

Crone's Cradle Conserve



WASTE AUDIT OF A SMALL ORGANIC TEACHING FARM



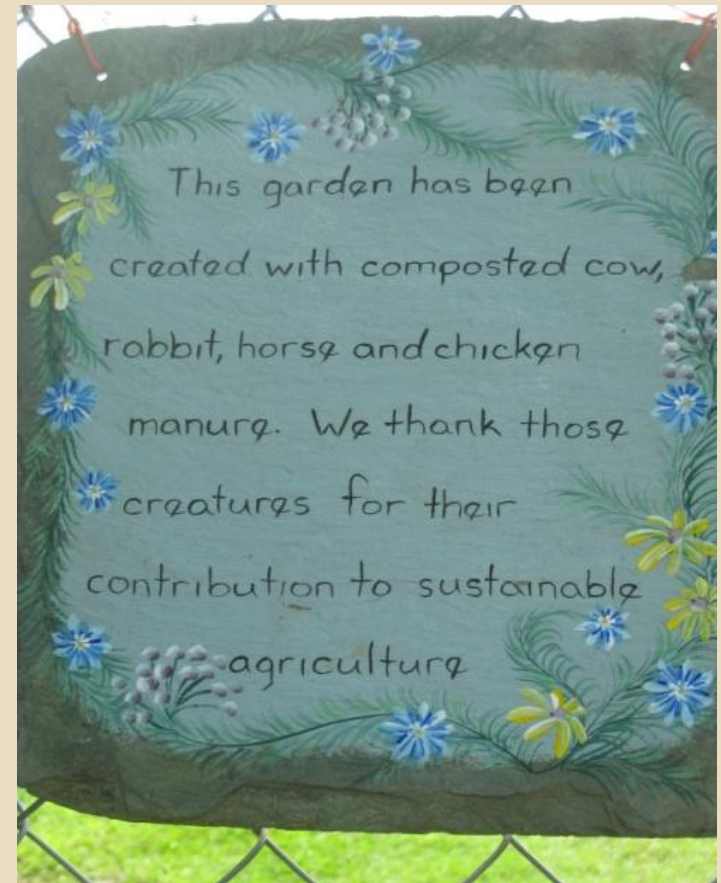
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BioEnergy Summer School 2011

Outline



- About Crone's Cradle Conserve
- Methodology
- Weekly Waste Report
- Methane Potential
- Comparison Between Weekly Farm Waste
- Recommendations for the Future



Crone's Cradle Conserve



- 756 acre, privately-owned, ecological preserve and education center
- Less than 100 acres used for human purposes
- Main purpose is sustainability in farming
- Majority of income comes from the harvests of 2/3 an acre of organically-grown produce and related products

Current Waste Disposal Methods



- Compost: Pig manure, field culls, and kitchen waste
- Landfill: All invasives (except taro) and all diseased plants are taken to the landfill
- Weeds and taro are dumped away from the gardens
- Rabbit manure is applied directly in the gardens



Methodology



- Visited Crone's Cradle 2-3 times each week
- Waste was separated by day and type
- Weighed each sample type and took a representative sample of each waste



Sampling and Weighing



Methodology (cont)



- Samples were brought back to the BEST Lab to undergo TS and VS testing to determine maximum methane potential
- Samples were chopped up into small pieces or put through a disposal



Methodology (cont)



- Each sample was weighed into three sets of approximately 100 grams and dried in an oven for 24 hours, then weighed to determine TS content
- The samples were then ashed in a furnace for 4 hours and weighed to determine VS content
- Using the mass of each waste, its % TS of wet weight, and its % VS (% TS), the methane potential of the collected waste was calculated

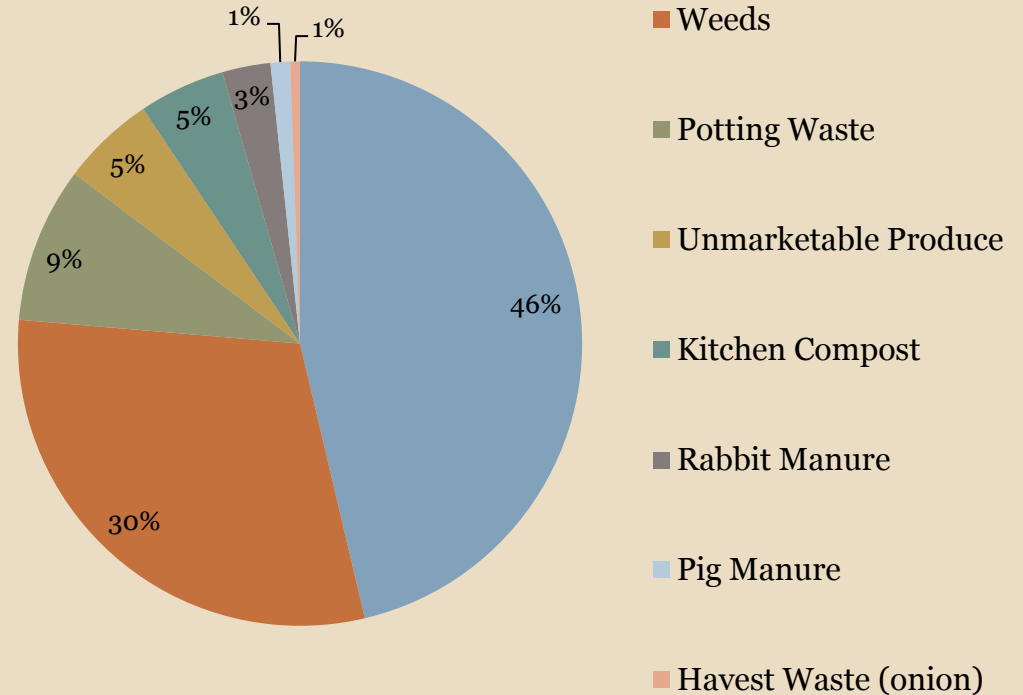


Waste Collected the Week of 6/13/11



Sample	Mass (kg)
Row Clearings	188.10
Weeds	122.02
Potting Waste	36.29
Unmarketable Produce	21.70
Kitchen Compost	20.07
Rabbit Manure	11.23
Pig Manure	4.54
Harvest Waste (onion)	2.27

Waste Percentages for the Week of 6/13/11

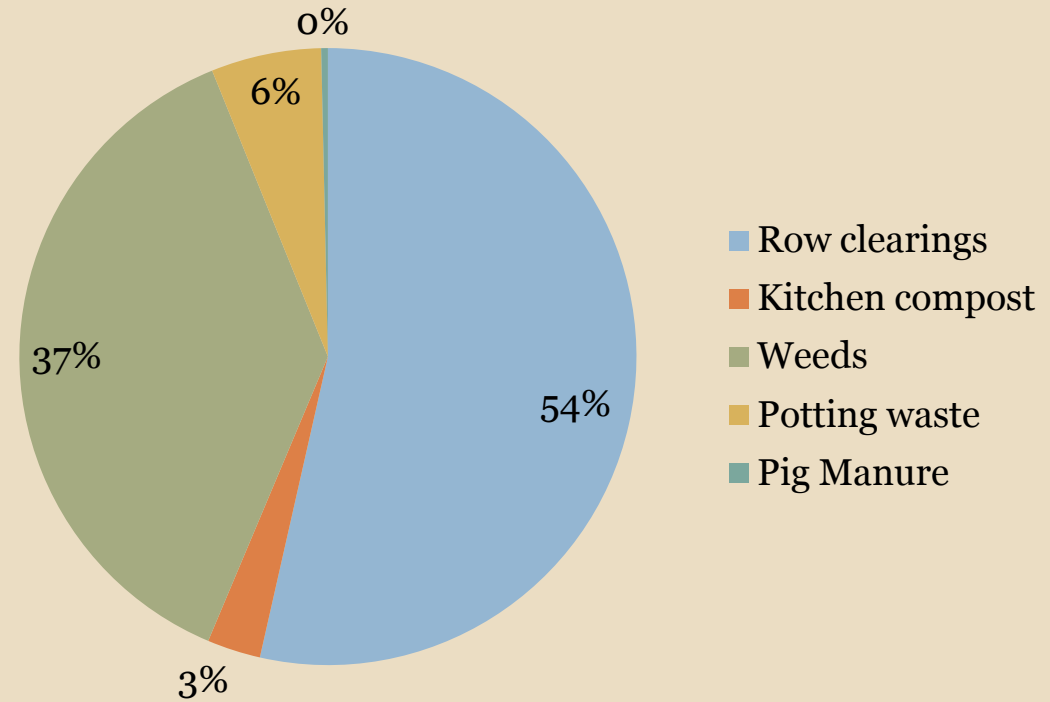


Waste Collected the Week of 6/27/11



Sample	Mass (kg)
Row clearings	277.6
Weeds	194.6
Potting waste	29.9
Kitchen compost	14.5
Pig manure	1.8

Weekly Waste Percentages for the Week of 6/27/11

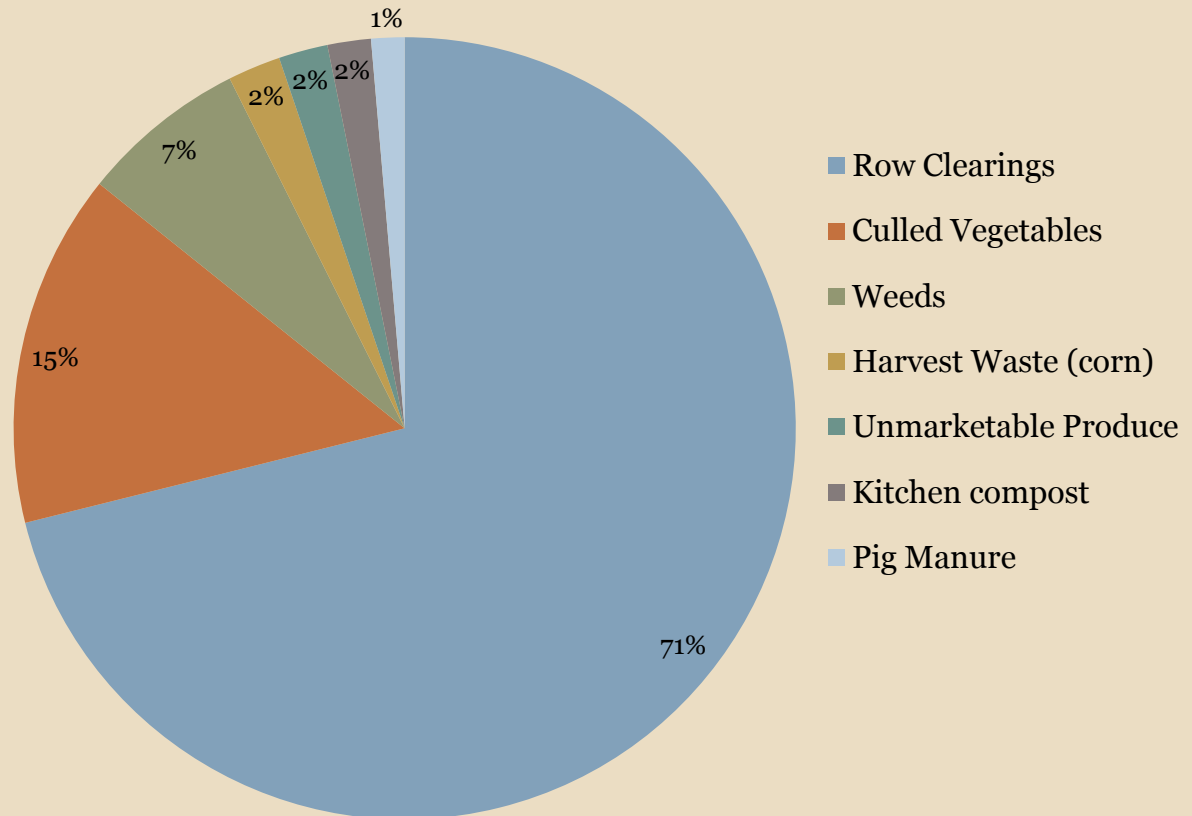


Waste Collected the Week of 7/11/11



Sample	Mass (kg)
Row Clearings	373.10
Culled Vegetables	76.79
Weeds	36.04
Harvest Waste (corn)	11.45
Unmarketable Produce	10.66
Kitchen compost	9.41
Pig Manure	7.21

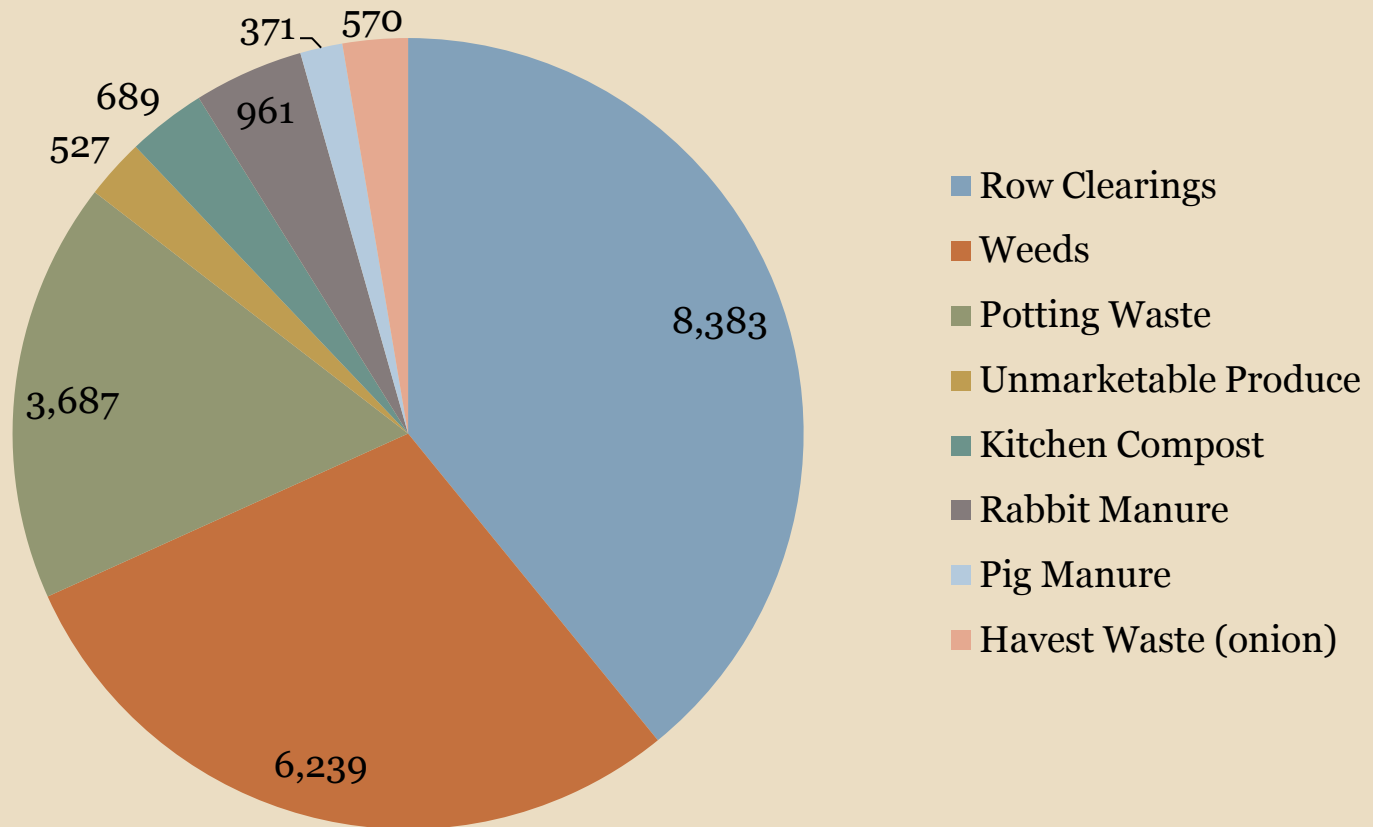
Waste Percentages for the Week of 7/11/11



Methane Potential for Week of 6/13/11



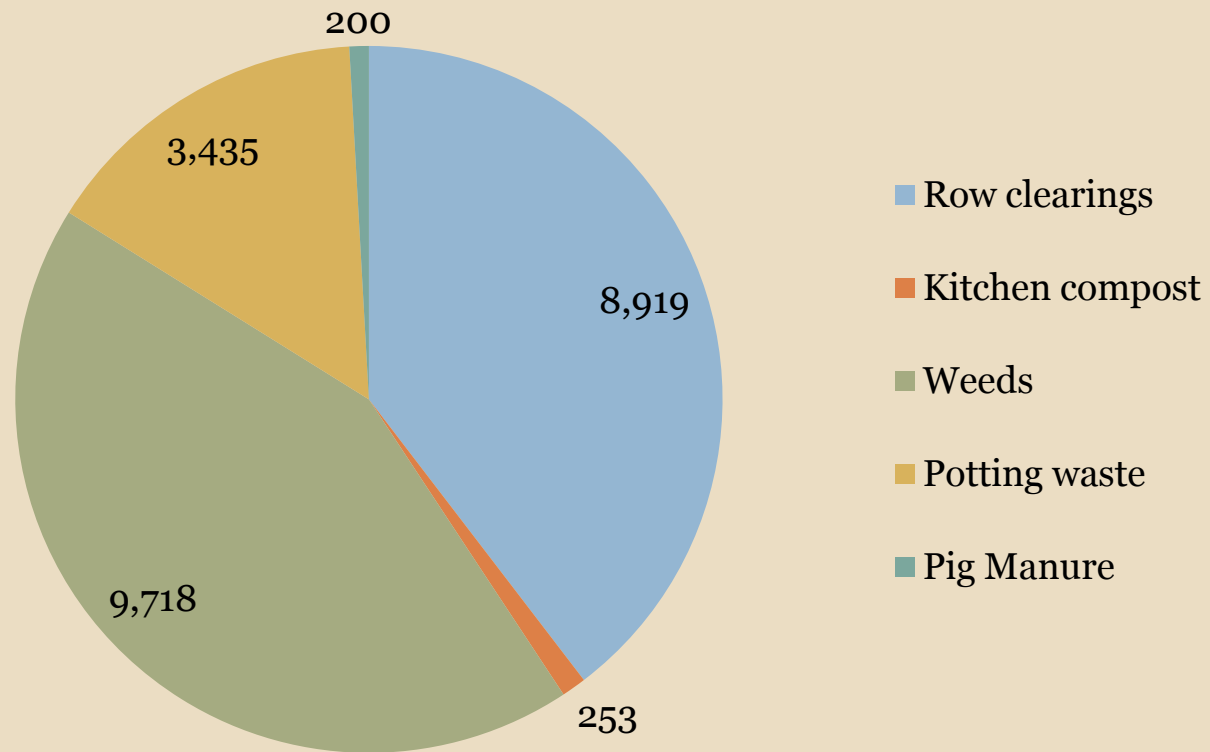
Estimated Methane Potential (L) for the Week of 6/13/11



Methane Potential for Week of 6/27/11



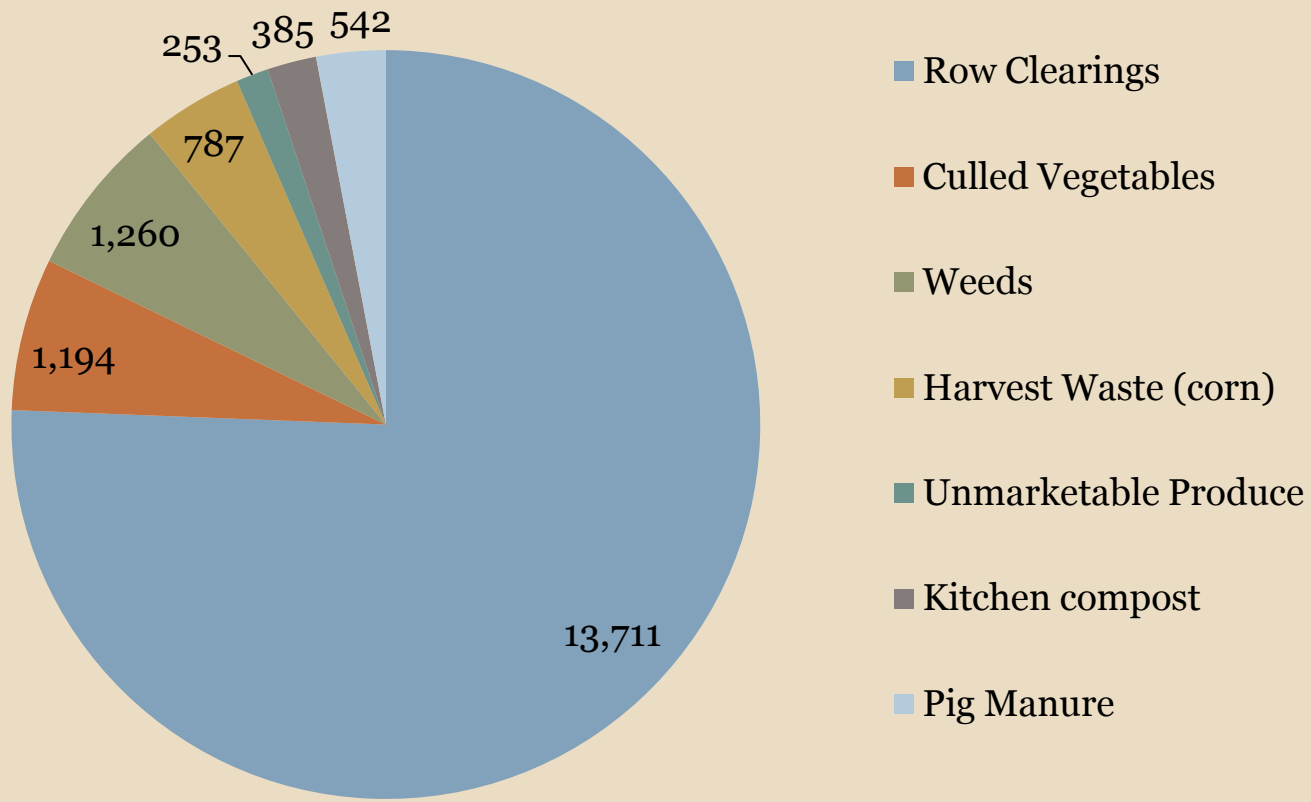
Estimated Methane Potential (L) for the Week of 6/27/11



Methane Potential for Week of 7/11/11



Estimated Methane Potential (L) for the Week of 7/11/11



Waste and Methane Total per Week



Week	Total Waste (kg)	Maximum Methane Potential (L)
6/13/2011	406.2	21,427.1
6/27/2011	518.5	22,779.9
7/11/2011	524.7	16,633.9

- Estimated Methane Potential does not necessarily correlate directly with mass of weight
- TS and VS values are important to methane production

Compost vs. Anaerobic Digestion



- Culled vegetables and kitchen waste yielded the lowest methane potential
- Weeds, diseased plants, and invasive species could be anaerobically digested instead of being sent to a landfill or dumped away from the gardens
- A hierarchy of compostable waste could be established based on the crops produced to evaluate energy vs. compost needs

Compost vs. Anaerobic Digestion



- Weeds are dumped; an estimated 17,200 L CH₄ could be produced from the weed waste of the three week audit
- Approximately 31,000 L CH₄ could've been produced from the row clearings over the course of the three weeks

Future Studies



- Seasonal waste audit (2-3 weeks per season) to demonstrate variability between seasons
- Estimate yearly methane potential using a seasonal waste audit
- Feasibility study of installing an anaerobic digester on the property
- Quantifying the value of composting vs. anaerobic digestion



Questions/Comments

