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Make cover
crops part of
your plan



Cover crops benefit soil health and fertility

- Soil Cover
- Living roots
- Plant diversity in space and time
 - Species and functional groups
 - Root structure
 - Habitats
- Source of food for microbes
- N fixation



Other benefits of cover crops

- Improved water infiltration
- Erosion control
- Dust control
- Beneficial insects
- Temperature moderation in summer
- Quicker wet-season access
- Reduced soil compaction



Impacts of cover crops on N cycle

Long term

- Build soil organic matter and stored N
- Support robust microbial communities

Short term

- Timing of N release to plants
- Cooler soil temperatures

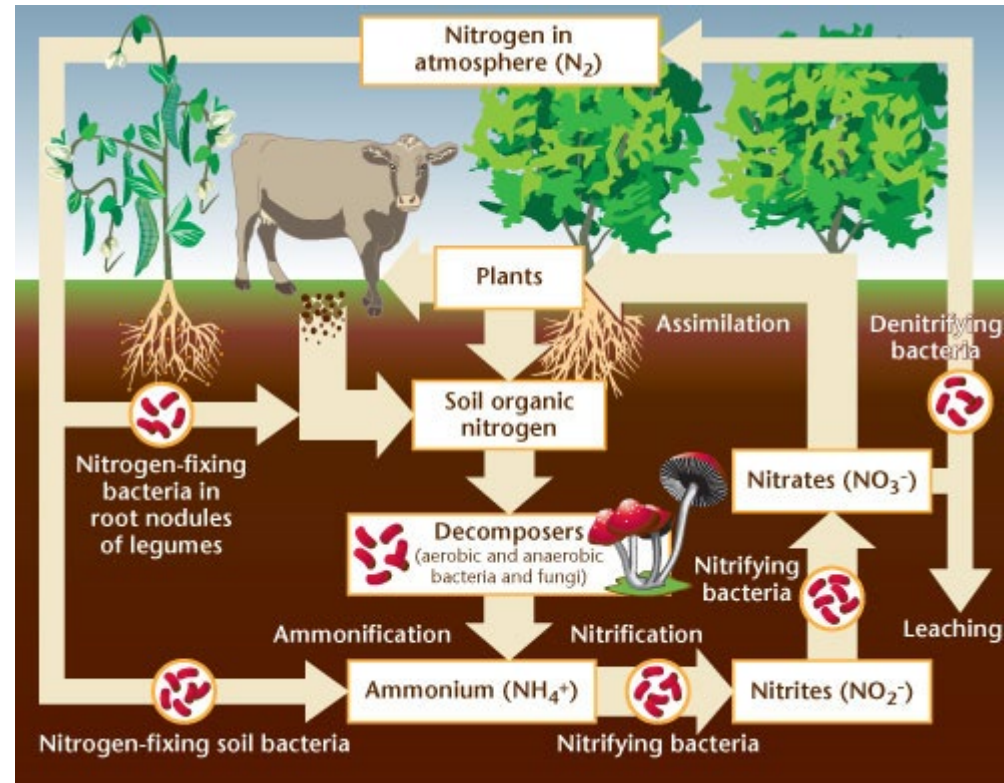
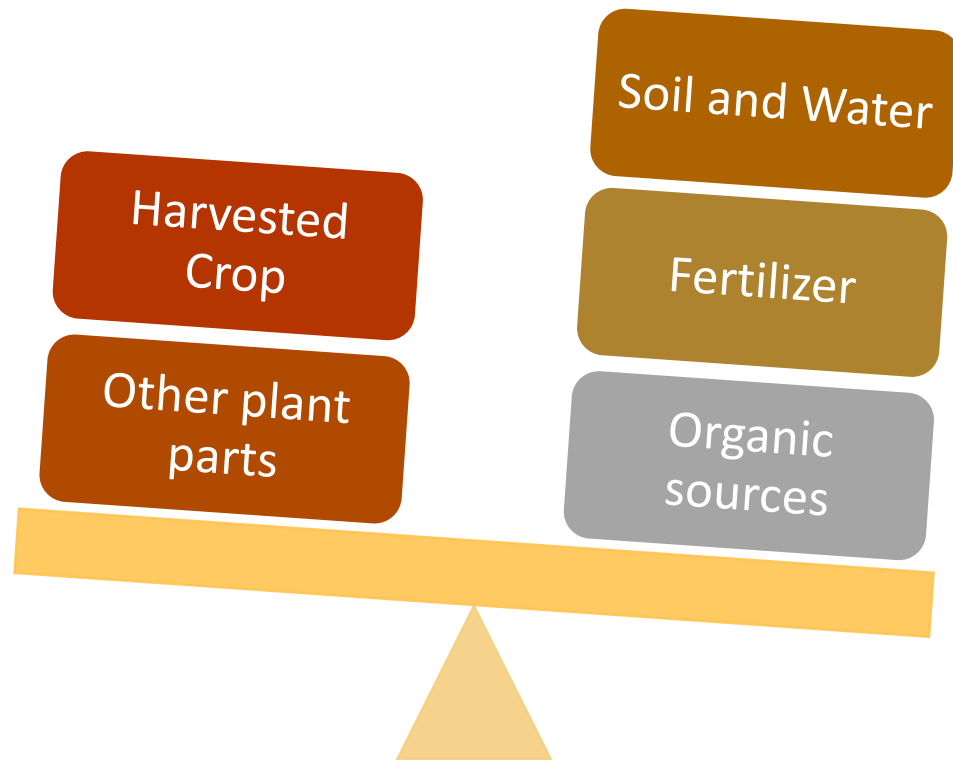


Image: WSU College of Natural Sciences

Nitrogen budget components

Demand

Supply



N from organic sources


How much?

- Total N in the material

N availability?

- C:N ratio
- Placement of material
- Decomposition conditions-
temperature and moisture





What do I need to know?

- Biomass at termination
- N content
- C:N
- Incorporated or surface mulch?

Biomass at termination

- Sample your cover crop, oven dry, weigh

OR

- Rough estimate based on height, % cover



Quantity of N contribution

- Total Biomass

$$\frac{0.37 \text{ lb}}{4 \text{ ft}^2} \times 43,560 \frac{\text{ft}^2}{\text{ac}} = 4,030 \frac{\text{lb}}{\text{ac}}$$

Quantity of N contribution

- Total Biomass

The diagram illustrates the calculation of total biomass. It features three orange boxes with white text: 'Sample dry weight' at the top left, 'Area of sample' at the bottom left, and 'Total biomass' at the top right. Brackets connect these boxes to the corresponding parts of the equation. The equation is:
$$\frac{0.37 \text{ lb}}{4 \text{ ft}^2} \times 43,560 \frac{\text{ft}^2}{\text{ac}} = 4,030 \frac{\text{lb}}{\text{ac}}$$

Estimating biomass

- Dry matter for **100 percent** groundcover at **6 inches** height:
2,000 lb/ac
- For each additional inch add 150 lb/ac.
- For an 18-inch high groundcover:

$$18 \text{ in.} - 6 \text{ in.} = 12 \text{ in.}$$

$$12 \text{ in.} \times 150 \frac{\text{lb}}{\text{ac}} = 1,800 \frac{\text{lb}}{\text{ac}}$$

$$2,000 \frac{\text{lb}}{\text{ac}} + 1,800 \frac{\text{lb}}{\text{ac}} = 3,800 \frac{\text{lb}}{\text{ac}}$$

Nitrogen content (%N)

- Send sample to lab
- Estimate based on plant mix, age at termination



Grasses

1.5-3% N



Legumes

3-4% N



Other

1.5-3% N

- Use higher range before flowering, lower range after flowering

Quantity of N contribution

- Total Biomass

$$\frac{0.37 \text{ lb}}{4 \text{ ft}^2} \times 43,560 \frac{\text{ft}^2}{\text{ac}} = 4,030 \frac{\text{lb}}{\text{ac}}$$

- Multiply by N content

$$4,030 \frac{\text{lb}}{\text{ac}} \times 3.2 \% \text{ N} = 129 \frac{\text{lb}}{\text{ac}}$$

Quantity of N contribution

- Total Biomass

$$\frac{0.37 \text{ lb}}{4 \text{ ft}^2} \times 43,560 \frac{\text{ft}^2}{\text{ac}} = 4,030 \frac{\text{lb}}{\text{ac}}$$

- Multiply by N content

$$4,030 \frac{\text{lb}}{\text{ac}} \times 3.2 \% \text{ N} = 129 \frac{\text{lb}}{\text{ac}}$$

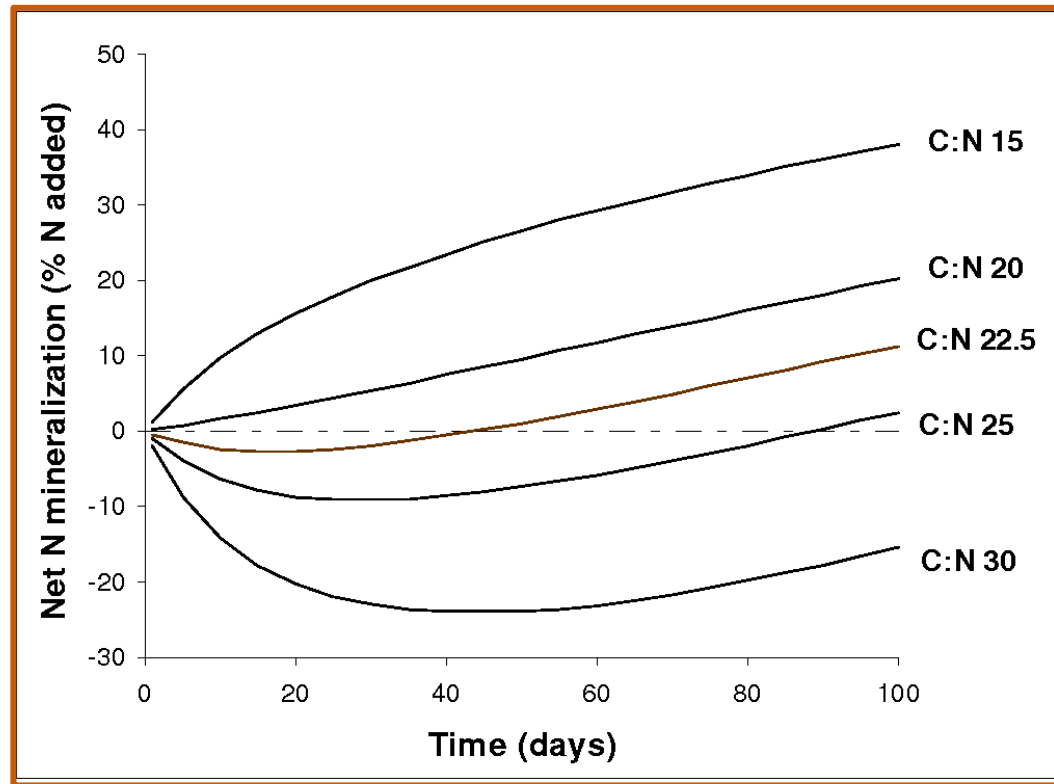
Total
biomass

N
content

Total N in
biomass

N availability from cover crop

- Quality of cover crop (C:N)
- N release or N immobilization?
- Incorporated or surface mulch?
- Timing?



M E Proberta, [R J Delveb](#), S K Kimani, and J P Dimes. 2005. **Modelling nitrogen mineralization from manures : representing quality aspects by varying C : N ratio of sub-pools.** Soil Biology and Biochemistry, 37:2, 279-287.

Carbon-Nitrogen Ratio (C:N)

- Send sample to lab
- Estimate based on plant mix, age at termination



Wheat 18:1



Vetch 12-15:1



Legume-Oat mix 15-18:1

Data from Yolo and Solano County field samples, Margaret Lloyd, UCCE.

N available from Cover Crop



- High C:N
- Terminated far in advance of planting
- Surface mulch
- Cool temperatures
- Very dry or very wet soil conditions

- Low C:N
- Terminated near planting time
- Incorporated
- Warm temperatures
- Moderate soil moisture

Quantity of N contribution

- Total Biomass

$$\frac{0.37 \text{ lb}}{4 \text{ ft}^2} \times 43,560 \frac{\text{ft}^2}{\text{ac}} = 4,030 \frac{\text{lb}}{\text{ac}}$$

- Multiply by N content

$$4,030 \frac{\text{lb}}{\text{ac}} \times 3.2 \% \text{ N} = 129 \frac{\text{lb}}{\text{ac}}$$

- Multiply by % available:

$$129 \frac{\text{lb}}{\text{ac}} \times 20\% \text{ available} = 26 \text{ lb/ac}$$

Questions?

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