Forage Production From Three Soybean Varieties

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Introduction:

Soybeans are widely grown in Ontario as an oilseed crop, but were originally introduced to the province as a forage crop. Currently, there is no acreage devoted to forage soybeans in Ontario, but some dairy farmers are experimenting with the crop in the northeastern USA. Three varieties of soybeans bred specifically for forage use have been released in the USA recently. At New Liskeard, we have previously looked at short-season grain soybeans being "salvaged" as silage. In this experiment, we evaluated the forage production from three soybean varieties that varied in maturity and intended end use.

Methods:

Over the past 5 years, the average Corn Heat Unit accumulation at this site is approximately 2350. In selecting varieties of soybeans to assess for silage yield under this climate, we selected an adapted variety, a non-adapted grain variety, and a forage-type variety. It was thought that a non-adapted (ie: long season) grain variety would produce high forage yields since vegetative growth would continue into late summer. The selected varieties are shown in Table 1.

Table 1. Soybean varieties evaluated for forage production at New Liskeard.

Variety	CHU rating	Maturity Group	Intended Use	Distributer
Alta	2400	00	Grain	First Line Seeds, Guelph, ON
Hanlon	3250	2.5	Grain	First Line Seeds, Guelph, ON
Donegal	unknown	5.0	Forage	Seedway, Hall, NY

All varieties were planted in 15 cm (7") rows with a target population of 220,000 plants per ha (550,000 plants per acre). This required a seeding rate of 120 kg/ha of Alta, 100 kg/ha of Hanlon, and 116 kg/ha of Donegal. The seed was not inoculated but 50 kg/ha of actual N was applied pre-plant. Phosphorus and potassium levels were sufficient based on soil test results. The experimental design was a randomized complete block with four replications.

Plots were to be harvested when leaf yellowing began or prior to the first killing frost. Since Alta is an early maturing variety, two sets of Alta plots were sown, one to harvest at leaf yellowing, the second to harvest when Hanlon and Donegal plots were harvested. Whole plant moisture, dry matter yield, and plant composition were measured. Whole plant samples were retained for forage quality analysis.

Results:

The initial harvest of Alta was on August 24, while Hanlon, Donegal, and the remaining Alta plots were harvested on September 17. No frost occurred prior to harvest. Whole plant moisture content was similar between early-cut Alta, Hanlon, and Donegal at 72% to 74% (Table 2).

Hanlon and Donegal were highest in yield and were not statistically different from each other (Table 2). Both were greater in yield than Alta. The yields of Hanlon and Donegal were very high, equalling the total yield of two good cuts of alfalfa at this site. The yield of Alta was much lower which was expected given its shorter maturity.

Alta had a leaf content of 16.9% of the total dry matter at the August 24 harvest but had no leaf remaining at the September 17 harvest (Table 2). Hanlon had lower leaf content than Donegal but Hanlon also had less stem and more pods. Donegal formed very few pods up to the September 17 harvest. While quality data are not complete so far, one would expect that leaf and pod content would indicate higher quality and stem content would indicate lower quality.

Table 2. Moisture content, whole-plant yield, and composition of three soybean varieties.

Treatment	Whole Plant Moisture	Whole Plant DM Yield (kg/ha)	% Stem	% Leaf	% Pod
Alta (Aug. 24)	72.7%	7851	23.1	16.9	60
Alta (Sept. 17)	23.5	7569	20.5	0.0	79.6
Hanlon (Sept. 17)	71.7	12662	44.7	24.2	31.1
Donegal (Sept. 17)	74.0	11401	63.6	34.0	2.4
Average	60.5	9871	38.0	18.8	43.3
F (0.05)		***	***	***	***
LSD		1908	6.8	11.9	5.6
CV (%)		12.1	4.1	3.6	8.0

Practical Considerations:

Both Hanlon and Donegal were quite tall (over 120 cm) and lodged by harvest time. Donegal seemed to lodge more than Hanlon. Alta was much shorter (about 75 cm) and did not lodge. We harvested with a sickle-type machine which cut the plots reasonably well but under field conditions a discbine would be preferable. The loss of pods at the conditioner might be a concern but we could not evaluate this under our conditions. The optimum moisture for ensiling will vary with the storage system. For bunkers 65% to 70% moisture would likely suffice, but upright silos would require a drier product, perhaps 60 to 65% moisture. Round bales could be wrapped at a wide range of moisture contents, from below 50% to about 65%.

Conclusions:

Under our climatic conditions, a long-season grain-type soybean and a long-season forage-type soybean produced similar forage yields. Absolute yields were quite high, equalling two excellent cuts of alfalfa at this site. Practical considerations include cutting a heavy, lodged crop without losing pods, and field wilting to the correct moisture content. Given the extra costs associated

with an annual forage crop, it is unlikely that forage soybeans could compete with perennial crops like alfalfa, but given their high yield, forage soybeans should make an excellent choice for emergency forage if alfalfa winterkill is severe.