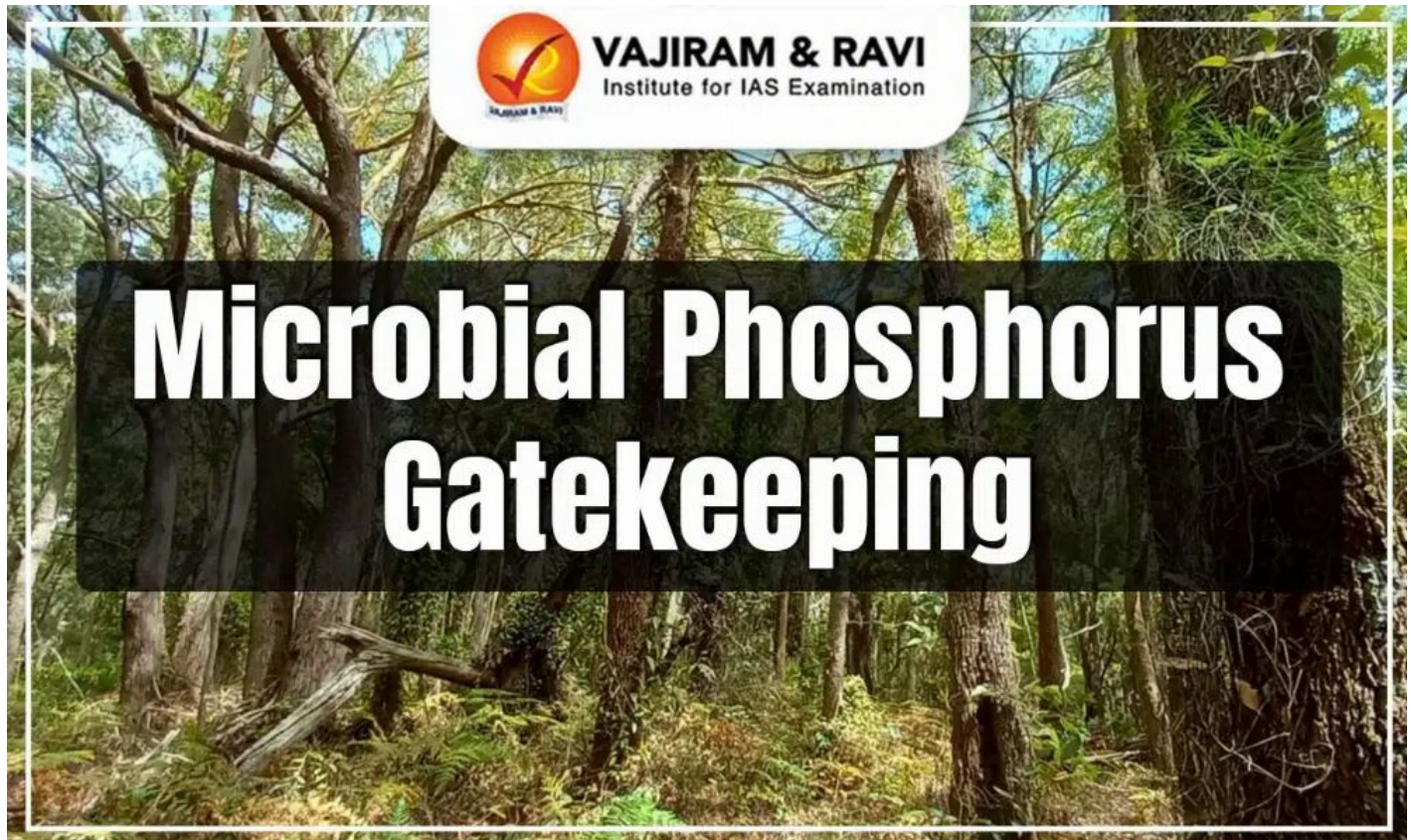


Microbial Phosphorus Gatekeeping

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Microbial Phosphorus Gatekeeping Latest News

A recent study published in Nature Geoscience examined the role of soil microbes in phosphorus cycling over 700,000 years in the Cooloolo coastal dune system, located in Cooloolo National Park, Queensland, Australia.

Importance of Phosphorus in Ecosystems

- **Phosphorus (P)** is an **essential macronutrient** required by all life forms. It is crucial for:
 - **Energy metabolism** (e.g., ATP production),
 - **Cell membrane synthesis** (phospholipids),
 - **Photosynthesis and genetic functions** (DNA/RNA).
- In **ancient and weathered soils**, such as those in **Australia**, **phosphorus levels decline significantly** over time due to **mineral weathering**, making it the **primary limiting nutrient** in many ecosystems.

Key Findings

- The study discovered that **soil microbes**—especially **fungi and bacteria**—act as ‘**phosphorus gatekeepers**’ by regulating how phosphorus is accessed and cycled in the soil.
- Microbes use several **adaptive mechanisms** to survive phosphorus scarcity:
 - **Replacing membrane phospholipids** with **non-phosphorus lipids**,
 - **Accumulating microbial lipids** (fats) that reduce the need for phosphorus,
 - **Optimising phosphorus use efficiency** in their metabolism.
- This **microbial gatekeeping** strongly influences how **phosphorus becomes available to plants**, creating a **balance of competition and facilitation**:
 - **Microbes and plants compete** for phosphorus,
 - But **microbes aid plants** by **recycling phosphorus** and making it more accessible in the long run.

Microbial Phosphorus Gatekeeping FAQs

Q1: What is meant by microbial phosphorus gatekeeping?

Ans: It refers to the ability of soil microbes to regulate the availability of phosphorus to plants by controlling its release, uptake, and storage in soil ecosystems.

Q2: Why is phosphorus important in agriculture?

Ans: Phosphorus is a vital macronutrient essential for plant growth, root development, and energy transfer (ATP).

Q3: How do microbes influence phosphorus cycling?

Ans: Microbes solubilise inorganic phosphorus, produce phosphatase enzymes, and store or release phosphorus based on environmental conditions.

Source: **PHY**

Source: <https://vajiramandravi.com/current-affairs/microbial-phosphorus-gatekeeping/>

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