

## Nitrogen fertilization of soil endangers rare plant species

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LOS ANGELES, April 18 (Xinhuanet)-- Rare plant species are six times more likely than abundant species to be lost due to nitrogen fertilization of soil, US scientists said on Monday.

While nitrogen increases the production of plants, an excess amount of it creates a competition among plants for space that drives rare plants out of existence, causing a weakening of biodiversity in the ecosystems.

Researchers at the University of California, Irvine, have found this through experiments conducted across nine ecosystems in North America. Their paper was published in a journal, the Proceedings of the National Academy of Sciences.

"The results from the 34 nitrogen-fertilization experiments are useful for putting together conservation strategies that protect rare plants and spare them from extinction," said Katharine Suding, an assistant professor and the first author of the paper.

"As a basic building block of plant and animal proteins, nitrogen is a nutrient essential to all forms of life. But it is possible to have too much of a good thing," she noted.

The researchers analyzed the responses to nitrogen fertilization of 967 plant species. The ecosystems in their experiments included arctic and alpine tundra, grasslands, abandoned agricultural fields, and coastal salt marsh communities.

While the researchers found that rare plants were vulnerable to nitrogen fertilization, they determined that other plant traits also put even the most abundant plant species at risk.

Based on simple plant traits, the researchers are able to predict which types of species will be most at risk as nitrogen levels continue to increase.

Nitrogen from the air can be used by plants only when it is chemically fixed into compounds that plants can metabolize. In nature, only certain bacteria and algae have the ability to fix atmospheric nitrogen, and the amount they make available to plants is relatively small.

But some species may be better able to take advantage of this added resource, getting bigger at the expense of other species and causing diversity to decline. The researchers found evidences in Kansas, California, and Alaska that local plant species are lost.

Even without the fertilizers, nitrogen availability is increasing at all the sites due to atmospheric deposition, a process by which gases or particles are transferred from the atmosphere to the Earth's surface.

Annual nitrogen deposition rates can reach more than 50 kilograms per hectare in auto-dominated areas like Southern California, which is in the range of application rates of nitrogen fertilizers for farming. Even relatively pristine areas such as the alpine tundra are experiencing substantial inputs of

nitrogen falling from the sky, according to Suding.

"Our results predict that the impacts of nitrogen fertilization are widespread and dramatic, and that many species face local extinction risk. This work will help us identify species most at risk and point to management strategies to protect our ecosystems in face of these impacts," she noted. Enditem