

Standardizing efficiency estimates for crop nitrogen use

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Assistant Prof. Quan Zhi and Prof. Fang Yunting from the Stable Isotope Ecology Research Group of the Institute of Applied Ecology at the Chinese Academy of Sciences, cooperated with researchers at the University of Maryland, U.S., investigated three commonly used crop nitrogen use efficiency quantification approaches and explained why they lead to different estimate values.

Crop nitrogen use efficiency (NUE) refers to the proportion of nitrogen in fertilizers that is absorbed and used by [crops](#), which is an important indicator to evaluate fertilizer efficiency and environmental impact of nitrogen input in farmland. However, different NUE quantification approaches produce quite different NUE values, which is not conducive to comparison between different studies.

The definition of the N input varies. The nitrogen difference approach (NUE_{diff}) and the ^{15}N tracer approach ($NUE_{^{15}N}$) only consider fertilizer N, while the nitrogen balance approach (NUE_{bala}) considers all N input, including N input from atmospheric deposition. The NUE_{diff} approach and the $NUE_{^{15}N}$ approach either do not consider or consider less about "the residual effect of N in the soil" (the fertilizer N remained in the soil will be used by crops in the following growing season), but the NUE_{bala} approach put emphasis on this effect.

The researchers analyzed the national-scale farming household survey data and the field experiment data and computed NUE of cereal crops in China. The NUE values computed with the NUE_{diff} , $NUE_{^{15}N}$ and NUE_{bala} approaches were 32%, 30%, and 52%, respectively.

The scientists discussed in detail the differences and connections between the three NUE quantification approaches, including their individual advantages and disadvantages. They recommended that an appropriate NUE quantification approach should be chosen according to specific needs and purposes, and a uniform standard must be formulated to increase comparability between studies.

This study, published in *Nature Food*, is titled "Different quantification approaches for [nitrogen](#) use efficiency lead to divergent estimates with varying advantages."

More information: Zhi Quan et al, Different quantification

approaches for nitrogen use efficiency lead to divergent estimates with varying advantages, *Nature Food* (2021). [DOI: 10.1038/s43016-021-00263-3](#)

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