

Sensing technique	Soil attribute	Advantages	Limitations
vis-NIR	Soil organic C	<p>Rapid and easy to use. Inexpensive measurements. Relatively accurate. Samples can be wet, under field conditions. Non-destructive. No sample pre-treatment required; no harmful chemicals. Effects of water on soil organic C estimation can be corrected. Robust field instruments available and becoming more affordable.</p>	<p>Empirical, requires calibration. Calibration requires expertise. Surface measurement. Requires correction for water.</p>
mid-IR	Soil organic C	<p>Rapid measurement. Inexpensive measurements. No harmful chemicals. Non-destructive. Accurate predictions on dried, ground samples. Few portable instruments but becoming more available.</p>	<p>Empirical, requires calibration. Need to dry and grind soil samples. Calibration requires expertise. Surface measurement. Corrections for water need testing. Few studies on estimating C in the field.</p>
AGA transmission	Bulk density	<p>Rapid. Accurate. Inexpensive sensor and measurements. Non-destructive. Allows characterization of variability vertically and laterally. Can estimate stocks on fixed-depth and ESM basis. Instrumentation readily available.</p>	<p>Requires soil core sampling. Needs independent measure of water content. Needs construction of a set-up. Uses active radiation. Requires SOP and regulatory approval. Requires a licensed operator.</p>
AGA backscatter	Bulk density	<p>Non-destructive. Does not require sampling of intact core. Commercial instrumentation available.</p>	<p>Requires pit for active gamma/neutron source. Variable accuracy reported. Needs independent measure of water content. Uses active radiation Requires SOP and regulatory approval. Requires a licensed operator.</p>