

Isotope-labeled fertilizer shows uptake by sorghum, microorganisms

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Current collection and storage of animal manure from open parks results in nitrogen losses and hence low nitrogen fertilizer value for crops. Photo by O. Y. A. Traoré.

In semi-arid sub-Saharan Africa, soils of smallholder farmers' fields are often nutrient depleted. While farmers have limited access to industrial mineral fertilizers, animal manure and legume crop residues provide some locally available nutrients. However, organic fertilizer input may result in competition between soil microorganisms and crops for nutrients.

A new *Agrosystems, Geosciences & Environment* study aimed to get insights into this situation by assessing simultaneously the uptake of nitrogen (N) and phosphorus (P) from organic and mineral fertilizers by sorghum and soil microorganisms. A pot experiment and a soil incubation study was conducted using a nutrient-depleted Lixisol from Burkina Faso. Double ^{15}N and ^{33}P isotopic-labeling techniques were applied to determine the contribution from different fertilizers to sorghum N and P uptake; the same was done with available and microbial N and P in the soil.

Mineral fertilizer induced the highest sorghum N and P uptake while N from manure was poorly available. Residues from young cowpea induced microbial N and P immobilization, which reduced sorghum N and P uptake to the level of the non-fertilized treatment. N:P ratios suggested more microbial P than N limitation in organic fertilizer treatments.

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Traoré, O.Y.A., Kiba, D.I., Bünemann, E.K., & Oberson, A. (2020). Nitrogen and phosphorus uptake from isotope-labeled fertilizers by sorghum and soil microorganisms. *Agrosystems, Geosciences & Environment*, 3, e20111.

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