USDA
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NATURAL RESOURCES CONSERVATION SERVICE

23A

SOIL TECH NOTES

CARBON : NITROGEN RATIO (C:N)

What is it and why is it important for a good soil condition??

The C:N ratio is a quick way to evaluate the balance between two elements present in the soil that are both essential for crop growth and microbial health.

The C:N ratio in the organic matter of agricultural soils ideally averages about 10:1. This is considered an indication of a dynamic equilibrium condition that can and should be maintained.

When organic material is added to the soil in root residue, manure, corn stalks, etc., the increased carbon triggers microbial growth.

If the amount of N in the added material is inadequate to support the increased growth of microbes, the microbes will absorb N **from the soil** and immobilize it in their tissues. This will deprive growing plants of nitrogen they need for immediate growth. As carbon breaks down, larger microbe numbers decrease and N is now released again into the soil. The more stable 10:1 C:N ratio can now be established.

Cover crops, especially legumes, have C:N ratios generally less than 25:1. As a general rule, these plants decompose relatively quickly because the amount of carbon contained is offset by adequate amounts of nitrogen and N is not immobilized.

Low nitrogen, high carbon residues, such as wheat straw, have low nutritional quality for microbes and take longer to decompose.

C:N ratios also provide clues about the microbial population present, as higher ratios tend to support more fungi present in the soil than bacteria.