Advanced Composting Discussion: Carbon to Nitrogen Ratio Simplified Calculations

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Carbon and Nitrogen - a quick review

- Primary nutrients required by microorganisms for proper composting
  - Carbon
  - Nitrogen
  - Phosphorus
  - Potassium
- Excessive or insufficient quantities of Carbon or Nitrogen greatly affects the composting process

Carbon and Nitrogen - a quick review (con't)

- Carbon: Provides energy and supports growth
- Nitrogen: Provides protein and support reproduction
- A balanced Carbon to Nitrogen (C:N) ratio of 25:1 to 30:1 is ideal for an active compost pile
- C:N ratios of as low as 20:1 or as high as 40:1 also produce good quality finished compost

Carbon and Nitrogen - a quick review (con't)

- If C:N < 20:1
  - Excess Nitrogen will off-gas to the atmosphere as NH_3 or N_2O, resulting in an undesirable odor
- If C:N > 40:1
  - Decomposition rate (ie: composting process) slows down
  - This can be countered by reducing the particle size

C:N Ratio - Simplified Calculations

- Does not factor in Moisture Content of feedstock material
- Does not factor in Degradability of the various feedstock materials
  - the ease in which the carbon compounds in the individual material decomposes and utilized by the microorganisms

Carbon to Nitrogen Ratio Simplified Formula

$$\frac{\left(\begin{array}{c}\text{[Carbon value}\\ \text{of material A]}\end{array} \times \begin{array}{c}\text{[Weight of}\\ \text{material A]}\end{array}\right) + \left(\begin{array}{c}\text{[Carbon value}\\ \text{of material B]}\end{array} \times \begin{array}{c}\text{[Weight of}\\ \text{material B]}\end{array}\right) + \ldots}{\begin{array}{c}\text{[Weight of}\\ \text{material A]}\end{array} + \begin{array}{c}\text{[Weight of}\\ \text{material B]}\end{array} + \ldots}$$

Simplified C:N Calc Example #1

- 10 lbs. Llama manure @ 20:1
- 10 lbs. Fresh leaves @ 40:1

Therefore...

$$\frac{([20] \times [10]) + ([40] \times [10])}{[10] + [10]} = \frac{600}{20} = 30:1$$

Simplified C:N Calc Example #2

- 10 lbs. Llama manure @ 20:1
- 10 lbs. Hardwood bark @ 220:1

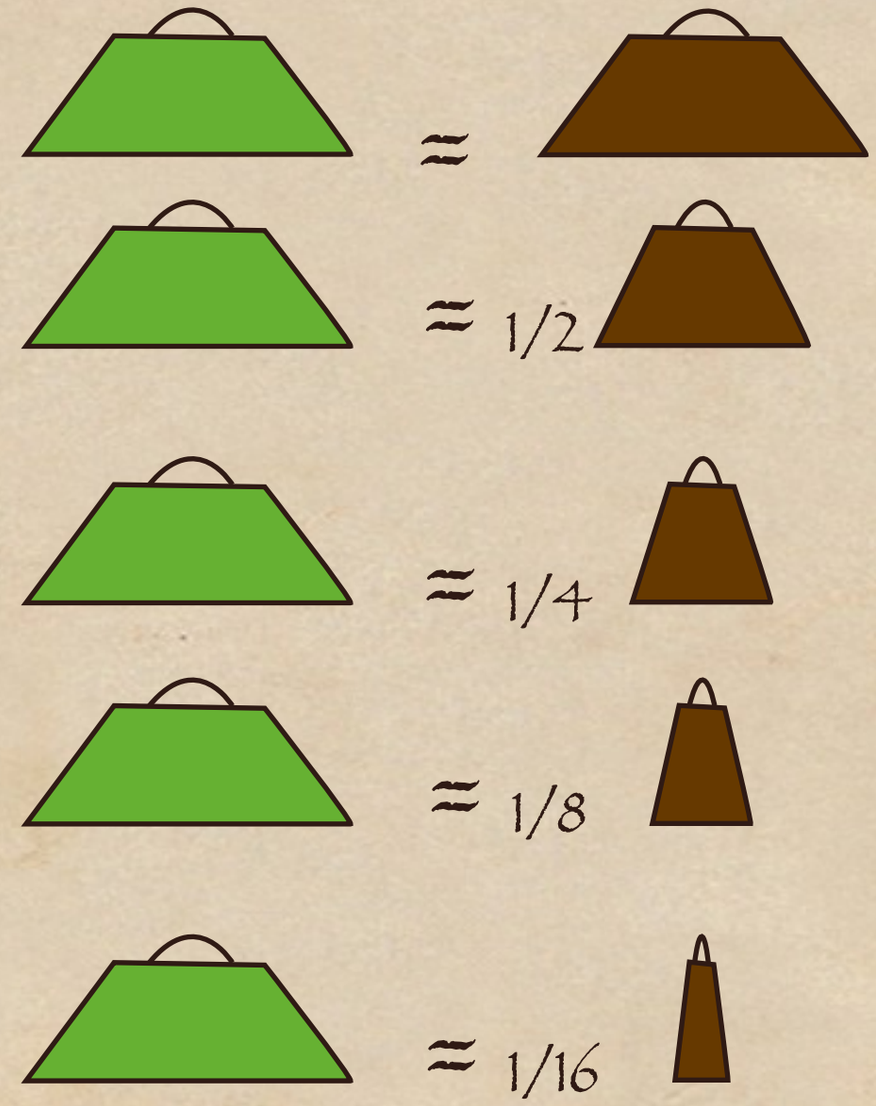
Therefore...

$$\frac{([20] \times [10]) + ([220] \times [10])}{[10] + [10]} \approx \frac{2400}{20} \approx 120:1$$

Too much 'brown' material added to mix!

General Guidelines for Mixing Greens and Browns for Acceptable C:N Ratio

- For browns < 60:1
  - Leaves, shrubs, corn stalks
- For browns 60:1 to 120:1
  - Pine Needles, straw, corn cobs
- For browns 120:1 to 180:1
  - Wheat, paper, newsprint
- For browns 180:1 to 320:1
  - Hardwood bark, paper towels
- For browns 320:1 to >500:1
  - Softwood bark, cardboard, wood chips, sawdust



NOTE: If mixing more than 2 types of brown material, use the Compost Calculator!

Practical Application Example

- Village of Corrales Composting Facility
  - Starting Bin Dimensions: 10'x8'x5' = 14.8 cu yd
  - Estimated kitchen scraps (greens) per week = Qty 10 55 gal containers = 550 gals/wk = 2.7 cu yd = 4,300 lbs
  - If we mixed w/ dried leaves (browns), we'd need minimum of 3000 lbs of leaves = 15 cu yd
  - Therefore, the starting bin would be too small; 14.8 cu yd vs. an estimated compost pile of 17.7 cu yd!
  - If we mixed w/ 500 lbs of leaves and 200 lbs of wood chips, estimated compost pile would only be 6 cu yd!

Questions???

- Thanks for your attention!