

COMPOSTING MANURE WITH SAWDUST AT LOCUST GROVE FARM, A SMALL POULTRY OPERATION

by

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Background:

Locust Grove Farm, operated by Linda Lee and Herman Beck-Chenoweth, is located in Vinton County of southeastern Ohio. They produce range raised chickens, turkeys and eggs and market directly to consumers and restaurants. In addition Linda and Herman raise fresh vegetables such as lettuce(s), okra, peppers, potatoes, pumpkins, sweet corn, tomatoes, etc. for these same markets. Composting poultry manure with sawdust was of interest to Locust Grove Farm as a way to produce a high quality organic fertilizer.

Project:

Poultry manure at the Locust Grove Farm¹ was mixed with fresh sawdust(woodshavings) and composted in a static windrow system. Table 1 shows chemical properties of materials used in composting. Laboratory data showed that the sawdust (fresh) had a carbon/nitrogen ratio of 208 and the poultry manure had 9.1. Recommended C:N levels for composting are 20-30 (Hansen et al., 1995.). Based on amounts of manures from each source on the farm, it was recommended that a 1:1 up to a 1:2 v/v mix of poultry manure to sawdust would give a C/N ratio of 20 - 30. It was also recommended that composting be done at the Locust Grove site using a naturally ventilated windrow system (Hansen, et. al., 1995).

The test was started on August 31, 1996. Personnel removed material from the buildings by hand forking and use of a front end loader. Preparation of the compost mix involved: use of a front end loader to layer sawdust to a depth of 18 inches in the bottom of a manure spreader; layering the poultry manure on the bulking agent; blend the materials by discharging through the spreaders beaters and form a windrow 4 feet high, 8 ft wide and 60 ft long (Fig. 2). The mix was then allowed to compost for 30 days in the windrow. Following composting, the material was remixed and placed in a cone shaped pile 7 feet deep at the peak, where it cured till spring of the year. It was then applied to various crops.

Results:

Table 1 shows results of the laboratory analyses of the actual materials used and the resulting compost mix for dry matter, carbon, nitrogen and pH. Mixing ratio was 0.5:1 w/w or about 1:1 v/v for sawdust to poultry manure, respectively. The C/N ratio of the mix was estimated at 18 compared to the desired value > 25. At 21 days C:N was measured at 11.3. Analysis of the product mixes for nutrients was done at the completion of the curing (about 8 months) and results are also presented in table 1. Finished compost had a fertilizer value of 2.4%N, 3.8% P₂O₅ (1.7%P) and 1.0 % K₂O (0.82% K).

Temperature histories, recorded during the test, are presented in Fig. 1. The mix heated very fast, achieving a peak temperature of 148 F by day three. No data was collected on NH₃-N evolution, but nitrogen losses based on laboratory analysis and estimated dry solids loss was 16%. Dry solids losses of the compost mix, based on ash analysis was estimated at 40% for eight months of composting.

Observations made during material handling showed no problems with blending the sawdust and poultry manure using a manure spreader. Removal of manure from the current building was the biggest problem. General appearance of the compost at the end of 7 months (composting/curing) can be described as - black, moist, odor free and good structure. Results of composting showed that nutrient balances on N, P, and K for the farm would project N decreasing by 12-16% , while P and K would not change significantly when sawdust is used as the bulking agent. Since composting would not increase N,P,K, etc., other benefits of compost would need to be justified to offset the cost of producing it.

References

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Table 1. Chemical characteristics of compost feedstock and mixtures used in study of composting at Locust Grove Farm. Blending ratio was 0.5:1 w/w or 1:1 v/v for sawdust:chicken manure.

Material	Sawdust	Chicken Manure	Compost Mix t= 3 weeks.	Compost Mix t= 8 months
<u>Chemical Properties</u>				
dry solids, %	42.4	55.8		
moisture, %	57.6	44.2		
C, %	45.7	22.1	29.3	19.7
N, %	0.22	2.43	2.6	2.38
C/N	208	9.1	11.3	8.3
Ash, %	0.59	51.84	35.3	58.9
pH	6.1	8.2	7.9	6.6
Phosphorus, %	0.0089	1.62		1.66
Potassium, %	0.0772	1.97		0.82 ¹

¹The potassium value is low based on mass balances.

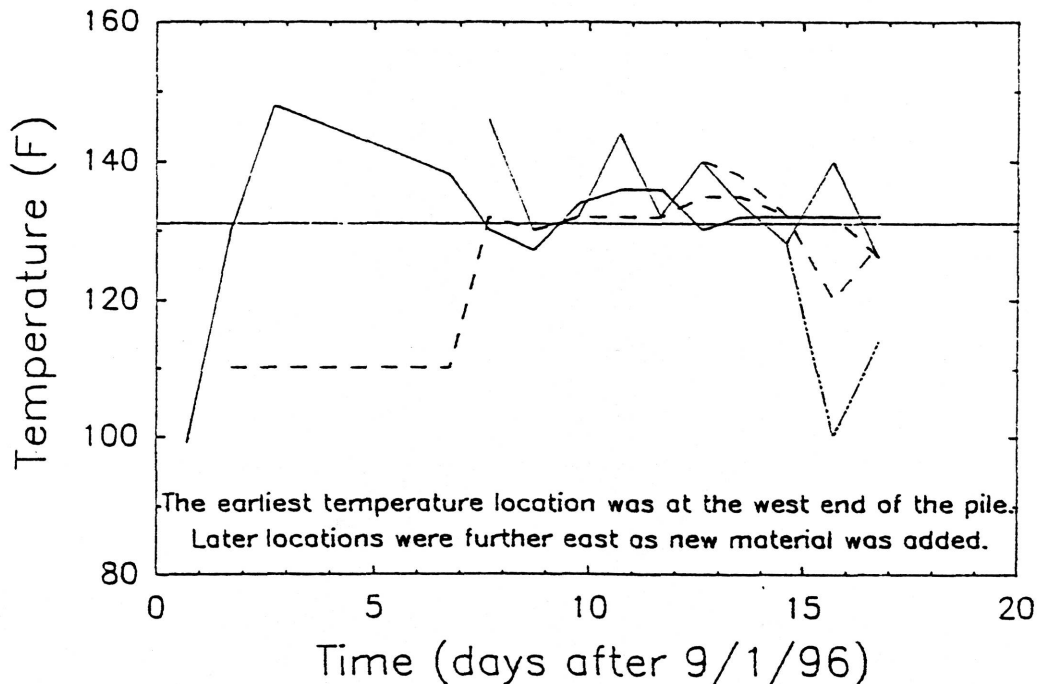


Figure 1. Temperature histories of poultry manure mixed with sawdust during field study.