Performance of conventional, dwarf, grazing, and silage corn at New Liskeard.

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Corn silage is the highest yielding forage crop grown in Ontario and produces a feedstuff high in energy and relatively low in protein. In cooler areas such as northern Ontario, corn silage acreage has expanded rapidly in the past several years, partly in response to warmer growing seasons. At the same time, there has been increased publicity regarding types of corn designed for grazing on the stalk. In theory, corn that is strip grazed can provide a high energy ration without the cost of harvesting the corn mechanically. In this project, we evaluated the performance of 9 hybrids under the relatively short season conditions at New Liskeard. The hybrids assessed had a wide range of intended end uses.

Methods

The trial involved 9 varieties (Table 1). Three were conventional hybrids designed for grain or silage production in short season areas, one was a short-statured type designed for grain production in very short season areas, three were bred for grazing, and two were bred for silage use (BH 431 is a leafy hybrid and SD 95 contains a sugary gene from sweet corn). All varieties were planted in 28" rows except the short-statured variety (Canamaize) which was in 14" rows. Individual plots were 4 rows wide (8 rows for Canamaize) by 20' long and each plot was replicated 4 times. Planting was on May 30 and harvesting was on September 17 and October 28. Corn heat unit accumulation from planting to the first harvest was 2,383 and from planting to a killing frost on October 03 was 2,514. Populations were measured by counting the number of plants in 4.92 m of row in two separate locations in each plot. Harvesting was done by hand cutting two rows 56" long from each plot, separating the ears manually from the stalk and husk and weighing each component separately. From these samples, dry matter content and dry matter yields were calculated. The dried ears were then threshed to measure grain yield.

Table 1. Hybrids grown in New Liskeard corn trial.

Name and intended use	Maturity Rating	Seed Source
39N03 - grain/silage **39T68** - grain/silage **39K72** - grain/silage	2100 CHU (71 day) 2350 CHU (75 day) 2250 CHU (75 day)	Pioneer HiBred Ltd. Chatham, ON
Canamaize - grain	1950 CHU	Canamaize, Minto, Manitoba
AG100 - grazing **AG102** - grazing **AG112** - grazing	100 day 102 day 112 day	Baldridge Hybrids, Cherry Fork, Ohio, USA
BH 431 (leafy) - silage **SD 95** (su cross) - silage	100 day 92 day	Speare Seeds, Harriston, ON.

Results:

For the conventional hybrids, plant populations were all close to the target of 75,000 plants per hectare, while Canamaize was below the target of 150,000 plants per hectare (Table 2). At the first harvest on September 17 (prior to any frost), the stover (stalk, leaves and husks) dry matter content was generally highest for the grazing and silage hybrids and least for the grain hybrids and Canamaize. Stover yield was generally highest for the grazing types along with the BH 431 hybrid. The conventional grain hybrids were intermediate in stover yield and Canamaize was lowest in stover yield. Ear (cob plus grain, no husk) dry matter content was highest for the grain types and Canamaize and much lower for the other hybrids. Similarly, ear yield was highest in the grain types, intermediate in Canamaize and lowest in the grazing and silage hybrids. Total forage yields were highest for the grazing and silage hybrids, intermediate for the grain types and lowest for Canamaize.

Table 2. Plant population, stover yield, ear yield, and total yield at September 17 harvest

Entry	Population ('000 per hectare)	Stover % Dry Matter	Stover DM Yield (kg/ha)	Ears % Dry Matter	Ears DM Yield (kg/ha)	Total DM Yield (kg/ha)
39N03	72.6b[1]	40.8 cd	9,427 c	54.0ab	7,307a	16,734b
39T68	74.8b	44.8 bc	13,119 c	50.7 bc	7,379a	20,498b
39K72	79.5b	41.2 cd	11,585 c	48.8 c	7,765a	19,322b
Canamaize	132.9a	37.1 d	4,273 d	54.9a	4,742 b	9,015c
AG100	71.9b	50.4a	25,793ab	21.8 e	2,902 cd	28,695a
AG102	79.8b	46.9ab	26,656a	20.2 ef	2,868 cd	29,524a
AG112	72.3b	49.8ab	27,534a	17.8 f	2,352 d	29,886a
BH 431	77.3b	47.9ab	26,787a	21.8 e	4,078 bc	30,865a
SD 95	70.8b	48.8ab	22,174 b	28.0 d	4,449 b	26,741a
Average	81.3	45.3	18,594	35.3	4,871	23,476
LSD (0.05)	10.1	5.1	4,027	3.5	1,593	4,588
CV (%)	8.5	7.7	14.8	6.8	22.4	13.3

1. within a column, values followed by the same letter are not significantly different (*P= 0.05*)

Dry grain corn yields were highest for the grain-types, followed by Canamaize, SD 95 and BH 431 (Table 3). The grazing hybrids were all very low in grain yield. This was expected since it was clear from outset that the grazing types and the silage types required much more heat to mature than was available at this site. It should be noted that despite harvesting on September 17 (near the expected first frost date), whole ear moisture content on the grain hybrids and the Canamaize were still around 45 to 50%, while the grazing and other long-season types had moisture contents in the ears of around 80%.

Table 3. Dry grain corn yield and moisture of ear (grain plus cob) on September 17 harvest.

Entry	Sept. 17 Dry Grain Yield	Ear moisture Sept. 17
39N03	5,678a[1]	46.0
39T68	5,330a	49.3
39K72	5,718a	51.2
Canamaize	3,478 b	45.1
AG 100	1,545 c	78.2
AG 102	1,298 c	79.8
AG 112	1,023 c	82.2
BH 431	2,215 bc	78.2
SD 95	3,014 b	72.0
Average	3,256	
LSD (0.05)	1,302	
CV (%)	27.4	

1. Within a column, values followed by the same letter are not significantly different *(P=0.05)*

A second harvest was taken at the end of October, about 25 days after the first killing frost. Late September and October were very wet at this site. At that time, stover dry matter content had increased on the grain type hybrids and the Canamaize, while dry matter content had decreased (ie: gotten wetter) on the grazing types and on the BH431 and SD 95 varieties. Stover yield in late October was generally greatest for the grazing types, intermediate for the grain types and lowest for Canamaize. Ear yield and grain yield are not reported for the late harvest since bird damage had removed much of the grain from the ears by that time. It is noteworthy that stover yields decreased dramatically between the first and second harvest. Some of this dry matter was translocated to grain which was then eaten by birds and not measured, some was likely leached during the cycle of freeze-thaw and heavy rainfall that occurred in October, some was contained in frozen leaves which were lost during high winds and a small amount may have been lost due to lodging.

Summary and Interpretation:

We assessed three conventional hybrids that are reasonably well-adapted to the area, one variety that should produce grain consistently in this area, and three grazing hybrids and two silage hybrids that require much more heat to mature than we would expect at this site. In terms of stover and total forage yield, the long-season types (grazing types and silage types) were much superior to the conventional and dwarf types. However, grain component of total yield was much higher on the conventional types and very low on the grazing types. To date we do not have quality data available on the stover and ear samples. This is critical in determining the relative worth of the high yielding grazing types. It is generally thought that a high grain content is

essential in producing high energy corn for silage or grazing, although in recent years, stalk digestibility has become the focus of attention regarding silage energy values. If the grazing types had acceptable energy levels, they would appear to be worthy of further study since their dry matter yield was exceptional. The exceptionally large losses of dry matter in the stover between the first and second harvest dates is disturbing. If grazing corn is to be used late in the year after hard frosts, we need to identify where the losses are occurring and try to minimize them.

Table 4. Second cut (Oct. 29/99) stover dry matter content and yield.[1]

Entry	%DM Stover	DM Yield Stover
39N03	51.3a[2]	5,473 e
39T68	41.3b	6,284 de
39K72	52.9a	8,706 cd
Canamaize	54.5a	2,124 f
AG 100	34.3b	9,581abc
AG 102	36.9b	11,341ab
AG 112	36.2b	11,787a
BH 431	35.9b	8,887 bc
SD 95	40.8b	9,626abc
Average	42.7	8,201
LSD (0.05)	8.0	2,579
CV (%)	12.9	21.6

1. Ear and grain yield data were not useful due to excessive bird damage at second harvest date.
2. Within a column, means followed by the same letter are not statistically different (P=0.05)

Assessment of the conventional hybrids showed that grain yields were satisfactory in the grain-type hybrids and in the Canamaize. Clearly Canamaize is not suitable for grazing since it has low stover yields. The grain yields reported should be taken with caution since heat accumulation at New Liskeard was higher than normal in 1999.

Animal performance data and observations made while grazing the above hybrids standing can be found on a separate report.