

Horse Manure and Soil Nitrogen

Horse manure and soil nitrogen. Horse manure is an abundant, locally available source of organic matter for soils. A major concern about horse manure is that it can cause a nitrogen deficiency when added to soils, leading to stunted, yellowed crops. Undiluted horse manure contains modest levels of nitrogen (about 1 to 2% of dry weight), and supplies small amounts of N to plants via slow release. When horse manure is mixed with woody bedding, the resulting product often ties up nitrogen in the soil through microbial immobilization, leading to N deficiency in the crop.



We sampled horse manure from 36 farms and stables in King County, Washington, and determined N concentration and C:N (carbon:nitrogen) ratio in each sample (Tables 1 and 2, Figures 1 and 2). All but one of the undiluted materials had a C:N less than 30:1 and half had a C:N equal to 20:1, while most of the samples with bedding had a C:N greater than 30:1. In general, materials with a C:N less than 20:1 are expected to supply N to plants, and C:N greater than 30:1 are expected to create N deficiency. Materials with intermediate C:N often tie up some N the first few weeks after application and supply N later in the season.

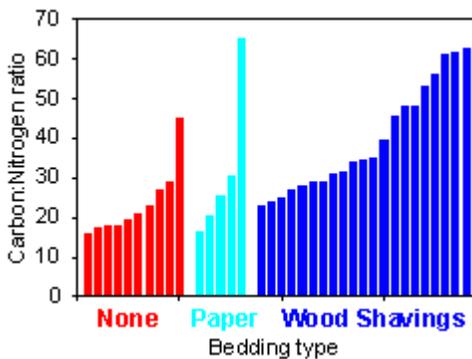


Figure 1.

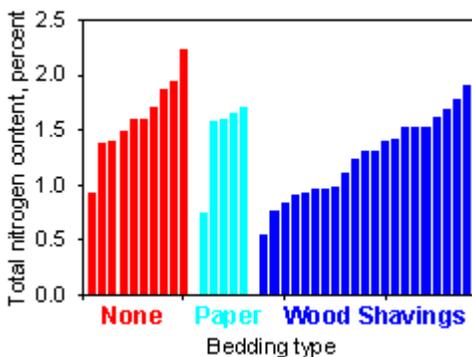


Figure 2.

Table 1. Averages.

| Bedding Type | Moisture % | Total N % | C:N Ratio |
|---------------|------------|-----------|-----------|
| None | 75 | 1.59 | 20.2 |
| Paper | 66 | 1.60 | 25.4 |
| Wood Shavings | 67 | 1.31 | 34.4 |

Table 2. Ranges.

| Bedding Type | Moisture % | Total N % | C:N Ratio |
|---------------|------------|-----------|-----------|
| None | 47-81 | 0.93-2.23 | 16-45 |
| Paper | 61-81 | 0.74-1.70 | 16-64 |
| Wood Shavings | 52-78 | 0.55-1.90 | 23-61 |

The data indicate that horse manure without bedding will supply a modest amount of N to plants. Horse manure with bedding will often tie up N, and supplemental N is needed when using this material as a source of organic matter for soils. Information on managing N when using horse manure is found in the following link: [A Horse Owner's Guide to Good Stewardship \(pdf file\)](#).