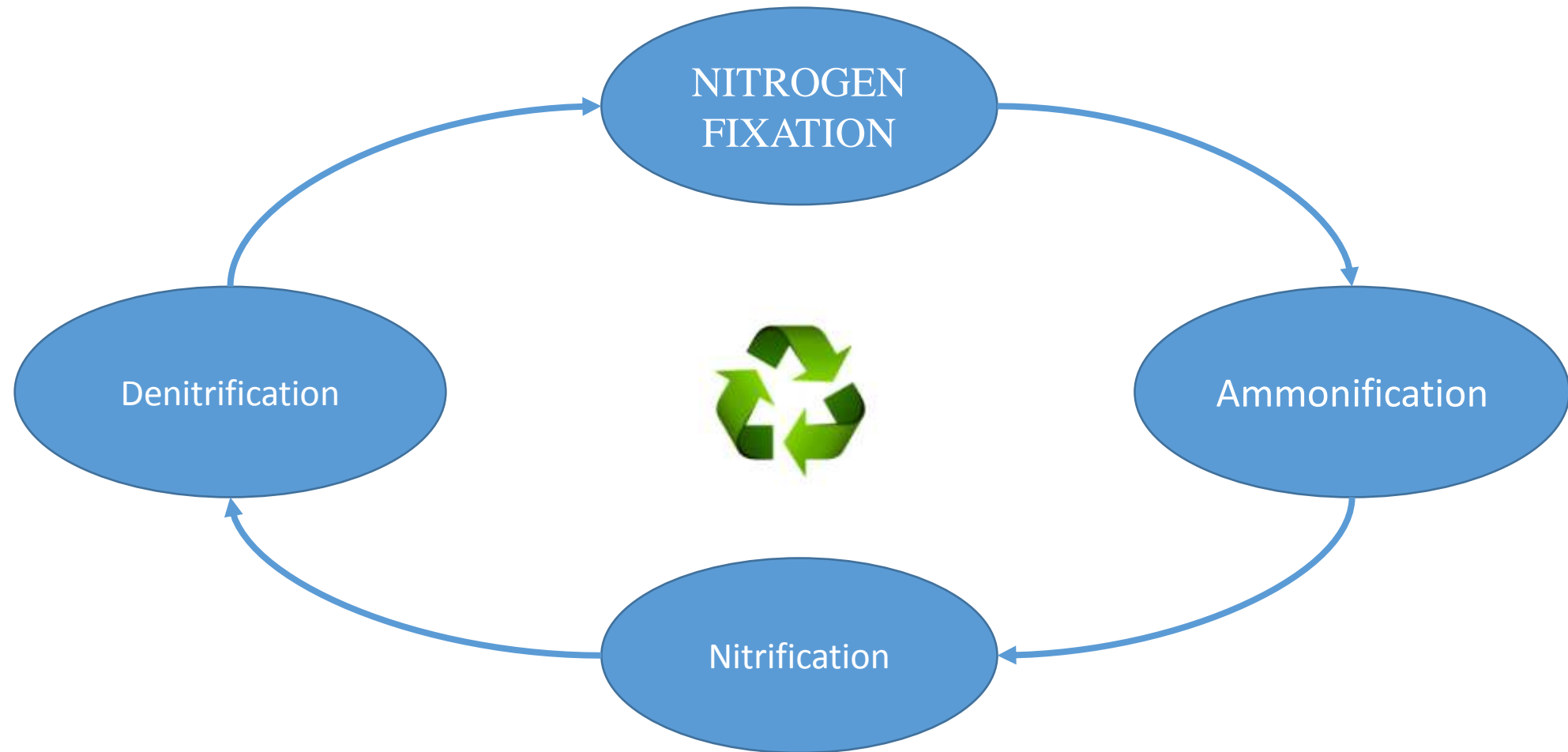


NITROGEN FIXATION

NITROGEN CYCLE



NITROGEN FIXATION

- Chemical process
- Atmospheric nitrogen is assimilated into organic compounds.
- Microorganisms are used as the major part of the nitrogen cycle.
- Nitrogen gets **fixed** by combining with oxygen or hydrogen.

CLASSIFICATION :

- Atmospheric fixation
- Industrial fixation
- Biological fixation

Atmospheric fixation

- Constitutes 5-8 % of the fixation process.
- Lightning breaks nitrogen molecule apart.
- Nitrogen atoms combine with oxygen or hydrogen atoms.
- Nitrogen Oxides are formed.
- Nitrogen Oxides dissolve in rain to form Nitrates.

INDUSTRIAL FIXATION

- Catalyst used to combine nitrogen and hydrogen forming ammonia.
- High pressure and temperature (600 deg. C).
- Ammonia formed is used as a fertilizer.

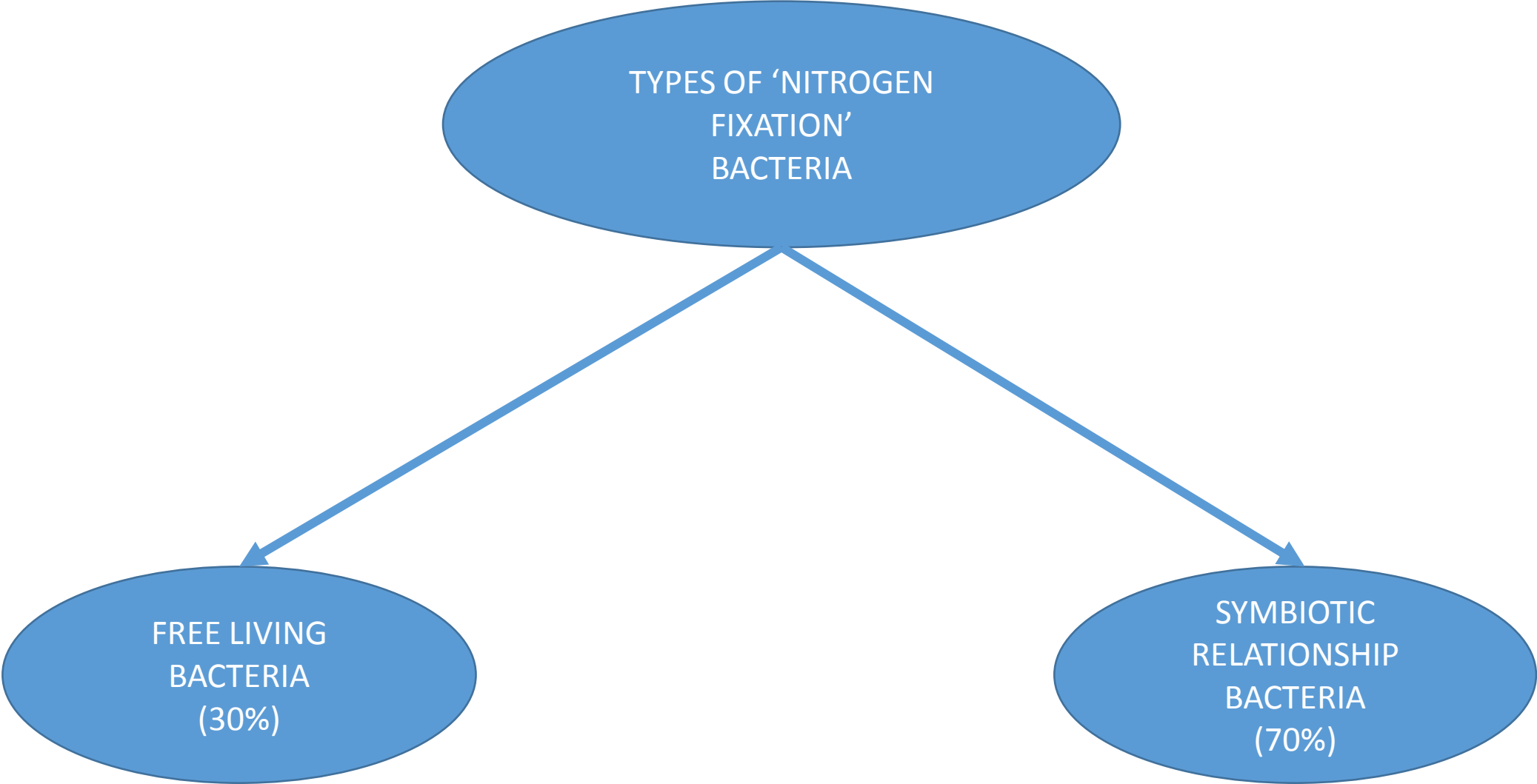
BIOLOGICAL FIXATION

- Atmospheric nitrogen reduced to ammonia in presence of nitrogenase.
- Nitrogenase - Biological catalyst found naturally only in certain micro-organisms.
- Examples - Symbiotic Rhizobium and Frankia, or the free living Azospirillum and Azotobacter.

TYPES OF 'NITROGEN
FIXATION'
BACTERIA

FREE LIVING
BACTERIA
(30%)

SYMBIOTIC
RELATIONSHIP
BACTERIA
(70%)



FREE LIVING BACTERIA

- Present in soil.
- Highly specialized in combining atmospheric nitrogen and hydrogen.

SYMBIOTIC RELATIONSHIP BACTERIA

- Present in roots of legume family plants.
- Provide ammonia in exchange of carbon.

FACTORS INHIBITING NITROGEN FIXATION

➤ Edaphic factors

➤ Biotic factors

➤ Climatic factors

- EDAPHIC FACTORS

- Excessive moisture

- Phosphorous deficiency

- Soil acidity

- Mineral N

- Climatic factors

- Extreme temperature

- Availability of light

- **Biotic factors**

- Absence of required Rhizobia species.

- Crop competition.

- Insects and nematodes.

- Excessive defoliation of host plant.

FACTORS ENHANCING NITROGEN FIXATION

- Inoculations with proven strains.
- Screening for improved microbial and host plant materials.
- Introduction of improved cultural practices.