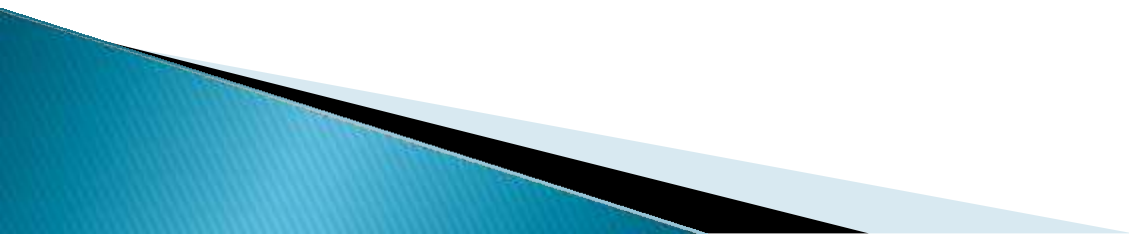


FERTILIZER REACTIONS IN SOIL



FERTILIZER Materials having

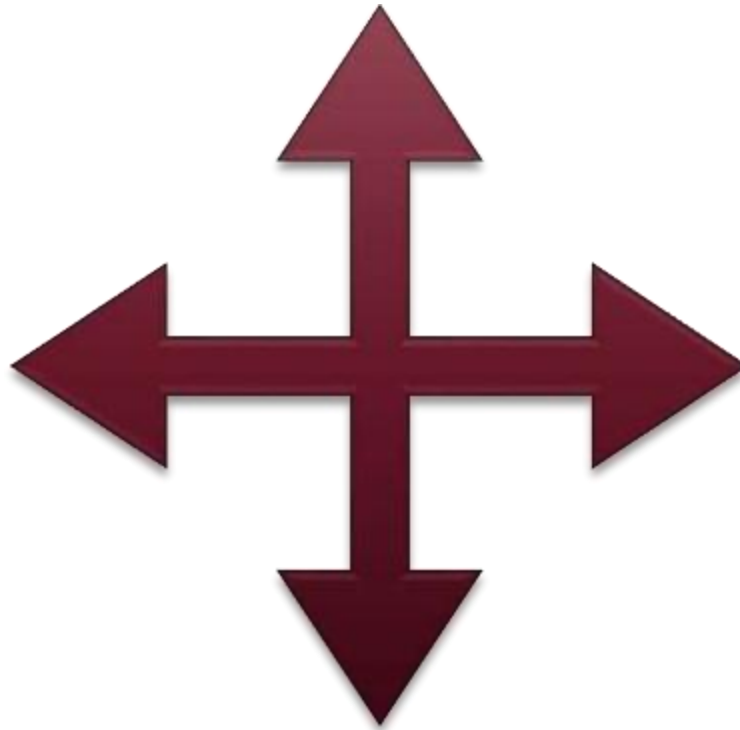
- definite chemical composition
- higher analytical value
- capable of supplying plant nutrients in available form



NITROGENOUS FERTILIZER

Ammonical form (Eg. Ammonium sulphate – 20% N)

Amideform
Eg: Urea -46% N



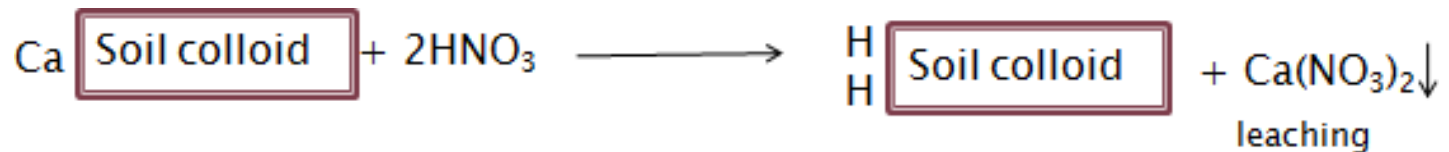
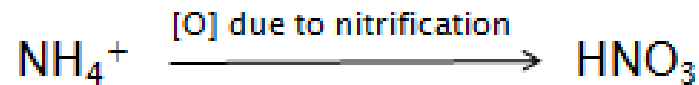
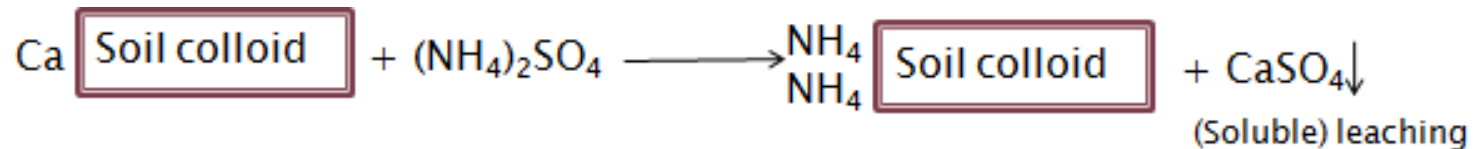
Nitrate form
Eg: NaNO_3 – 16% N

Both Ammonium- Nitrate Eg:
CAN – 20% N

Reaction of Ammonium sulphate in soil

1. In Upland condition:

Cation exchange - NH_4^+ displaces some other cations.



2. In calcareous soil:



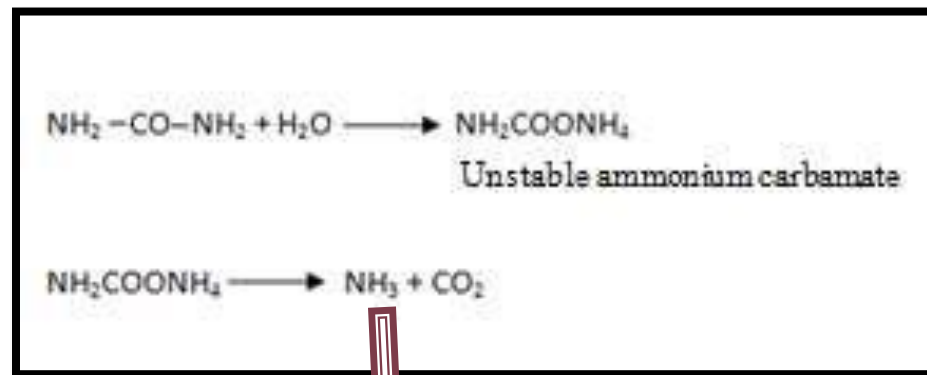
When $(NH_4)_2SO_4$ applied as

Broadcast – losses of Nitrogen is appreciable

Drilled - losses of nitrogen is not appreciable

REACTION OF UREA IN SOIL

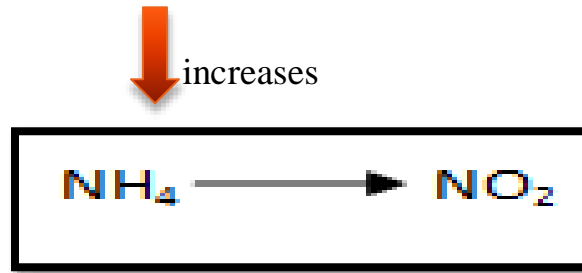
Urea undergoes enzymatic hydrolysis to produce ammonium carbamate.



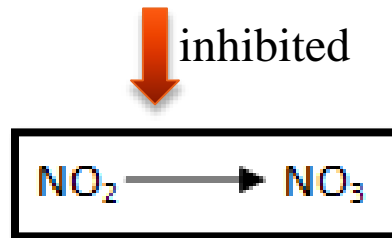
NH_3 converted to NH_4^+

Further reaction is similar to Ammoniacal form

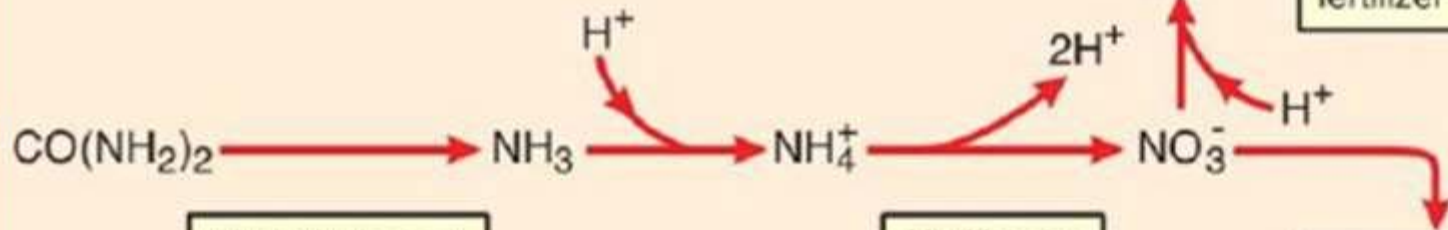
- High concentration of urea – combined toxic effect of NH_3 and NO_2
- Higher concentration of NH_3



- Due to low population of Nitrobacter



Acidity and nitrogen fertilizers



Hydrolysis and ammonification

Nitrification

Urea
UAN

Anhydrous
Ammonia

MAP
DAP
SoA

CAN
sodium
nitrate

Loss of OH^- in produce removed

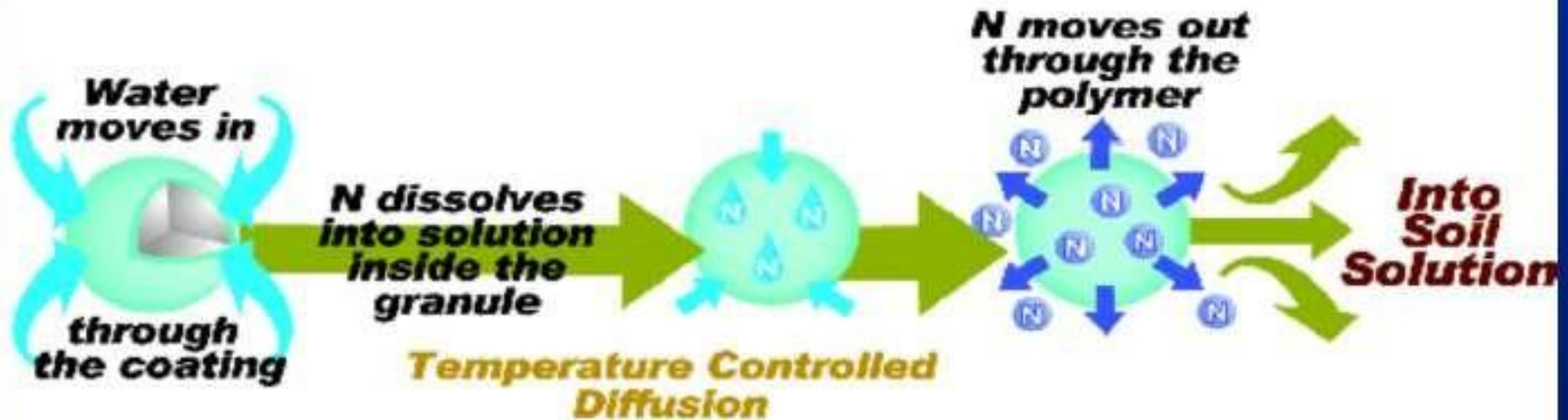
If plants take up nitrate, net H^+ production is zero from urea and NH_3 fertilizer

If nitrate is lost by leaching, the net production of H^+ acidifies the soil for all fertilizers except NO_3^-

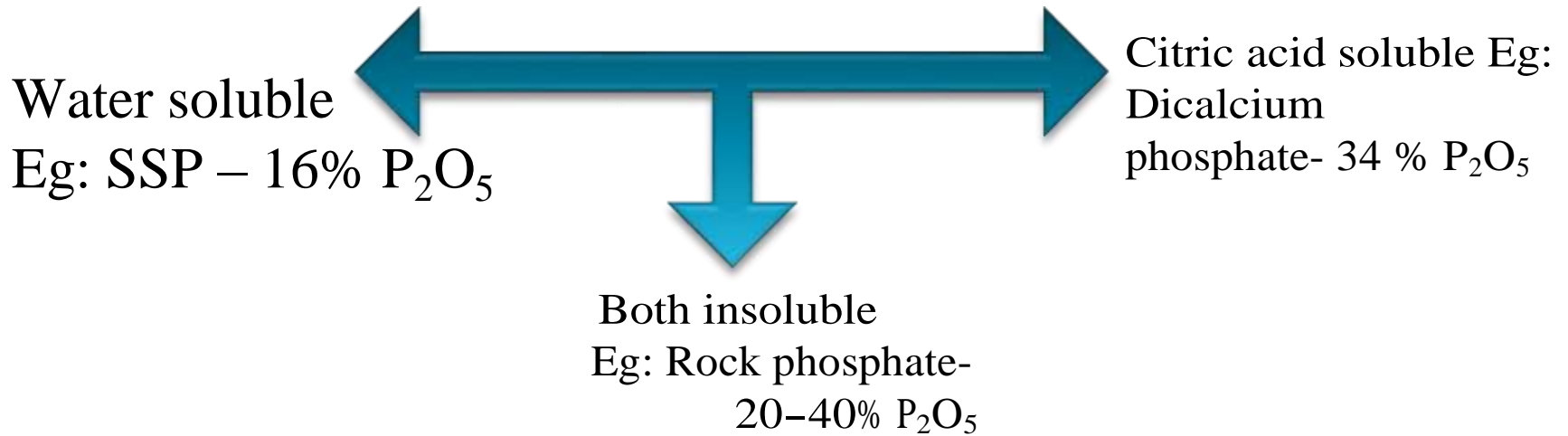


REACTION OF SLOW RELEASE NITROGENOUS FERTILIZER

Polymer Coated Urea



PHOSPHATIC FERTILIZERS

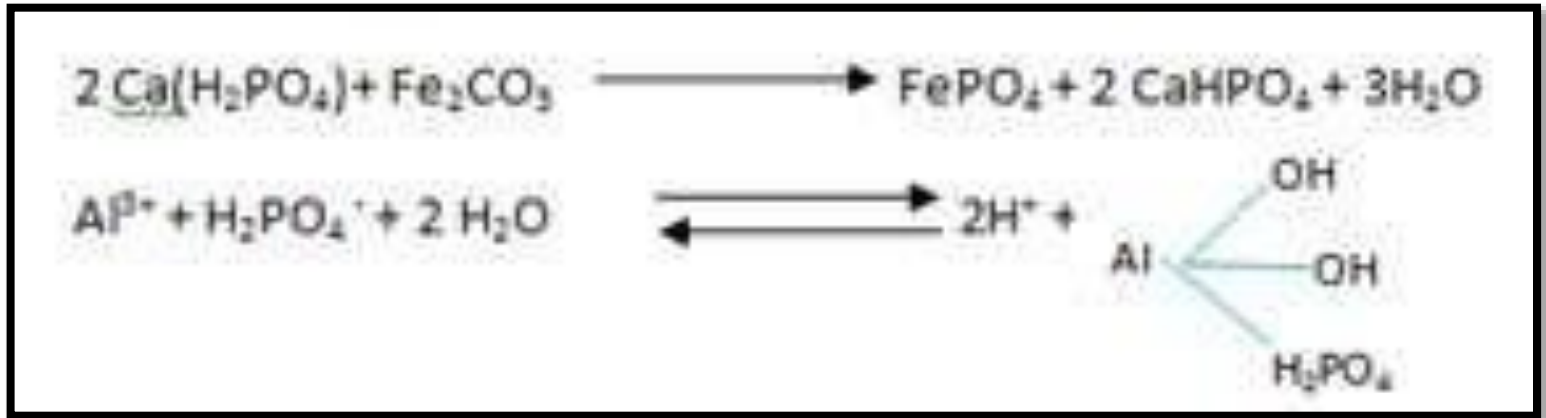


REACTION OF SUPERPHOSPHATE IN SOIL

Superphosphate applied to moist soil

- Dissolved in soil moisture
- Within short time gets precipitated
- SSP not leached from soil by Rainfall

REACTION OF SSP IN ACID SOIL



Combines with Fe and Al – forms insoluble phosphate
- becomes unavailable

REACTION OF SSP IN NEUTRAL AND CALCAREOUS SOIL

- Monocalcium phosphate converted to Tricalcium phosphate
- Tricalcium phosphate converted to insoluble compounds like apatite

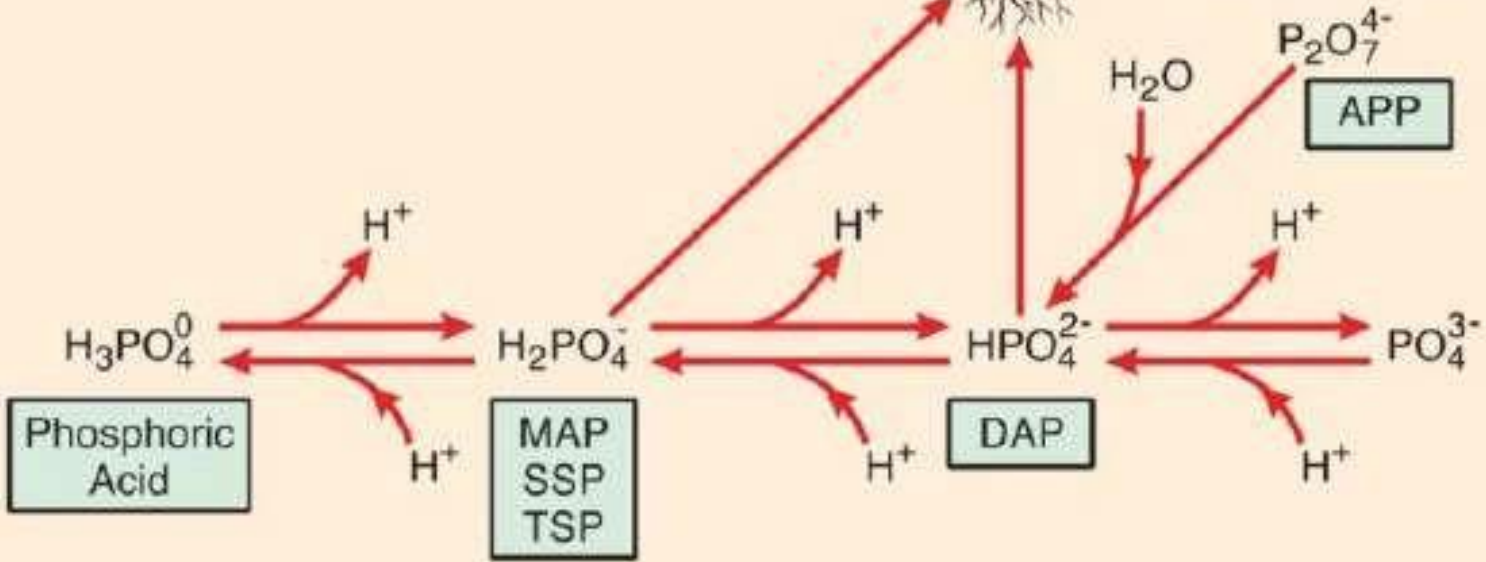
REACTION OF SSP IN ALKALI SOIL

- ❖ SSP reacts with sodium and forms monosodium phosphate
- ❖ Monosodium phosphate – highly soluble and become available to plants

Acidity and phosphorus fertilizers

Loss of OH⁻ in produce removed

Form of P taken up by plant has little effect on soil acidity



REACTION OF POTASSIC FERTILIZER IN SOIL

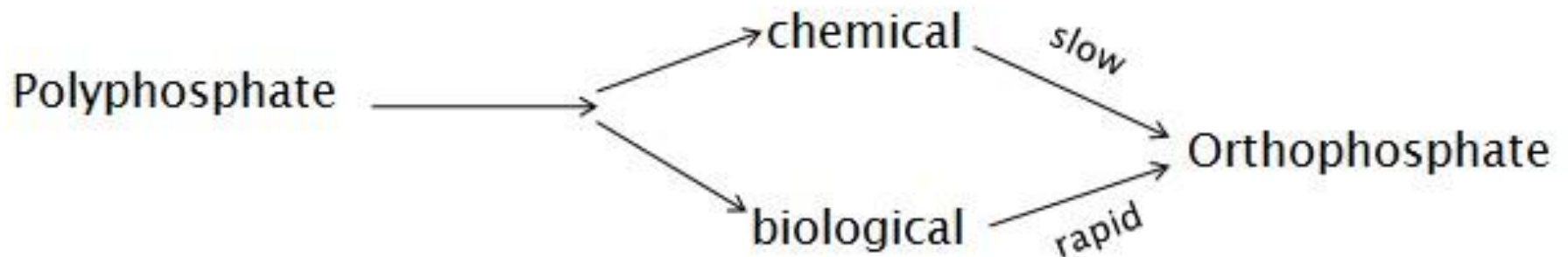
Both KCl and K_2SO_4

– soluble in water

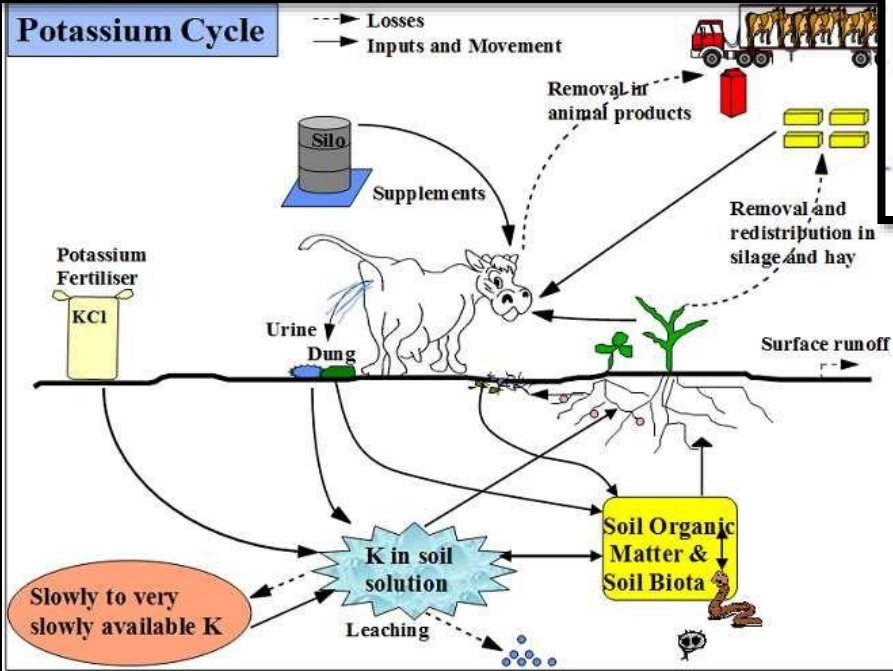
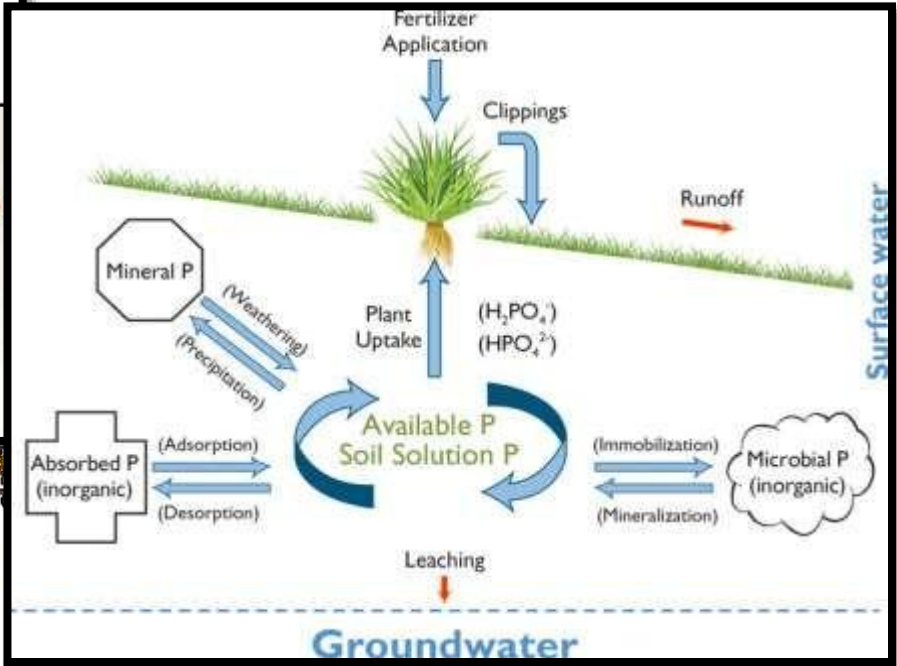
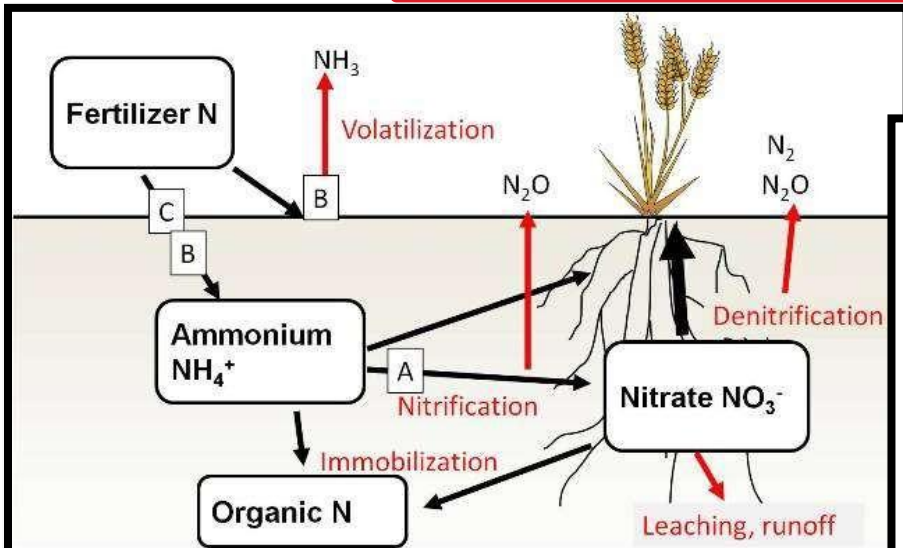
-on application in soil they ionize to K^+ , Cl^- , SO_4^{2-}

- available to plants

REACTION OF POLYPHOSPHATE FERTILIZER IN SOIL



LOSS AND GAIN OF NUTRIENTS



Taken up by the crop

Can move from the field through soil erosion and water runoff

Reacts with soil minerals and organic matter

Fate of applied fertilizer

lost to the atmosphere as a gas

Can leach from the root zone with water

