Miscanthus

REFERENCE MATERIAL

Pedigree

Institution: AGgrow Tech
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

[a]Determined using NREL "Summative Mass Closure" LAP (NREL/TP-510-48087)

[b]Determined 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

[a]Proximate analysis was done according to ASTM D 5142-09

[b]Ultimate 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

[c]Heating 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_2O_3	%Ca as CaO	%Fe as Fe_2O_3	%K as K_2O	%Mg as MgO	%Mn as MnO	%Na as Na_2O	%P as P_2O_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

[a]Determined 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

[a]Determined 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

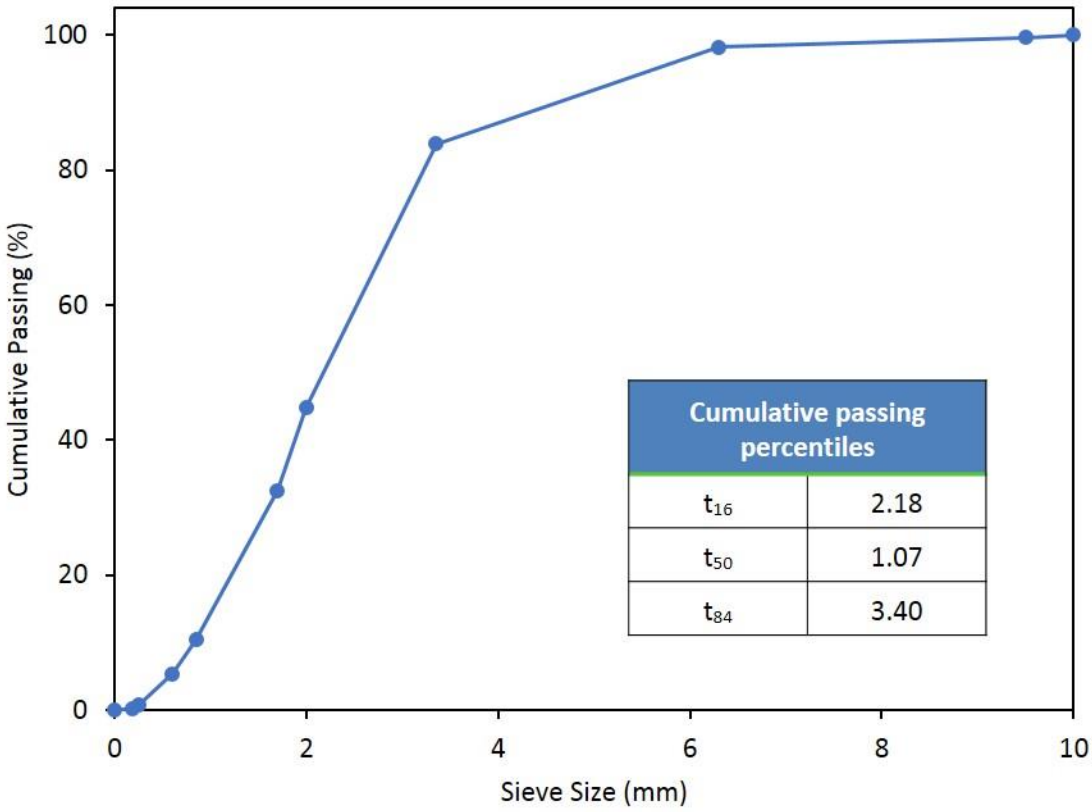

Figure 1. *Cumulative passing percent of 1-inch Reference Miscanthus determined according to ANSI/ASAE S319.4 using a Ro-Tap test sieve shaker (Model RX-29, W.S. Tyler) and a 15 minute total sieving time (completed 4/2015). The cumulative passing percentile sieve sizes (e.g., t_{16}) were calculated 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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