

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>