

Miscanthus

REFERENCE MATERIAL

Pedigree

Institution: Repreve Renewables
 Location: Tifton, GA
 Scientific Name: *Miscanthus × giganteus*
 Variety: Freedom

Harvested: 2014
 Received at INL: 2014
 Sample Preparation: 1-inch chopped using a Claas Forage Chopper

Composition

Table 1. Chemical composition^a of Reference Miscanthus (mean of analyses completed 2/2015 & 4/2015)

%Structural Ash	%Extractable Inorganics	%Structural Protein	%Extractable Protein	%Water Extracted Glucan ^b
0.52	0.02	0.47	0.16	0.27
%Water Extracted Xylan ^b	%Water Extractives Others	%EtOH Extractives	%Lignin	%Glucan
0.10	2.61	2.05	20.41	40.79
%Xylan	%Galactan	%Arabinan ^c	%Acetate	%Total
22.01	1.11	2.86	3.87	97.25

^aDetermined using NREL “Summative Mass Closure” LAP (NREL/TP-510-48087)

^bDetermined by HPLC following an acid hydrolysis of the water extractives

^c%Arabinan value includes %mannan, because arabinose and mannose co-elute on the HPLC column

Proximate, Ultimate & Calorimetry

Table 2. Proximate, ultimate, and calorific values for Reference Miscanthus (reported on a dry basis; completed 11/2014)

Proximate ^a			Ultimate ^b					Calorimetry ^c	
%Volatile	%Ash	%Fixed Carbon	%Hydrogen	%Carbon	%Nitrogen	%Oxygen	%Sulfur	HHV	LHV
85.53	1.40	13.06	5.85	50.64	0.21	41.88	0.01	8493	7073

^aProximate analysis was done according to ASTM D 5142-09

^bUltimate analysis was conducted using a modified ASTM D5373-10 method (Flour and Plant Tissue Method) that uses a slightly different burn profile. Elemental sulfur content was determined using ASTM D4239-10, and oxygen content was determined by difference

^cHeating values (HHV, LHV) were determined with a calorimeter using ASTM D5865-10

Elemental Ash

Table 3. Elemental ash composition^a of Reference Miscanthus (completed 4/2015)

%Al as Al ₂ O ₃	%Ca as CaO	%Fe as Fe ₂ O ₃	%K as K ₂ O	%Mg as MgO	%Mn as MnO	%Na as Na ₂ O	%P as P ₂ O ₅	%Si as SiO ₂	%Ti as TiO ₂	%S as SO ₃
0.29	18.34	1.20	6.44	9.03	1.11	0.18	3.58	52.31	0.02	3.15

^aDetermined as described in ASTM standards D3174, D3682 and D6349

Lignin Chemistry

Table 4. Lignin chemistry of Reference Miscanthus (completed 1/2016)

Monolignol Composition ^a			Cinnamate Content ^a	
p-Hydroxyphenyl (H) content (% of total H+G+S)	Guaiacyl (G) content (% of total H+G+S)	Syringyl (S) content (% of total H+G+S)	Ferulate content (% of total cinnamates)	p-Coumarate (% of total cinnamates)
2	66	32	34	66

^aDetermined by integration of peak volumes of ball-milled whole cell wall samples, swelled in 4:1 DMSO:Py, and analyzed by gel-state HSQC NMR (Mansfield, S. D.; Kim, H.; Lu, F.; Ralph, J. (2012). Nature Protocols, 7(9), 1579-1589)

Particle Characteristics

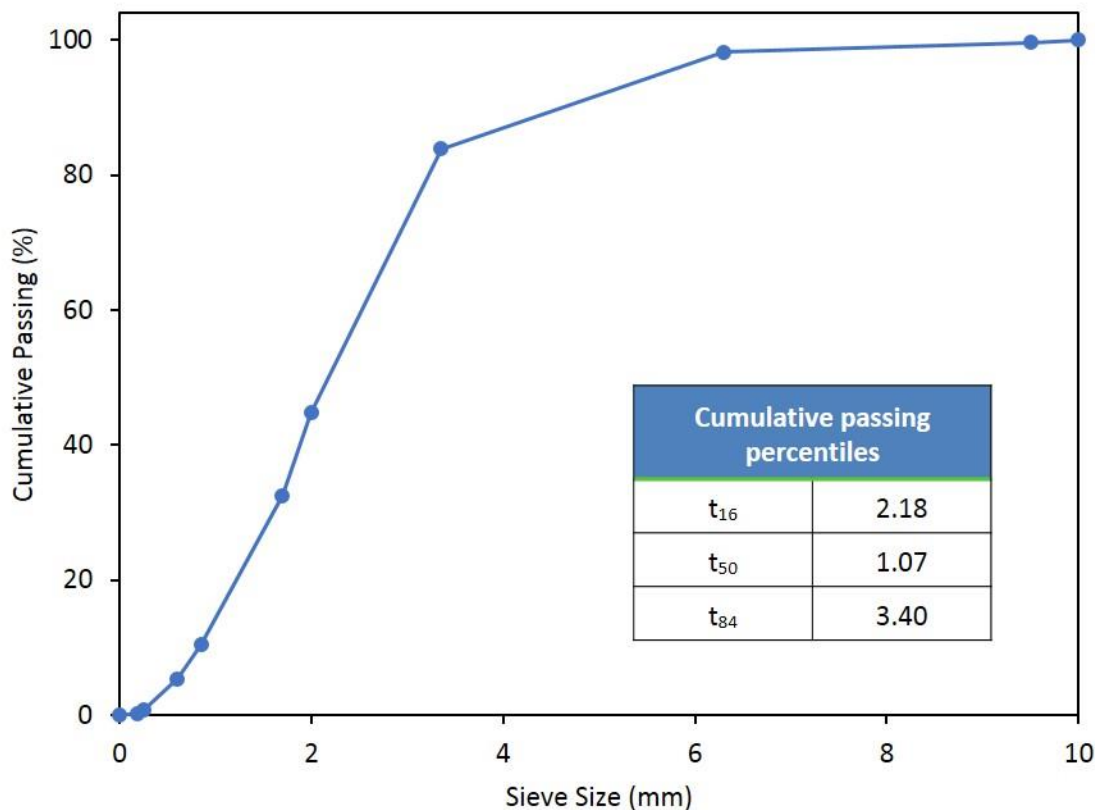


Figure 1. Cumulative passing percent of 1-inch Reference Miscanthus determined according to ANSI/ASAE S319.4 using a Ro-Tap test sieve shaker (Model RX-29, W.S. Tyler) and a 15 minute total sieving time (completed 4/2015). The cumulative passing percentile sieve sizes (e.g., t_{16}) were calculated by interpolation and represent theoretical sieve sizes that would retain 16, 50 or 84% of the particles by mass.

Contact

For questions regarding biomass material or analytical data please contact Amber Hoover at amber.hoover@inl.gov or 208-526-5992.

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Revised on 11/28/2016.