

Fodder Trees: 2015 Yield and Nutrient Analysis

This research note is part of a series detailing results from different facets of the trial. For more information, see:

2015 Sheep Production Report on Fodder Tree Diet

2015 Sheep Preferences of Fodder Trees

Economic Analysis and Practical Applications of Fodder Trees

RAIN has partnered with the Ontario Sheep Marketing Agency to investigate whether fast-growing, coppiced trees can be a nutritionally and economically viable fodder source for sheep. This project is taking place over the 2015 and 2016 growing seasons near Sault Ste Marie.

Thanks to our farmer co-operators Collen Alloi and Brent Atwell for their assistance with this project.



For more information on this project, please contact:

Christine O'Reilly
Research Technician
Email: coreilly@ssmic.com
Phone: 705-942-7927 x3147



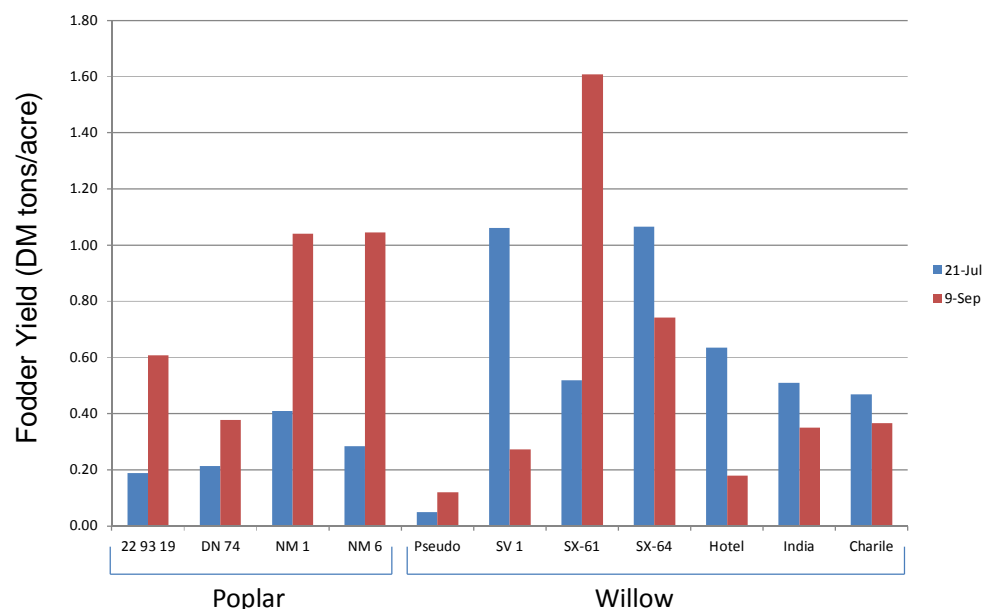
Method

In 2007, a short rotation woody coppice plantation was established by the Canadian Forest Service to assess the potential of fast growing willow and poplar for bioenergy. A section of this plantation was fenced off and split into four 0.75 acre paddocks. Trees were cut to 4" and allowed to regrow to heights of 12-24" before sixty mature, dry, Arcott Outaouais ewes rotationally grazed the new re-growth. Outside the grazed area, three species of native trees (Speckled Alder, Trembling Aspen, and White Birch) were also coppiced for comparison with the domestic varieties. Samples of the new growth were taken to determine dry matter yields and nutrient content of the tree re-growth.

Results

Tree Yield: Dry matter (DM) yield was assessed at two times during the growing season. Yields of tree crops in July ranged from 0.05 tons/acre to 1.07 tons/acre with an average of a 0.49 tons/acre. This sample included the entire succulent stem. In September, DM yields for leaves only ranged from 0.12 tons/acre to 1.61 tons/acre with an average of 0.61 tons/acre.

Figure 1. Dry matter yield (tons/acre) in the existing arrangement of fast growing willow and poplar fodder varieties for July and September 2015.



Nutritional Content of Trees: Leaf samples were sent to A&L Laboratories Canada for macro- and micro-nutrient analysis. Nutrient levels were reported for nitrogen (N), sulphur (S), phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), sodium (Na), copper (Cu), boron (B), zinc (Zn), manganese (Mn), iron (Fe), aluminum (Al), and molybdenum (Mo).

The data were analyzed to compare different groups of trees as follows:

- 1) Domestic (ie: artificially selected hybrids of fast-growing willow and poplar) vs native trees
- 2) All willow (genus *Salix*) vs all poplar (genus *Populus* – includes native Trembling Aspen)
- 3) Domestic willow (genus *Salix* – all willows were domestic) vs domestic poplar (genus *Populus*)

There were no statistically significant differences between any of the above tree groups for N (which is closely related to crude protein content), Na, B, Zn, Fe, or Mo.

Domestic tree varieties had significantly higher levels of S and Mg than native trees.

When comparing all willows to all poplars, willows had significantly higher levels of S, Mg, Ca, and Al. Poplars had significantly higher levels of K and Cu.

Some results changed when native Trembling Aspen was removed from the poplar group. When comparisons between willows and poplars were done using only domestic trees, willows had significantly higher levels of P, Mg, Ca, Mn, and Al. Poplars had significantly higher levels of Cu.



Figure 2. Sheep grazing coppiced regrowth

Table 1. Nutrient analysis of tree leaves

Genus	Variety	N (%)	S (%)	P (%)	K (%)	Mg (%)	Ca (%)	Na (%)	B (ppm)	Zn (ppm)	Mn (ppm)	Fe (ppm)	Cu (ppm)	Al (ppm)	Mo (ppm)
Populus	2239-19	2.04	0.56	0.13	0.72	0.34	0.96	0.01	17	167	153	133	12	55	0.01
Populus	DN	1.89	0.41	0.11	1.32	0.25	0.51	0.01	8	124	119	166	9	31	0.01
Populus	NM-1	1.72	0.55	0.13	1.06	0.34	1.03	0.01	26	196	155	195	11	48	0.01
Populus	NM-6	2.12	0.27	0.12	1.22	0.23	0.79	0.02	17	224	256	308	11	50	0.01
Salix	Charlie	1.68	0.75	0.17	0.7	0.69	1.97	0.01	26	100	189	170	6	99	0.01
Salix	Hotel	2.17	0.72	0.18	0.76	0.53	2.19	0.01	29	164	315	86	8	58	0.01
Salix	India	1.69	0.78	0.16	0.54	0.71	2.08	0.01	14	218	963	240	7	89	0.01
Salix	Pseudo	1.66	0.38	0.16	0.67	0.48	1.77	0.01	18	69	125	164	5	103	0.01
Salix	SV-1	2.2	0.71	0.33	0.6	0.44	2.18	0.01	19	196	480	207	7	68	0.116
Salix	SX-61	1.74	0.59	0.16	0.78	0.35	2.87	0.01	0.18	247	481	136	6	67	0.01
Salix	SX-64	1.69	0.58	0.16	0.99	0.31	2.21	0.01	14	233	527	238	7	87	0.348
Native Trees															
Alnus	Speckled Alder	2.22	0.15	0.12	0.45	0.24	0.56	0.02	4	37	206	145	8	67	0.01
Betula	White Birch	2.03	0.12	0.48	0.99	0.18	0.98	0.01	19	194	113	212	5	74	0.01
Populus	Trembling Aspen	2.74	0.25	0.22	0.93	0.23	1.94	0.02	9	325	295	130	12	53	0.01