Feedstock Development and Analysis for On-Farm Compost Energy Systems

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Abstract:

Our goal was to ascertain the most effective, affordable and reliable compost feedstock to power a hydronic (hot water) heat system and provide the necessary foundation for implementation of these sustainable energy alternatives in small-scale agriculture around Vermont and beyond. Our research was preformed at Bread & Butter Farm, a diversified dairy, beef and vegetable farm employing organic practices on conserved land in South Burlington, Vermont. Over ten weeks, we monitored the temperature output (energy potential) of three feedstock mixtures and two control piles along with their carbon/nitrogen ratios and nutrient compositions.

This research is based on the work of Jean Pain, a French farmer and inventor who pioneered the use of woody biomass based compost systems for hydronic heat and methane capture. Temperature trends established over the testing period indicate distinct differences in thermal output based on feedstock composition. Based on temperature alone, our 50-50 woody-to-agricultural mix sustained the highest thermal output over the ten-week testing period. The thermal profile and nutrient analysis suggest that several modifications in design must be made in order for these feedstocks to be viable for sustained heat and methane capture systems on-farm.