



Research Report

Grass Biomass Production Potential of “Marginal” Land in Vermont



For More Information on Grass Biomass, go to: <http://pss.uvm.edu/vtcrops/?Page=energycrops.html>

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Many of the perennial grasses growing on non-prime farmland in Vermont could be a potential source of biomass energy if harvested later in the season. Many of these sites are poorly drained and too wet in most years to be reliable for dairy or livestock producers as a high quality hay crop. There are many cool season grasses that are found growing on marginal wet soils in Vermont, but the most common is reed canarygrass (*Phalaris arundinacea* L.). This sod grass spreads by rhizomes producing thick patches and can be relatively high yielding. For biomass used for thermal energy, the best time to harvest cool season grasses is from late July through August after the grasses have reached full maturity. As grasses mature, their ash and mineral content generally declines which is better for fuel quality when used for thermal energy purposes.



Fig 1. Reed canarygrass growing on a poorly drained soil in East Randolph, VT

To assess the potential production of these types of “existing” grasslands, five fields were assessed in late July and early August in 2007. The fields had not been harvested nor mowed prior to this sampling time. None had received any nutrient inputs in 2007. Most of the fields were composed of predominately reed canarygrass. Three of the fields were poorly drained sites that had not been harvested or mowed in at least the previous two or three years. Two of the fields were underutilized hay fields.

At each site, samples were randomly collected walking a zigzag pattern across the field. Biomass yield was determined using a 6” by 36” sward sampler and electric clippers. The samples were cut to a 4 inch stubble height.



Fig 2. Sward sampler for collecting biomass yield and quality samples.

Samples were cut, dried and weighed to determine dry matter yield. The samples were then ground and sent to the Dairy One Lab (Ithaca, NY) for ash and potassium analysis and to the Cornell Forage Research Lab (J. Cherney) for energy analysis using a bomb calorimeter.

Average biomass production across all fields was 2.75 tons d.m. per acre (see Table below). The three most productive fields had over 90% reed canarygrass. One of the lowest producing fields was made up mainly of smooth brome grass and the other was mixed mainly reed canarygrass. Ash content ranged from 5 to 7.9 percent, much higher than the desired levels for using biomass for heat energy. In contrast, wood pellets are typically 1 % ash.

Biomass Samples Collected from "Existing Fields"						
<u>Field Name</u>	<u>Swift</u>	<u>Church</u>	<u>Lincoln</u>	<u>Rainville</u>	<u>Meach Cove</u>	<u>Average</u>
Town	S. Burl	S. Burl.	E. Randolph	Alburg	Shelburne	
Sample Date	8/4/2007	8/4/2007	8/4/2007	7/25/2007	7/26/2007	
No. Subsamples	9	11	14	11	12	
Biomass (tons d.m./acre)						
Mean	2.73	2.41	2.88	3.30	2.42	2.75
Std. Dev.	0.46	0.40	0.46	0.42	0.29	
Ash Content (% of d.m.)						
Mean	7.83	7.93	5.14	7.87	6.55	7.06
Std. Dev.	0.74	1.10	0.76	1.02	1.15	
Potassium Content (% of d.m.)						
Mean	1.61	1.17	1.19	1.43	1.13	1.31
Std. Dev.	0.33	0.18	0.26	0.08	0.16	
Energy Content (BTU/lb. dm)						
Mean	7875	7762	7984	7844	7924	7878
Std. Dev.	29	144	95	77	123	
Species	% Composition (Visual Appraisal)					
Reed Canarygrass	100	69	94	100	2	
Ky. Bluegrass	-	9	-	-	-	
Fine fescue	-	10	-	-	-	
Smooth brome grass	-	2	-	-	88	
Orchardgrass	-	-	-	-	5	
Italian Ryegrass	-	5	-	-	-	
Alfalfa	-	-	-	-	1	
Vetch	-	2	-	-	5	
Marestail	-	3	-	-	-	
Other Broadleaf	-	-	6	-	-	

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