

Greenhouse vegetable production emits high levels of nitrous oxide, study finds

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A new study has found that greenhouse vegetable production (GVP) systems are major sources of nitrous oxide (N_2O) emissions, a potent greenhouse gas.

The study, conducted by a team of researchers from the Institute of Applied Ecology of the Chinese Academy of Sciences, used a [high-frequency](#) continuous automatic monitoring system to measure the soil N₂O emissions from a typical GVP area in Shouguang, a major vegetable-producing region in Shandong Province, for a year.

The researchers found that the annual soil N₂O emission from the GVP system was about 100 kg nitrogen (N) per hectare. This was much higher than previous reports, which used low-frequency manual sampling methods that may have underestimated the emissions by 8–17%.

The study, [published](#) in the journal *Atmospheric Environment*, showed that the soil N₂O emissions from the furrows, where [irrigation water](#) and fertilizer were applied, were significantly higher than those from the ridges, where the vegetables were planted.

Moreover, [irrigation](#) caused multiple pulses of N₂O emissions throughout the growing season, increasing the emission rate by 12%–396%.

The researchers attributed the high N₂O emissions to the excessive nitrogen fertilization and frequent irrigation practices in the GVP systems, which enhanced the nitrification and denitrification processes in the soil. They warned that as the GVP area continues to expand rapidly in China, the N₂O emissions will also increase, posing a serious threat to the [global climate](#).

They called for more attention and measures to reduce the N₂O [emissions](#) from the GVP systems, such as optimizing the irrigation and fertilization management.

More information: Xue Li et al, High soil nitrous oxide emissions from a greenhouse vegetable production system in Shouguang, Northern

China, *Atmospheric Environment* (2023). DOI: [10.1016/j.atmosenv.2023.120264](https://doi.org/10.1016/j.atmosenv.2023.120264)

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