, Pathum Thani

JV Signing Ceremony at Khon Kaen University





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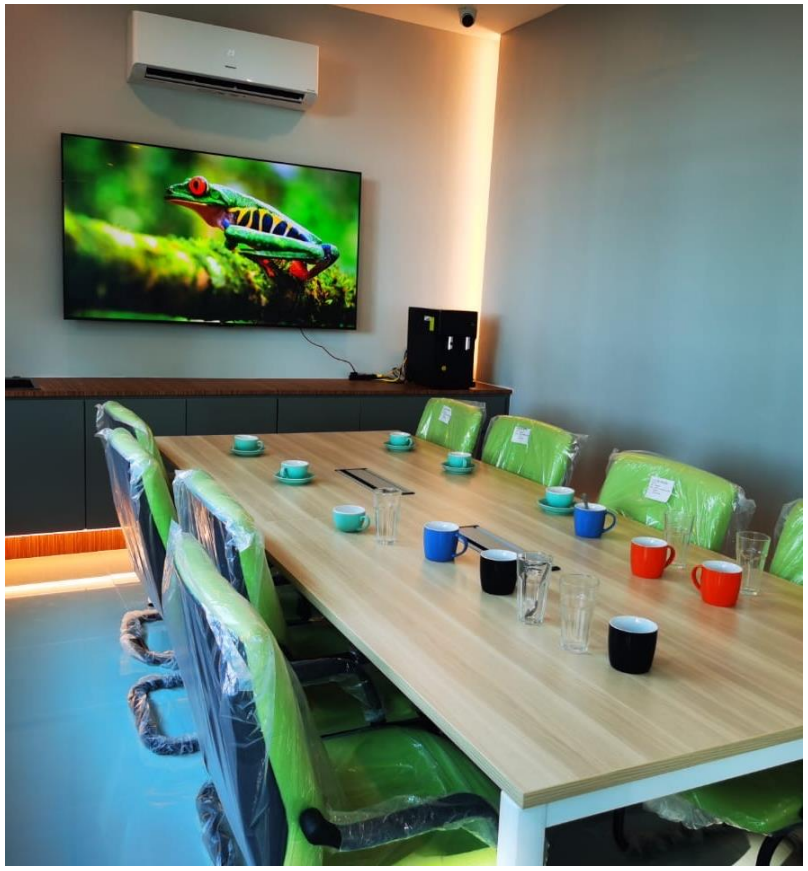

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