Climate Change Likely to Increase Eutrophication

Phosphorus is a critical nutrient for food production. It is applied as a fertilizer to agricultural land; however, its fate in the environment can contribute to costly eutrophication in rivers, lakes, and seas. The effects of climate change on the fate and impact of phosphorus in the environment are complex and poorly understood.

In an article recently published in *Agricultural & Environmental Letters*, researchers propose the “Phosphorus Transfer Continuum” as a potential framework to consider the fate of phosphorus in the environment under climate change. The framework describes the fate of phosphorus in the environment using four tiers: (1) Source (inputs), (2) Mobilization (start of the journey), (3) Transport (via subsurface or overland flows), and (4) Impact (water quality).

The researchers considered some of the effects of climate change on each tier. They suggest that in some regions, temperature and precipitation changes will have significant effects on farming practices, phosphorus inputs, and mobility that will likely increase net phosphorus transfers from land to water and its associated eutrophication costs.

As phosphorus is crucial to food production but costly to the environment, more research that considers the effects of climate change at each tier is needed.


Structural Stability Conditions Soil Carbon Gains from Compost Management and Rotational Diversity

Understanding processes that underlie soil carbon gains and enhance soil structural stability is key to sustainable production of intensively managed field crops. Long-term consequences of crop diversity and interactions with organic amendments have rarely been tested in a factorial manner, with recommended and economically feasible rates of compost and fertilizer. Understanding determinants of soil aggregate stability and aggregate-associated carbon pool sizes is important, but studies are constrained by the time periods required to detect changes.

New research published in *Soil Science Society of America Journal* compares soil structural stability and soil carbon pools over 20 years on a field crop experiment that allowed quantification of the impact of rotational diversity and integrated nutrient management options. Continuous corn effects were quantified relative to rotated corn with soybean, wheat, and cover crops under two nutrient management systems with and without compost in southwest Michigan.

The researchers found that diversity of carbon inputs is important in conditioning soil carbon gains and soil aggregate stability. Integrated compost in contrast to fertilizer management enhanced soil labile carbon accrual, inorganic carbon, and the proportion of macroaggregates while rotational diversity impacted soil aggregate stability and aggregate-associated carbon pool sizes. The long-term effects of feasible alternatives to conventional farming practices described in this study provide vital information to farmers considering the use of integrated nutrient management options to ameliorate degraded soils.