Impact of Hydrofluoric Acid on Humic Acid Extracted from Organic Soils and Amendments

The chemical and physical characteristics of humic acids (HA) vary depending on their source, age, and soil conditions. Ideally, the extraction method should not modify the characteristics of HA. Hydrofluoric acid (HF) is often used in HA extraction methods to remove inorganic constituents present in natural soil samples. However, there are concerns that using such a powerful reagent as HF may change the properties of HA.

In a new study published in the *Soil Science Society of America Journal*, HA was extracted from turkey litter compost, an agricultural organic soil, and a riparian soil, and the impact of HF on the properties of the extracted HA was assessed.

The results show that while HF is effective in removing inorganic components, it does not significantly affect the distributions of the HA functional groups. For the two soils, the HF treatment caused a drop in the proton-binding capacity at an alkaline pH (≥7). Aluminosilicates, amorphous Si, and iron oxides likely contributed to the observed proton-binding capacity of the untreated samples. Therefore, the HF treatment should be included for samples containing these mineral constituents, even for organic-rich soils.


Long-Term No-till Supports Greater Asymbiotic Nitrogen Fixation

Nitrogen is a major crop production input, and N fertilization can lead to surface and groundwater quality degradation. In North Dakota, N rate experiments have indicated that long-term (six years or more) no-till fields require less N for maximum yield and profitability compared with crops grown under a conventional tillage system.

A recently published article in the *Soil Science Society of America Journal* explains that part of the reason behind the lower N requirement in no-till fields is due to the greater activity of asymbiotic N fixers in long-term no-till soils compared with neighboring conventionally tilled soils. In the study, 12 locations in North Dakota were examined. At each location, a surface soil sample was obtained from a long-term no-till field and an adjacent conventional till field with a similar soil series. The samples were subjected to an acetylene reduction incubation, which is commonly used to evaluate asymbiotic N fixation. The results showed that 10 of the 12 sites had greater asymbiotic N-fixing activity compared with their conventional till neighbor.

This study indicates that farmers transitioning to no-till may benefit from reduced N fertilizer inputs partially due to increased activity of asymbiotic N fixers, which should also reduce the risk of ground and surface water nitrate contamination.


Step-by-step humic acid extraction method.


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