

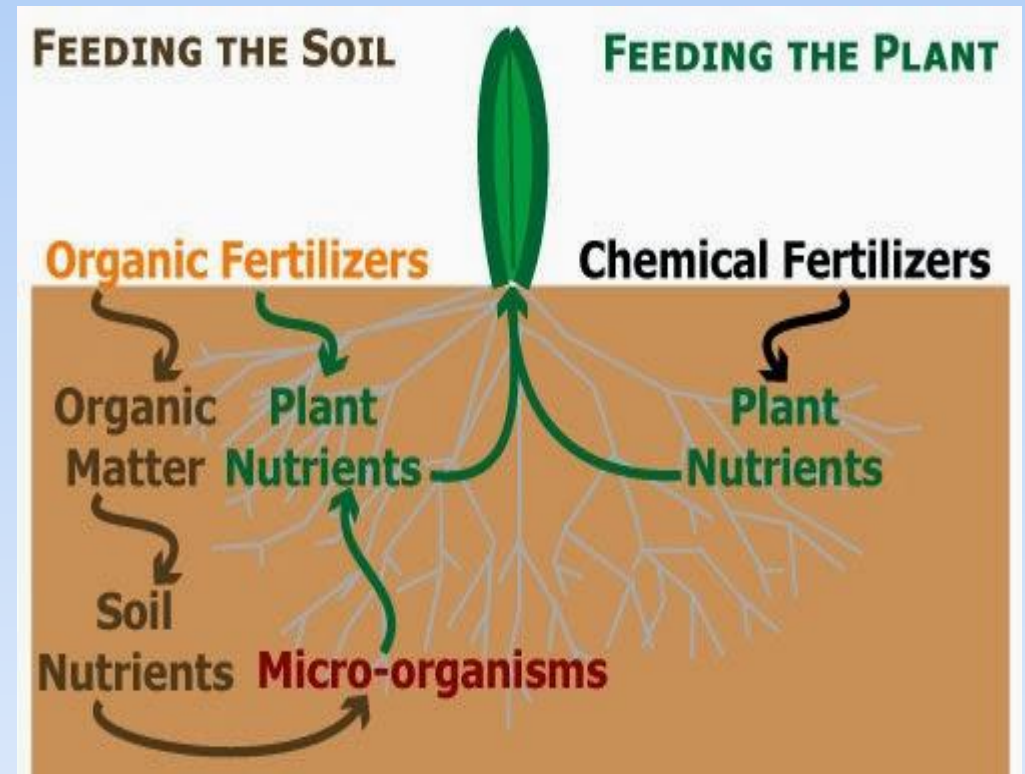
Reduction of Nitrogen and Phosphorus flows into Lake Rotorua



- I will cover today:
 - Modern fertiliser practice; focus on soluble nutrients
 - How P and N cycle in the soil
 - Soil biological function. Impact of soluble nutrients.
 - New bio-technologies that grow crops and pastures with reduced need for soluble nutrients.

Should we refocus fertiliser spend and emphasise efficiency more than cost per kg of N,P,K & S?

- Farmers can reduce N and P loss from their farms by reducing the inputs of soluble P and N fertilisers but that often comes with a reduction in productivity.
- Improvements in fertiliser nutrient efficiency using modern technologies are increasingly common globally.
- The NZ the fertiliser industry remains focused on Single Superphosphate and Urea
- We could place more emphasis on efficient use of the nutrients
 - Nutrient cycling
 - Methods of plant uptake
 - Reduced losses from soil to water



Regular applications of soluble nutrients on pasture. Typical pasture soil profile.



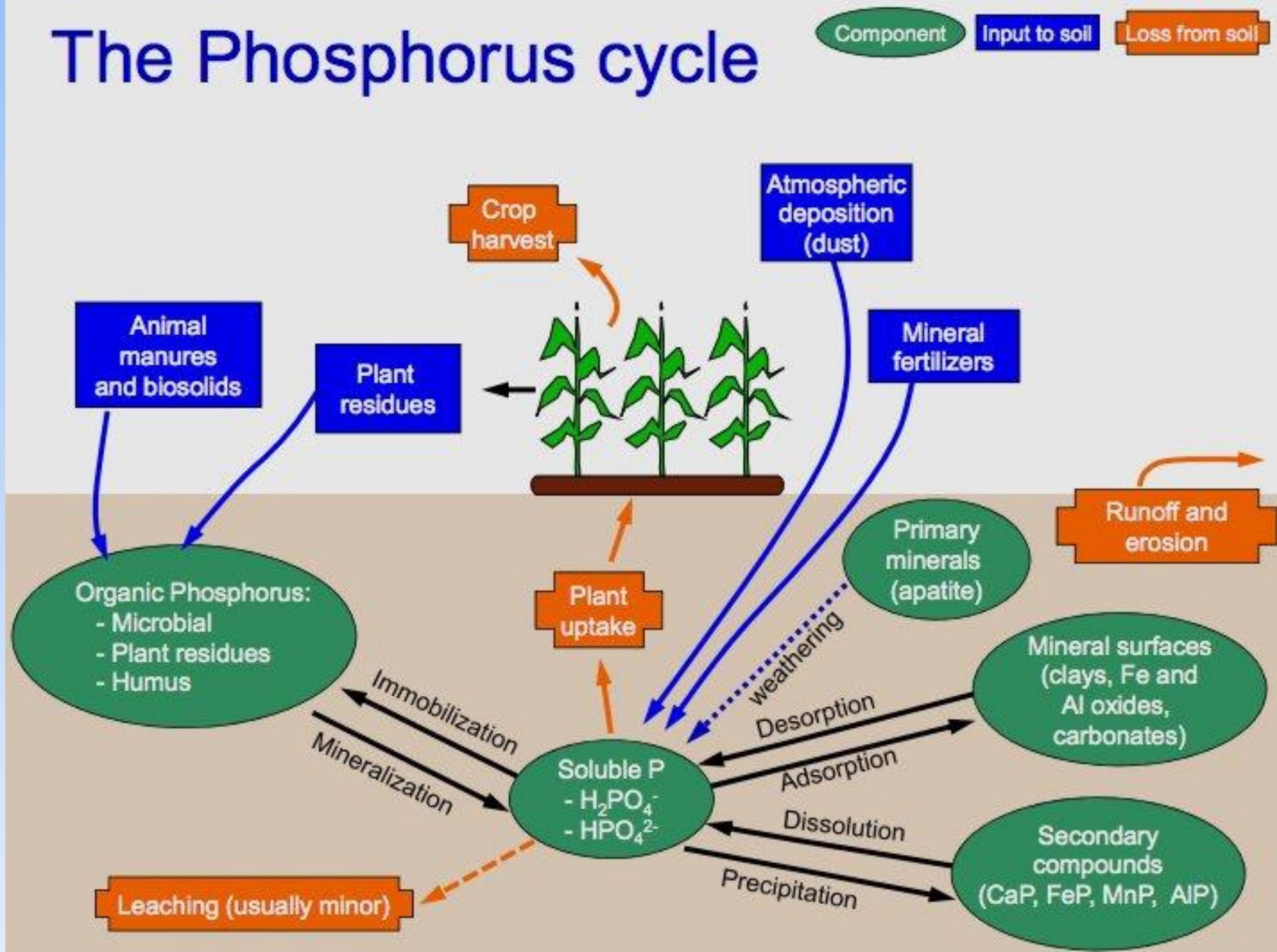
- Shallow root system
- Very high levels of undigested plant material in top 75 mm
- Only a fraction of the soil profile is being used for nutrient and moisture transaction by the pasture.

Same soil, climate and pasture. Different fertiliser approach.

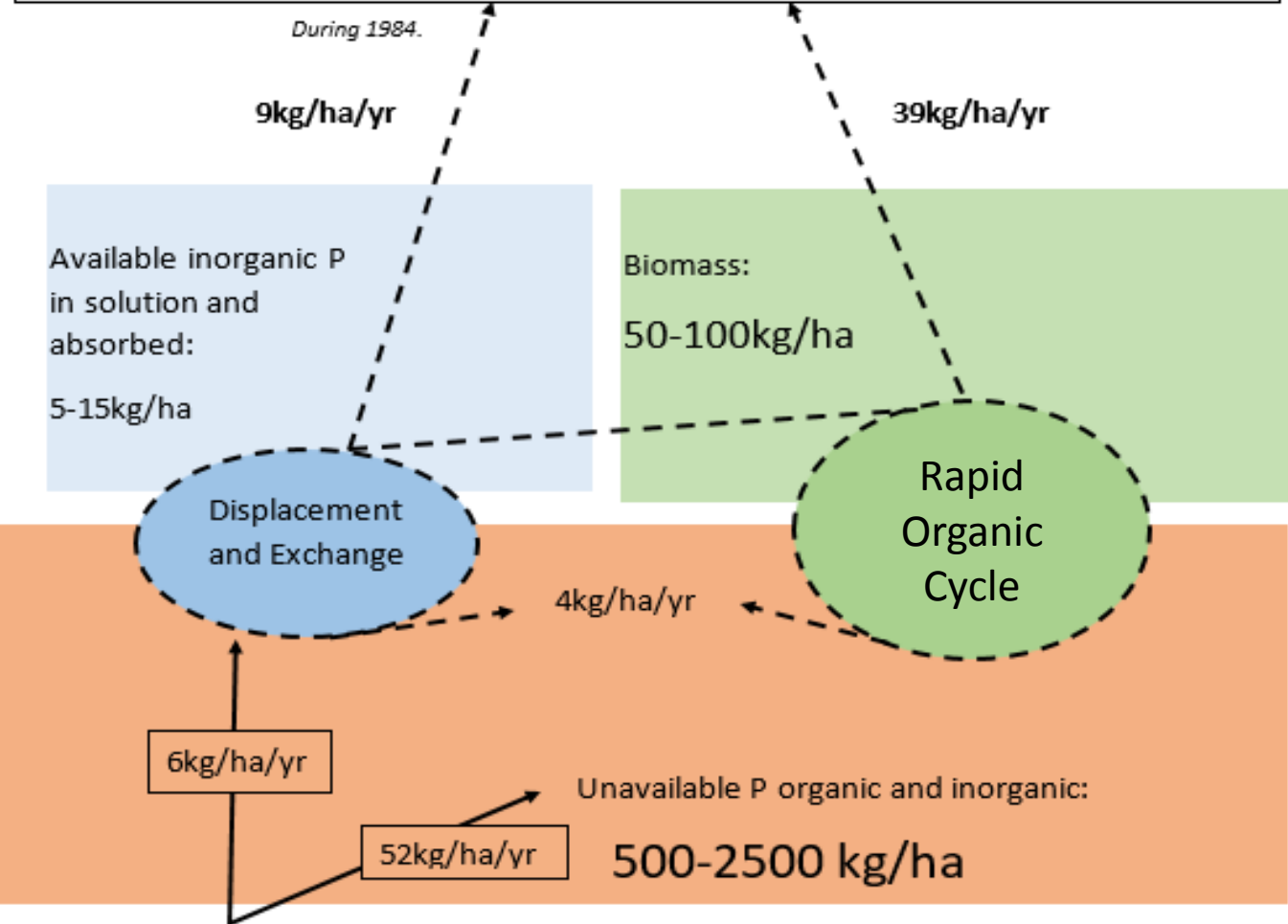


- Less thatchiness
- Deep root systems
- Deeper darker topsoil or “A” horizon
- More porosity. Air and water movement is enhanced.
- Less nutrient loss.
- More nutrient storage (soil organic matter and microbial biomass)

The Phosphorus cycle



Intake of P by pasture (including roots): 48kg/ha/year
 Yield is about 90% of maximum



INPUTS	Kg/ha/yr
Fertiliser	22
Dung	20
Litter and roots	16
TOTAL	58

LOSSES	Kg/ha/yr
Animal produce	5
Dung Transfer	5
Erosion, runoff, insoluble P in dung and in P rock	6
Immobilised by soil and leached	4
TOTAL	22

Fungi and bacteria associated with the roots facilitate P uptake for most plants. As well as water and other nutrients and secondary metabolites.

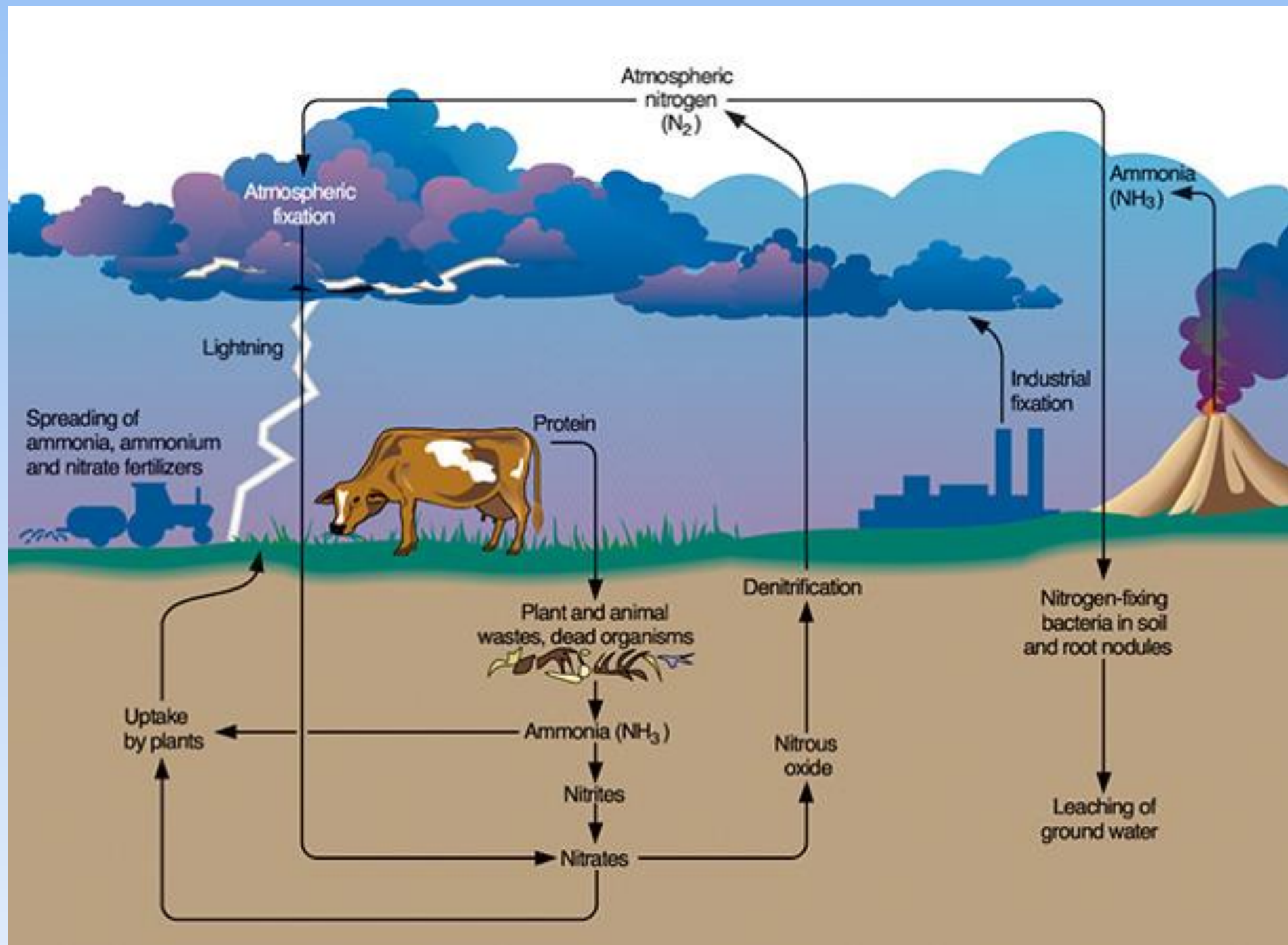


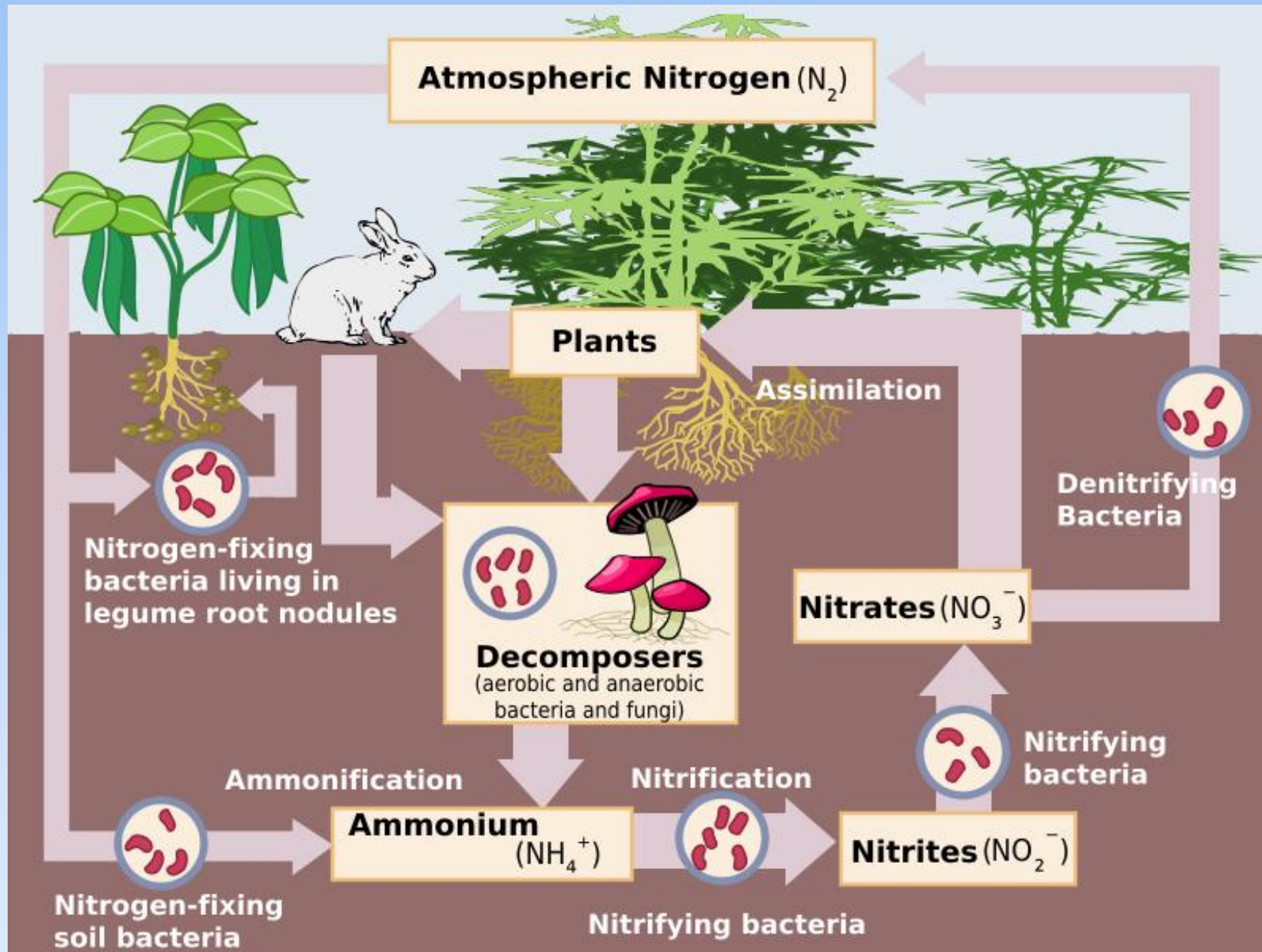
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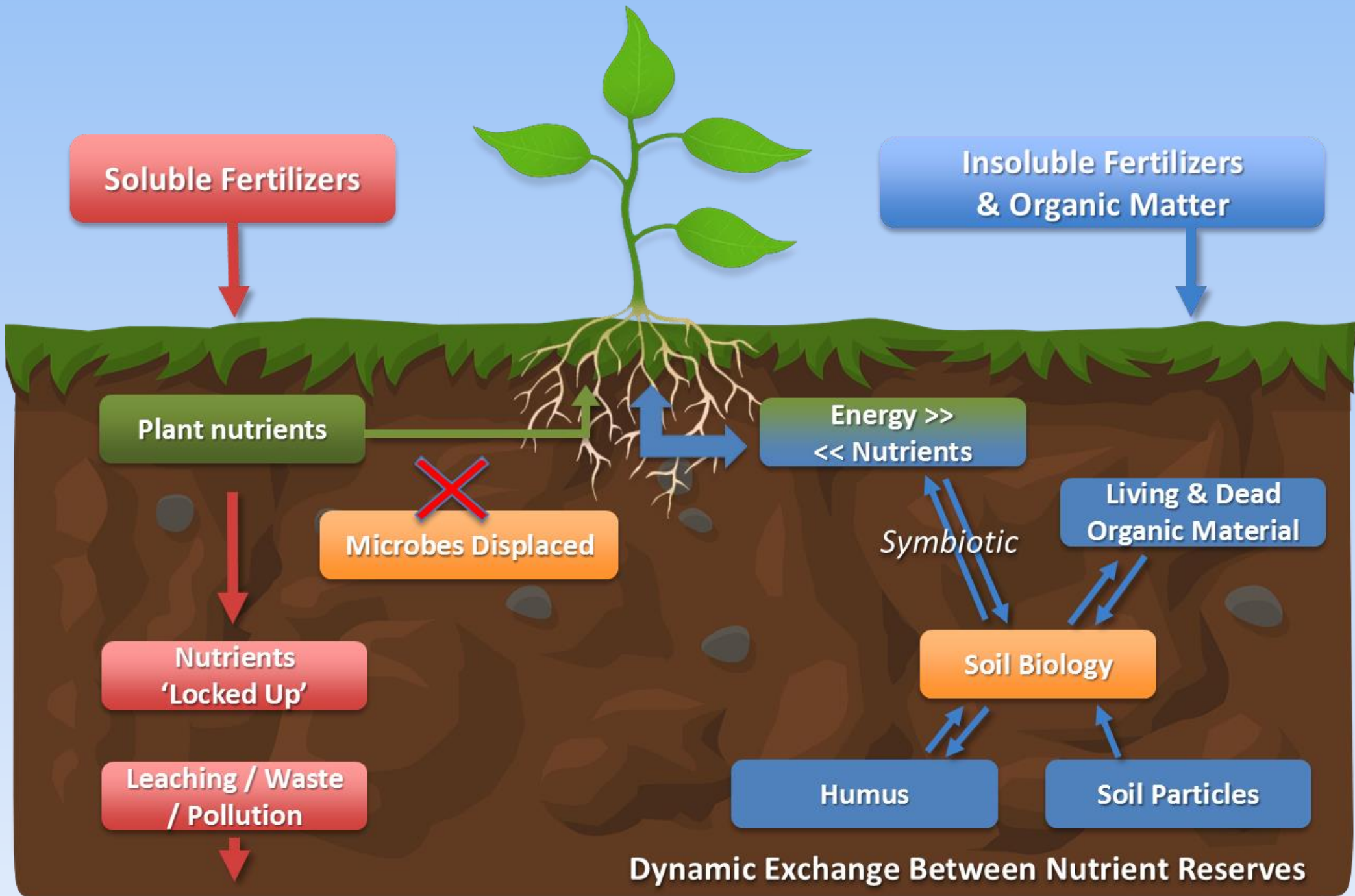


Clover can grow deep roots with deep nodules.



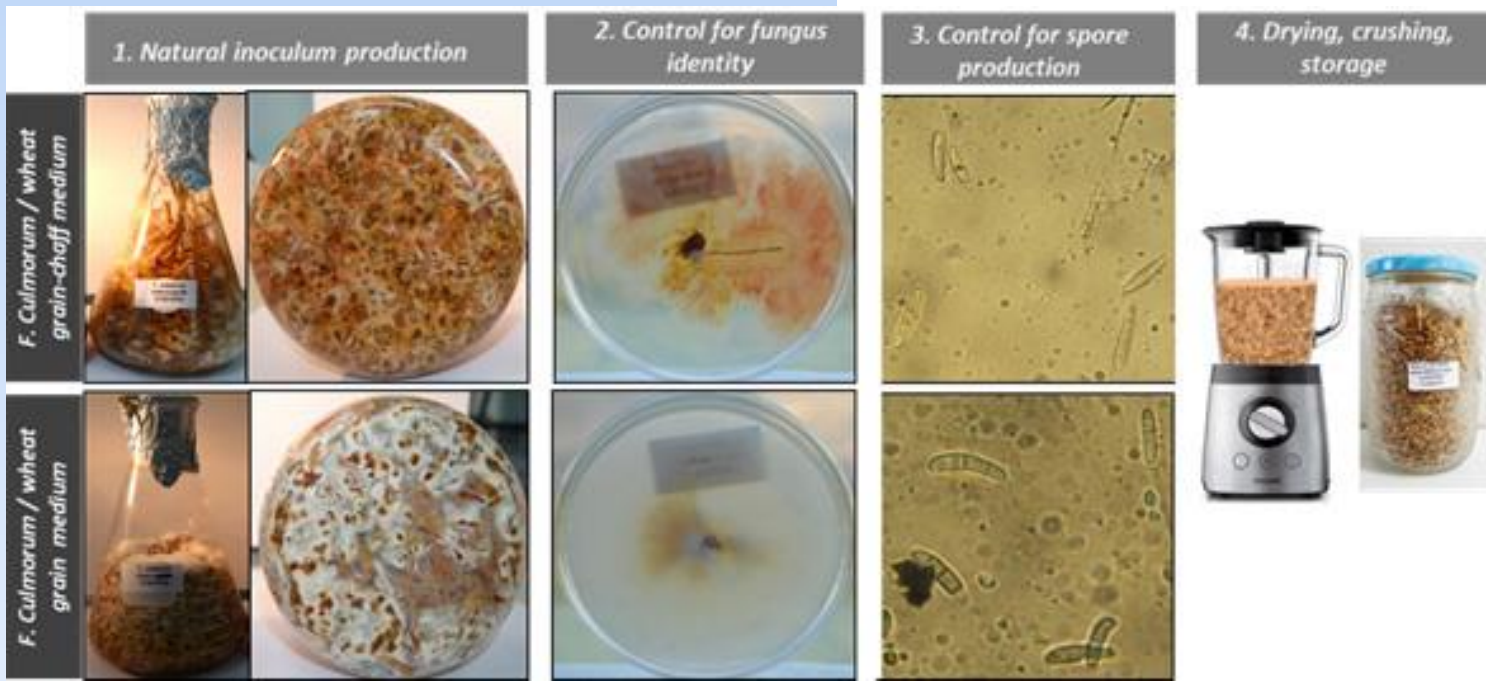
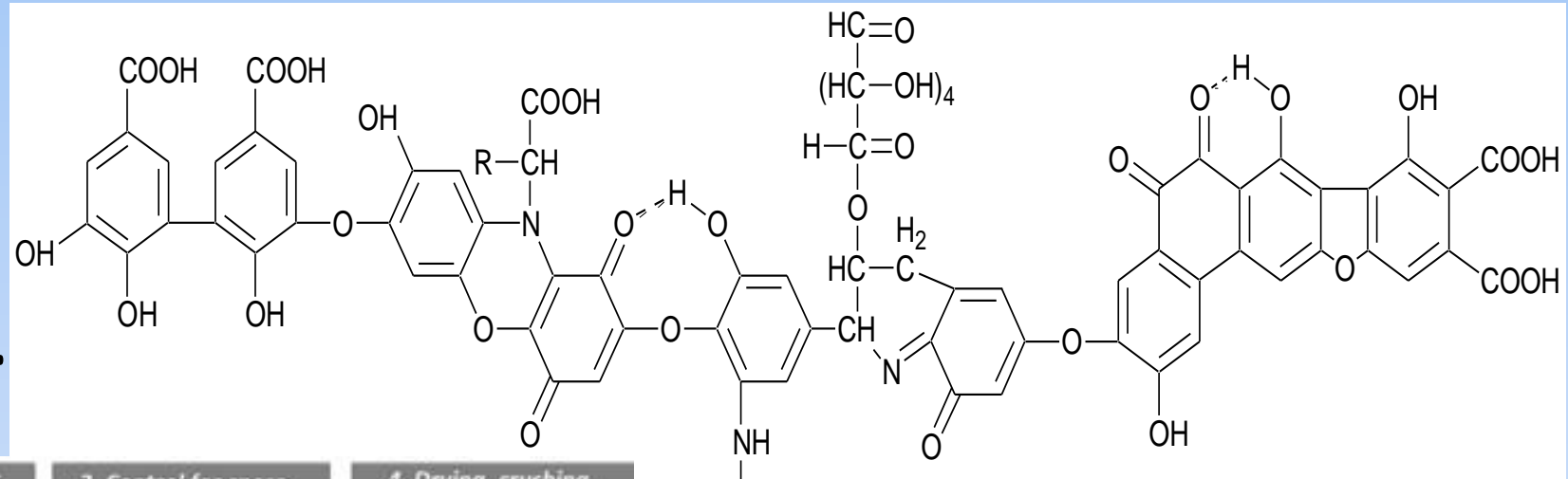






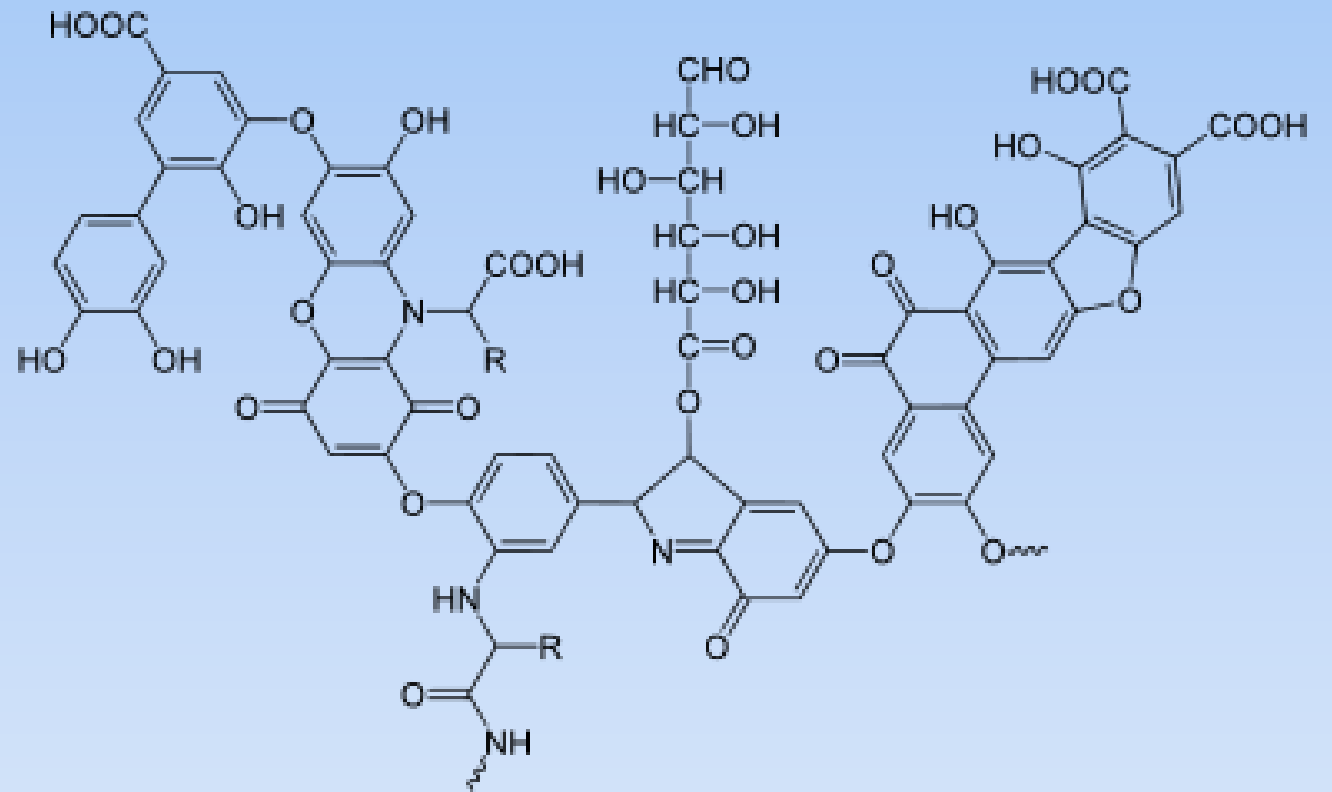
Products to enhance the soil biological function

- Humic Compounds
- Inoculums
- Other Biostimulants.

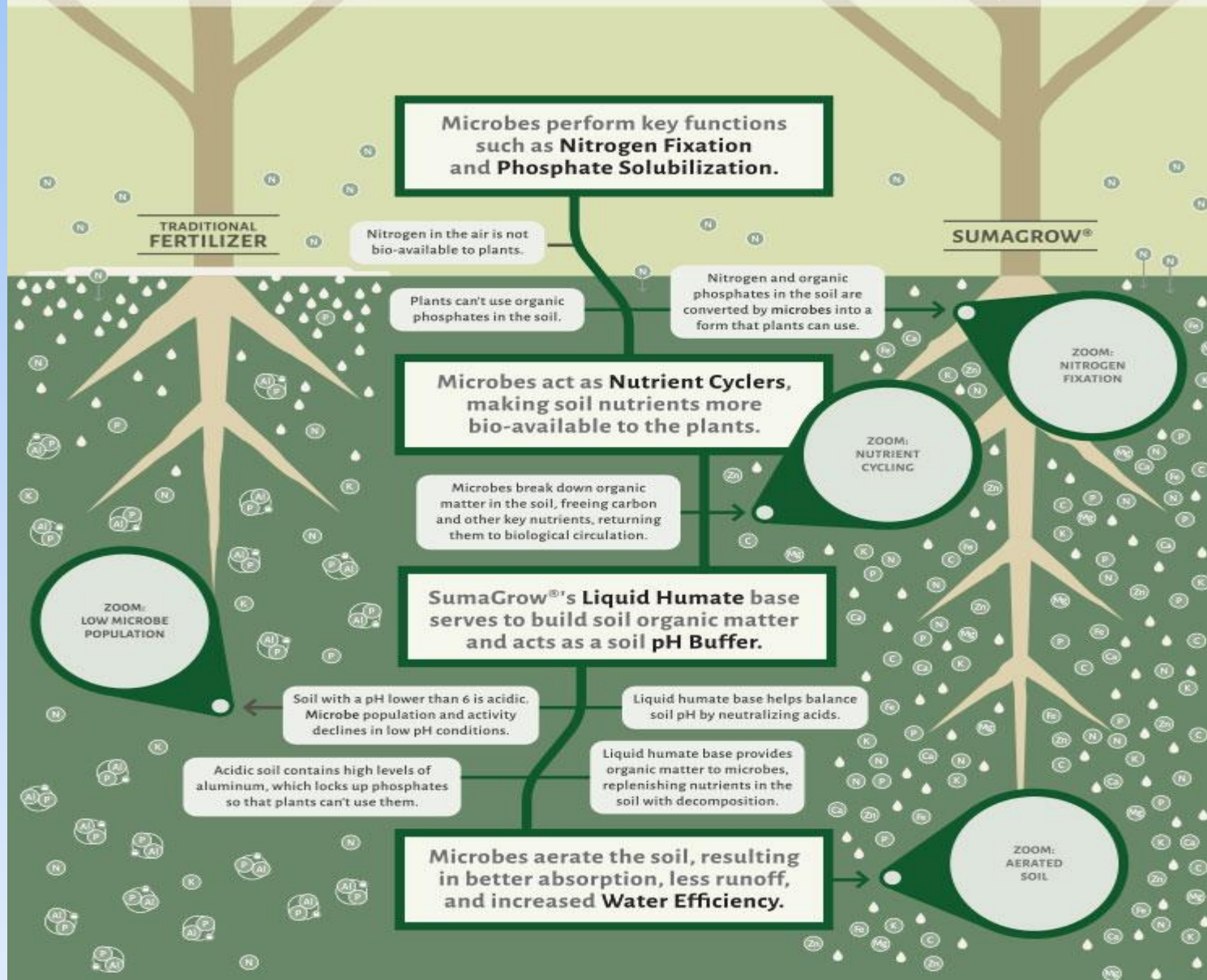


Humic Compounds

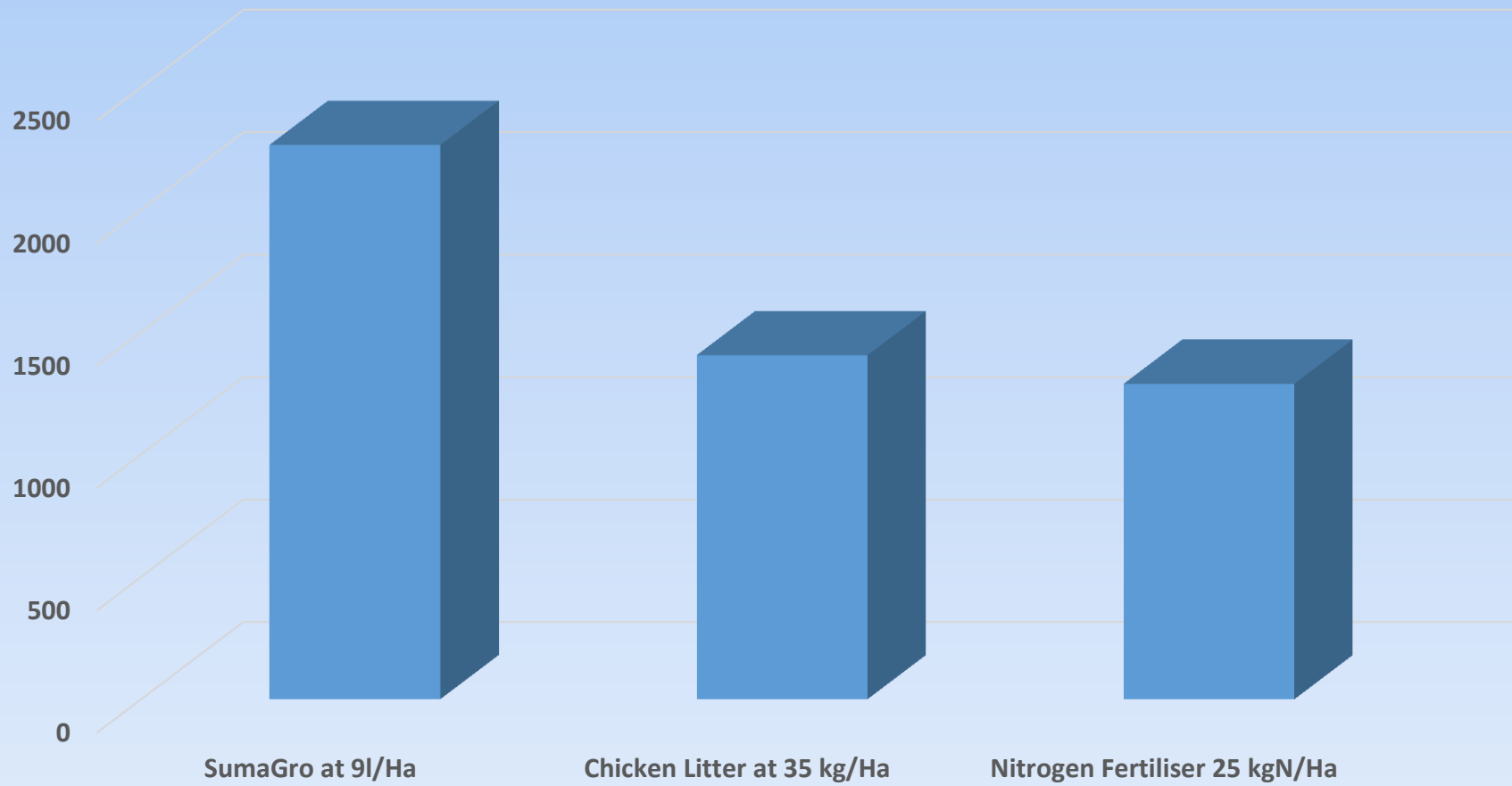
- Chelate soluble fertiliser nutrients like N and P
- Provide nutrition for microbes
- Stimulate plant root growth
- Improve efficiency with which fertiliser nutrients are used
- Increase P availability in soil
- Detoxify soils.
- Reduce Al and Fe activity in soil



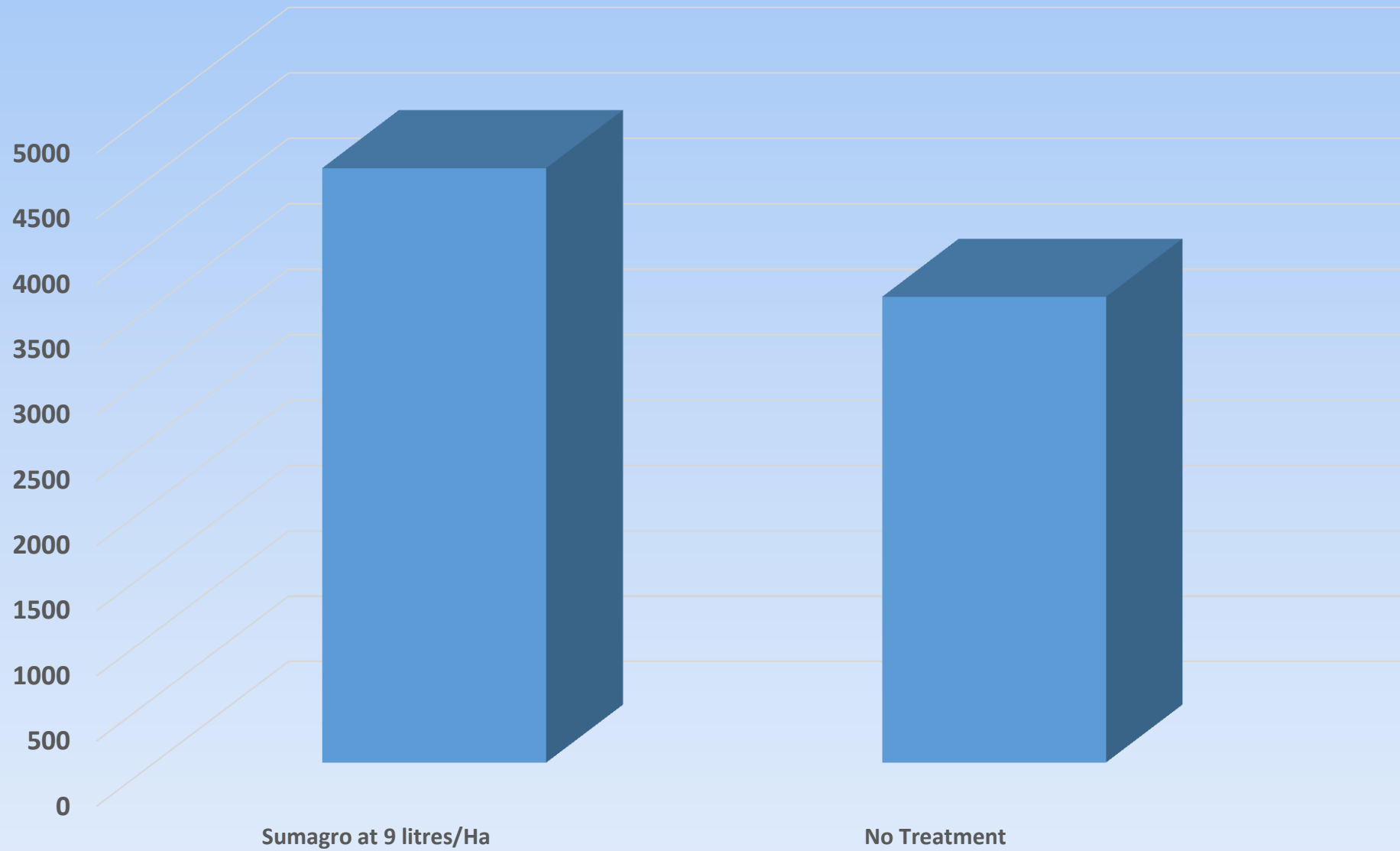
KEY MICROBIAL ACTIONS



Pasture production (Kg DM/Ha) from plots receiving three different fertiliser treatments

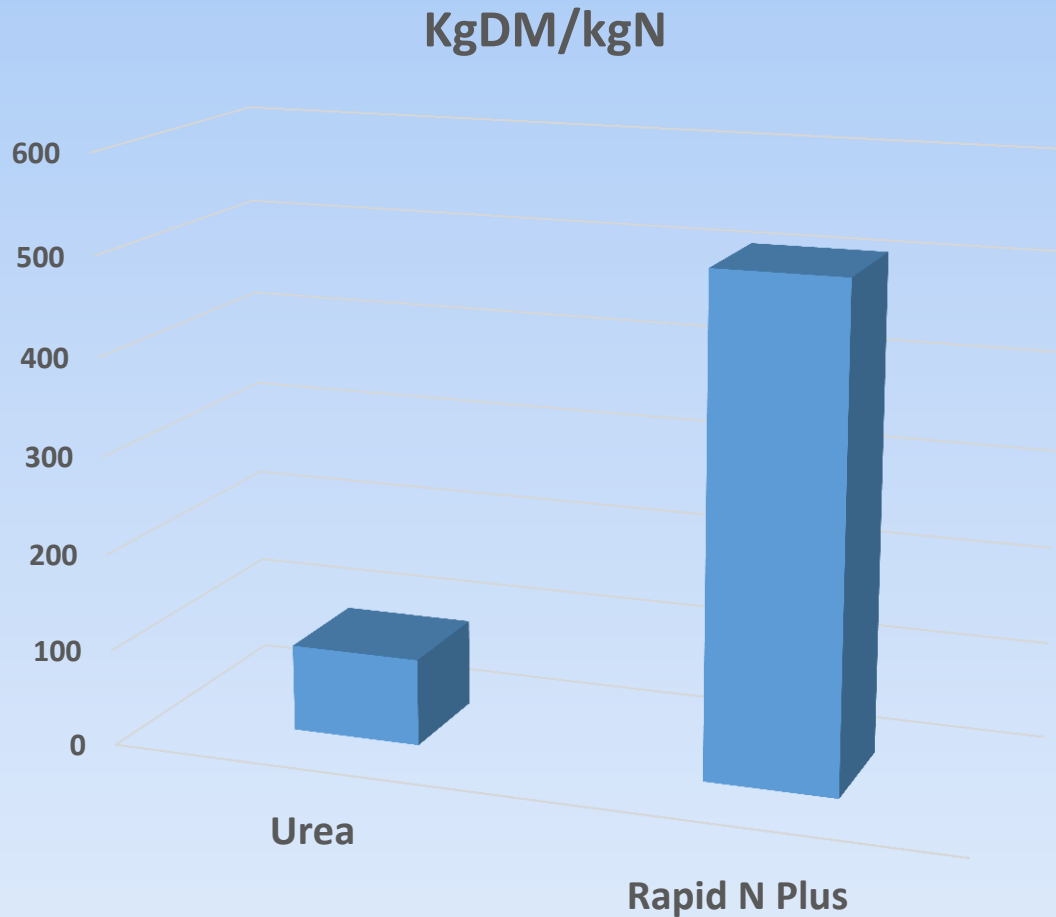


Sorghum Silage harvested (Kg DM/Ha) with or without SumaGrow application.



Rapid N. Omnia's foliar Nitrogen product.

Ag Research Ruakura. Compared Rapid N (UAN and Humic acid) with Urea



Nutrient efficient fertiliser results on a farm scale

COMPARISON OF FERTILISER APPROACHES	Farm using Humic acid with all fertiliser. Insoluble P. Foliar N,P,K most of the year	Farms with standard fertiliser approach. Soluble P and all N as solids.
Pasture Harvest (Tonne DM/Ha/Year)	17.2	17.0
Kg N applied/Ha/year	115	250
Kg P applied/Ha/year	20	45
Kg MS/Ha	1600	1600
OVERSEER kg N Loss/Ha/year	32	50
OVERSEER kg P Loss/Ha/year	0.4	0.8