Impact of High C:N Compost on Lettuce Yield

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Methods: Forest mulch compost that was made from ground tree branches and trunks was triple screened to capture biologically active fines that can immobilize nitrate-N in soil in winter fallow beds. The material used in this evaluation was 36.5% carbon (C) and 0.17% nitrogen (N) with a C:N ratio of 215:1. The material was applied at four rates onto peaked beds and mulched into the top three inches of soil with a bed shaper on February 12, 2020. The anticrustant starter fertilizer 6-16-0 was sprayed onto the bed top at four rates to each compost treatment on February 19 and the first water was applied to the field on February 20. Mineral nitrogen was measured in the field prior to the first sidedress fertilizer application on March 13 and stand and phytotoxicity was evaluated on March 26 and yield evaluations were made by harvesting 10 heads from each plot and measuring total head biomass (not stripped) on May 8.

Results: This was an observational trial and the following trends were observed:

Compost treatment effects:

- there were higher levels of soil nitrate-N in the non-compost treatments
- there was no impact on crop stand
- slightly lower mean head weight in treatments with higher rates of compost

Fertilizer treatment effects:

- there was higher nitrate in the soil in the higher fertilizer treatments
- no impact on crop stand
- higher yield in the highest fertilizer treatment

Based on these trends it appears that the higher rates of high C:N compost can reduce the yield of lettuce, but higher rates of starter fertilizer can offset this impact to a significant degree.

Table 1. Composite of compost treatments (including all fertilizer treatments
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Compost Tons/A[1]	Starter fertilizer lbs N/A	Starter fertilizer gallons/A	Soil March 13		March 26		May 8
			NH_4-N ppm	NO_3-N ppm	Lettuce stand plants/A	Phyto-Toxicity[2]	Mean head/plant lbs
0	---	---	1.2	35.3	32,516	0.0	1.6
5	---	---	1.2	22.7	32,026	0.3	1.6
10	---	---	1.5	24.1	31,863	0.3	1.5
15	---	---	1.8	26.2	32,189	0.5	1.4
---	0.0	0	1.5	23.9	31,862	0.8	1.5
---	7.8	15	1.2	26.3	32,516	0.0	1.5
---	15.5	30	1.6	28.1	32,352	0.3	1.5
---	23.2	45	1.3	30.0	31,862	0.0	1.6

1 – Compost 36.7% moisture (net solids applied: 15 = 9.5; 10 = 6.3; 5 = 3.2 T/A);
2 – Scale: 0 = no crop damage to 10 crop dead