

Detecting the manuring of millet in the past

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The nitrogen isotope ($\delta^{15}\text{N}$) values of wheat and barley grains have been found to increase with addition of manure/organic matter, making the $\delta^{15}\text{N}$ values of archaeological cereal grains a useful proxy for manuring intensity in the past. This relationship was initially determined in C_3 cereals, but a recent study of the $\delta^{15}\text{N}$ values of pearl millet (*Pennisetum glaucum*) growing in plots receiving low-medium levels of manure input in Senegal now provide a framework for interpreting the $\delta^{15}\text{N}$ values of this C_4 cereal in terms of manuring practice.

Nitrogen isotope values of charred pearl millet grains recovered from archaeological sites in Burkina Faso were found to increase during the first two millennia AD. This coincides with charcoal evidence for a transition from shifting cultivation to more permanent use of plots, indicating that increased manure application enabled soil to stay fertile for longer and reduced the length of time plots were left fallow. The high intensity of manuring in the second millennium AD at sites close to a permanent waterhole suggests that manure was likely sourced from outside the farming settlements, from livestock herded by pastoralists who would have been drawn to the supply of water in the dry season.

These initial modern and archaeological studies demonstrate how the isotopic analysis of millet grains, in combination with contextual fruit/seed, charcoal and faunal evidence, can enrich our knowledge of agricultural and subsistence practices in the past.