Fossilized Pollen Is Preserved in Alluvial Soils

Fossil pollen is a powerful tool to understand both land use and climate dynamics over time. Working in floodplain soils is challenging compared with working in traditional lakes or bogs because alluvial soils are more oxygenated, which accelerates pollen degradation.

In a recent article published in the *Soil Science Society of America Journal*, researchers report on studies from 18 watersheds in southern New England where specific physical and chemical soil properties were correlated to preservation and abundance of pollen in riparian soils.

Pollen indices are under-utilized in river soil systems due to perceived lack of preservation. However, this study illustrates that most alluvial soil horizons (60% overall) contain pollen. The researchers also found that pollen presence is positively correlated to higher soil organic matter concentration, C/N ratios, and silt and clay content within a given horizon.

Pollen analyses require specialized chemicals and procedures that can be both expensive and time consuming. The guidelines developed in this study can be used to pre-identify samples that likely contain pollen. The researchers also found that pollen presence is positively correlated to higher soil organic matter concentration, C/N ratios, and silt and clay content within a given horizon.

Riparian soil profile showing typical stratification where organic-matter-rich topsoil (0–20 cm) and buried surfaces at 50 cm are more likely to contain preserved pollen compared with the low-organic-matter horizons below 60 cm.


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Sugarcane Production Practices Influence Greenhouse Gas Emissions

Agriculture contributes greatly to greenhouse gas emissions, especially nitrous oxide. Determining the effect of various management practices on emissions is needed to refine current models that predict global greenhouse gas inventory.

In a two-year study published in *Agrosystems, Geosciences & Environment*, researchers evaluated the effect of sugarcane harvest residue management strategies (residue retain and residue burn) and nitrogen sources (urea and urea ammonium nitrate) on three greenhouse gas emissions: nitrous oxide, methane, and carbon dioxide.

Soil surface application of urea increased the nitrous oxide emission factor by 1.81 to 2.1 times compared with soil injection of urea ammonium nitrate (UAN). Compared with residue burn, residue retention both increased the nitrous oxide emission factor of urea and UAN by 26 and 47%, respectively, and caused a significant increase in methane emissions. Increased water content under residue retain had a considerable effect on these increased emissions. There was no difference in carbon dioxide emissions either by nitrogen fertilizers or harvest residue management.

These results will help sugarcane producers understand nitrogen losses due to different harvest residue management and nitrogen source regimes.

Considering the large area of 26 million ha under sugarcane, using the emission factors of nitrous oxide from this study, instead of the International Panel on Climate Change’s default value, could help to refine the current nitrous oxide emission models.


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