

2.6 The Nitrogen Cycle

Nitrogen atoms are needed for cells to make proteins and DNA (nitrogen bases). The atmosphere is made up of 79% nitrogen gas molecules (N_2) but living things need it to be changed to nitrate ions (NO_3^-) to be useful.

There are 2 ways that N_2 gas can be changed or "fixed" to make nitrates.

1. Nitrogen fixation by lightning

N_2 combines with oxygen when lightning strikes to make nitrates and the rain carries them to the soil.

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2. Nitrogen fixing bacteria

Bacteria found on the roots of legumes (clover, peas, alfalfa) fix nitrogen into nitrates and make them available to other plants.

When farmers rotate their fields they plant legumes in a field every other year to naturally fertilize it for the next year's crop.

Nitrogen and decomposers

The nitrogen in dead organisms and waste are converted to ammonia (NH_3) by bacteria and then to nitrates by another type of bacteria. Both of these bacteria need oxygen. The nitrates can then be absorbed by plant roots.

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Farmers and gardeners use manure and other decaying matter to provide nitrates to plants.

Denitrification

To complete the cycle, nitrogen needs to be released back into the atmosphere. This is done by denitrifying bacteria that break down nitrates into N_2 gas. These bacteria do not need oxygen. Older lawns are aerated (small holes punched in the ground) to allow oxygen in so there is less denitrification.

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In more acidic areas like bogs there is little oxygen and more denitrification. Plants need to survive with low levels of nitrates and some of them, like pitcher plants, supplement their diet by consuming insects.

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