

Suggestions to optimize the agricultural nutrient management in China

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With a three-decade high-speed development and recent rising funding in basic sciences in China, the agricultural nutrient management and relevant policy-making attracted increasing attentions from governments, organizations and institutions. A most recent survey on nitrogen (N) fertilizer efficiency in China revealed that the current typical N fertilization rate increased little in grain yield but significantly deteriorated the N loss to the environment, specifically via denitrification in waterlogged upland system, and ammonia volatilization and nitrate leaching in the irrigated system of North China Plain (1). The excessive fertilizer input in Chinese agricultural systems became more prominent in contrast to the long-term agricultural systems in other countries. Comparing the nutrient budgets (N and P) of corn-based system in Kenya, China and US, P.M. Vitousek et al. pointed out alarming nutrient imbalances in Chinese agricultural systems (2). With the increasing awareness by the general public and the government's desire to construct the "Green and Ecology" society, it is time for the country to optimize its agricultural nutrient management at the long-term and national scale.

Frugal fertilizer input -- The Chinese agricultural systems have been intensively managed for many centuries, and become more extremely degraded due to the recent overwhelming chemical fertilizers consumption. The astonishing nutrient imbalances in China can be blamed on pursuit of high crop yield alone, neglecting the environmental and ecological consequences. Significant reduction in fertilizer inputs, applying new types of fertilizers, fertilization at optimal growth period and accounting other nutrient sources (agricultural manures and residues, atmospheric deposition, irrigation and biological fixation) can minimize the adverse effects and to maintain a relatively high crop yield as well.

Ecological consequences -- The emerging pandemic human health problems at some villages or cities raised my concerns if their causes are associated with the malfunction of the agricultural system. Not much research has been done to link them. The ecological consequences of nutrient imbalances should be little neglected, specifically linking the agricultural system malfunction with the degradation of the terrestrial and aquatic biological systems, water quality, the transport of contaminants and the recent pandemic human health.

Long-term monitoring network -- China has a very diverse agricultural systems and management practices. To optimize the nutrient management in the country, the site-specific solutions are always needed such as farmer education and proper technology application. The long lasting or on-going monitoring sites and stations widely distributed in the country should be reassembled and synthesized to characterize the nutrient status across the diverse cropping systems. The inter-institutional collaborations and joint efforts at the national or provincial levels should be prioritized for hatching the wise and sustainable policy.

An integrative measure and policy on the nutrient issue will help meet the increasing demand for food, alleviate resource constrain during development and promote human living quality as well.

References

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2. Vitousek, P.M. et al., 2009. Nutrient Imbalances in Agricultural Development. Science, 324(5934): 1519-1520.