

Table 4. Typical carbon-to-nitrogen ratios.

Material	Carbon:Nitrogen Ratio
Legume hay	15-19:1
Non-legume hay	24-41:1
Corn stalks	42:1
Oat straw	70:1
Rye straw	82:1
Cow manure	18:1
Finished compost	17-20:1
Agricultural soils	8-14:1
Hardwood sawdust	500:1

for nitrogen. Microbes have a requirement of about one nitrogen atom for each 25 carbon atoms. This is a carbon-to-nitrogen ratio (C:N) of 25:1 or 25. If the organic matter has a higher C:N (more C and less N), microbes will need more nitrogen and will take it from the soil. Microbes are more efficient than crops in obtaining nitrogen from the soil. If there is not enough nitrogen for both the microbes and the crop, the crop will not obtain what it needs. Eventually there will be a net gain in nitrogen, but crops can suffer in the short term. If organic matter with a high C:N is applied to soil shortly before planting a crop, additional nitrogen may be needed to assure the needs of both the microbe and the crop are met. Organic matter with a C:N of less than 25:1 (25) should not be a problem and in some cases can contribute nitrogen for crop use. See Table 5 for examples of C:Ns of some sources of organic matter.

Cover Crops and Green Manures

Cover crops are grown to protect and/or enrich the soil rather than for short term economic gain. When turned into the soil, a cover crop is called a green manure, so the terms are reasonably interchangeable.

When a cash crop is not growing, it is wise to sow something to protect the soil from wind and water erosion, thus the term cover crop. It is also wise to “rest” your fields by occasionally rotating out of cash crop production, while at the same time growing something to improve soil fertility, thus the term green manure. Some green manure crops can also suppress weeds, by “smothering” them and starving them for light. Use high seeding rates if cover crops are grown for weed suppression.

Depending on their growing requirements, cover crops can be sown after vegetable harvest, between a

spring and fall crop or by overseeding into a standing small fruit crop after a final cultivation.

In selecting a green manure crop, consider the following: seed cost, winter hardiness (if applicable), ability to fix nitrogen, suppress weeds, and suitability to soil conditions, tillage equipment and the crop to follow. Here is a list of some common cover crops in New England and a description of their uses.

NONLEGUMES

These are selected when nitrogen contribution to the soil is not a priority. They tend to grow more rapidly and thus are better at short-term weed suppression than legumes. Late-season grasses are useful for recovering leftover nitrogen after crops have been harvested.

Winter Rye is a common winter cover crop, sown after cash crops are harvested in the fall. It is very hardy, adapted to a wide range of conditions, and seed is inexpensive. The latest-sown cover crop, it produces a lot of biomass in the spring. This adds organic matter to the soil but may be difficult to incorporate prior to crop planting.

Oats are used as a winter cover crop to protect the soil without requiring intensive management in the spring, because they are frost-killed. Shallow incorporation of residues may still be necessary before crop planting. Enough growth is needed before first frost to adequately protect the soil, so plant by late August, at a rate of about 100 lb/acre. Oat residues left on the soil surface may chemically suppress weed growth, and act as a physical barrier. Oats are also a good cover crop to plant any time during the spring or summer when land is out of production. Unlike winter rye, oats grow vigorously and upright when seeded in the spring or summer and compete effectively with weeds. Can grow in soils with low pH (5.5).

Ryegrass is a low-growing cover crop that produces an extensive root system good at capturing leftover nitrogen. It is well suited to undersowing, after last cultivation of a cash crop, in order to establish a winter cover prior to harvest. Annual ryegrass is less expensive than perennial ryegrass, and is more likely to winterkill; however, it may overwinter in milder areas, and perennial ryegrass may winterkill in harsher zones. These crops form a dense sod that reduces erosion.

Sudangrass and Sorghum-sudangrass (Sudex) are fast-growing, warm season crops that