Irrigation Crop Diversification Corporation

- Vision -

Through Innovation, The Irrigation Crop Diversification Corporation stimulates and services the development and expansion of sustainable Irrigation in Saskatchewan

Objectives and Purposes of ICDC

a) to research and demonstrate to producers and irrigation districts profitable agronomic practices for irrigated crops;

b) to develop or assist in developing varieties of crops suitable for irrigated conditions;

c) to provide land, facilities and technical support to researchers to conduct research into irrigation technology, cropping systems and soil and water conservation measures under irrigation and to provide information respecting that research to district consumers, irrigation districts and the public;

d) to co-operate with the Minister in promoting and developing sustainable irrigation in Saskatchewan.

Irrigation Crop Diversification Corporation

Board of Directors

The following served as Directors of ICDC in 2006/07:

Name	Position	Irrigation District	Development Area Represented	Election Year (#terms)
Rick Swenson	Chairman	Baildon ID	SEDA	’09 (2)
Randy Bergstrom	Vice Chair	Luck Lake ID	LDDA	’07 (1)
Rob Oldhaver	Alt. Vice Chair	Miry Creek ID	SWDA	’08 (1)
Kevin Plummer	Director	Moon Lake ID	NDA	’09 (2)
Paul Heglund	Director	Vidora ID	SWDA	’07 (1)
Francis Kinzie	Director	Pike Lake	Non-District	’09 (2)
Neil Stranden	Director	SSRID	LDDA	’08 (1)
Kelvin Bagshaw	Director	Luck Lake ID	SIPA rep.	app.
Larry Lee	Director	Macrorie ID	SIPA rep.	app.
John Babcock	Director		SAF rep.	app.
Abdul Jalil	Director		SAF rep.	app.

The Four Development Areas are: Northern (NDA), South Western (SWDA), South Eastern (SEDA) and Lake Diefenbaker (LDDA) as defined in ICDC’s bylaws.

ICDC Directors are elected by District Delegates to the Annual Meeting. Each Irrigation District is entitled to send one ICDC Delegate per 5,000 irrigated acres or part thereof. Two Directors are elected from LDDA, two from SWDA, and one each from NDA and SEDA. Non-District irrigators elect one representative. The Saskatchewan Irrigation Projects Association (SIPA) and Saskatchewan Agriculture and Food (SAF) appoint two directors each to the ICDC board. The ICDC board must, by law, have irrigators in the majority.

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1. Field Crops

a) Ethanol Wheat Demonstrations

Project Lead: Lana Shaw, PAg., Provincial Irrigation Agrologist

Co-operator(s): Kent Stacheruk, Baildon Irrigation District
Roy King, Luck Lake Irrigation District
Rick Loeppky, River Lake Irrigation District
Paul Hofer, Arm River Hutterite Colony, Disley West Irrigation District

i Project Overview - Introduction

Cereals are a part of crop rotation for irrigation, but higher-value options are needed to raise the gross value and profitability of the entire annual crop rotation. Interest has grown in producing varieties of cereal grains suitable for ethanol production facilities. Particularly, AC Andrew soft wheat has become very popular for the 2007 growing season. AC Andrew was registered in 2004 and was a product of the AAFC Lethbridge soft wheat breeding program. AC Andrew is a semi-dwarf with excellent straw strength. According to the 2007 CSIDC publication Crop Varieties for Irrigation, AC Andrew yields 26% more than the hard red spring wheat check variety AC Barrie. It also out-yields the highest-yielding durum wheat Commander by 15%. At the time of planting, given this yield advantage and the relative spring prices, ethanol-type wheat production was a good prospect for increasing gross returns.

Terra Grain Fuels is currently constructing an ethanol plant in the Rural Municipality of Pense No.160, near Belle Plaine, Saskatchewan that is designed to produce approximately 150 million litres of ethanol annually and 163,800 tonnes of dried distillers grains annually. There is close to 7000 acres of district

irrigation within 50 km of Terra Grain Fuels, and two of the ethanol wheat demonstrations are in these districts.

A proposed ethanol plant at Strongfield has sparked interest in soft wheat production in the area around Lake Diefenbaker. About 100,000 acres of irrigation is within the 'catchment area' of the proposed plant. Gardiner Dam Agri-Energy launched its share offering in July, and they participated in an early morning field event on August 12th.

Husky Energy began producing ethanol at Lloydminster in 2006. The facility has the capacity to produce 130 million litres of ethanol, using about 15 million bushels of wheat from local growers. The Northminster Irrigation District, with 1550 acres of irrigation, is located near the plant.

ICDC worked with four co-operators who planned on growing AC Andrew soft white wheat due to developments in the ethanol industry. The purpose was to demonstrate the potential of ethanol-type wheat under high-management irrigation conditions to irrigation farmers and the ethanol industry. The general project plan was to measure field-scale yield and record disease pressure at each of these demonstrations. The following four reports summarize each individual project. These are followed by an overview discussion.

ii Ethanol Wheat Demonstration – Stacheruk Site

Project Lead: Lana Shaw, PAg., Provincial Irrigation Agrologist

Co-operator(s): Kent Stacheruk and Ron Francis, Baildon Irrigation District, Moose Jaw

Project Objectives

To demonstrate the field-scale potential of ethanol-type wheat under high-management irrigation conditions to irrigation farmers and the ethanol industry.

To record disease pressure and measure yield for producer-managed energy cereals.

Demonstration/Project Plan

The co-operators rented irrigation land in the Baildon Irrigation District to produce AC Andrew soft wheat for their Terra Grain contract. A plan for a field-scale comparison of slow-release nitrogen with conventional nitrogen was discussed,

but the field was treated uniformly with the slow-release product in a mixture with conventional N. Yield from the demonstration was to be measured using a weigh wagon.

This demonstration was the site for two industry connection and technology transfer events during the growing season. It provided a focal point to bring the co-operators, ICDC and SAF staff into discussions with local irrigators, Heartland Agro, Agrium, and Terra Grains.

Demonstration Site

This district, which started irrigating in 1982, uses City of Moose Jaw municipal effluent delivered through a pressurized mainline. It is located about 10 miles south of the City of Moose Jaw at SE 35 -15 -26 - W2 and consists of close to 3000 acres of centre pivot irrigation. The centre pivot on this demonstration site is typical of those in the Baildon Irrigation District at the present time. It is a high pressure pivot, over 20 years old, with 800 gallons per minute output utilizing high-pressure impact sprinklers.

The soil on the SE 35 is a fine loamy sand overlying a clay loam. The depth to the clay layer varies over the field. The demonstration site has drainage problems because of this clay layer. The topography is rolling.
Field History: Wheat in 2006, irrigated pasture for nine previous years. Lower yields usually occur when wheat is planted on wheat stubble because of increased root and leaf disease pressure.

Project Methods and Observations

Establishment and Crop Management

The field was pre-worked, fertilized and harrow packed in the spring. Fertility is summarized in Table 1. The nutrient composition of the municipal effluent was determined based on 12 acre inches application and 50% volatilization of nitrogen in the application. The soil test recommended rate of phosphate and potassium was applied, and a slightly lower rate of nitrogen was applied when effluent application is included in the calculation.

Table 1 Nutrient summary for Stacheruk demonstration.

Nutrient	Soil Residual (0-24")	Effluent Application (in 12 acre inches)	Pre-Seeding Application
Nitrogen	54 lb./ac.	19 lb./ac.	100 lb./ac.
Phosphate	52 lb./ac.	12 lb./ac.	25 lb./ac.
Potassium	494 lb./ac.	------	15 lb./ac.

The field was seeded on May 12th. Establishment was very good.

Herbicides: 0.5L Roundup in early spring and 0.75 L Roundup pre-seeding. Two applications of Buctril M and an application of Horizon at the recommended rate controlled broadleaf and grassy weeds. Weed control was effective until late in the season when buckwheat became a problem.

There were visible drainage problems present on about 8% of the area. Establishment was poor and weeds were heavier in those areas. There was quite a difference in the productivity on this sandy soil from the mid and lower slope positions to the upper slope positions. The co-operator was advised to manage the irrigation to optimize productivity on the mid-slope areas, which represented the largest area under the pivot.

Lorsban was sprayed to control wheat midge on July 11th.

Total irrigation applied through the season was 12.6 inches, with 6.8 inches of rainfall. Irrigation was generally timely and adequate.

Disease Observations

The co-operator applied a full rate of Tilt at flag leaf as well as a half rate with the herbicide application.

The demonstration site was sampled as part of the provincial fusarium head blight (FHB) and leaf disease survey. There was an average of 91 kernels per head, compared with an average of 71 for HRS wheat field sampled. The FHB level for the demonstration site was very low (0.13% infection rate).

Yield Measurement

Stacheruk's demonstration was combined on Sept. 11th and yield was measured by weighing trucks, as the weigh wagon was unavailable. A total of seven acres was weighed. The yield was 55 bu./ac. with a bushel weight of 60 lb./bu. and 13.5% protein. The sample graded #2 with heat stress causing downgrading.

Final Discussion

Yield was lower than the co-operator expected. The extreme heat in July seem to be the most likely explanation, and is supported by the presence of shrunken kernels in the sample.

iii Ethanol Wheat Demonstration – Hofer Site

Project Lead: Lana Shaw, PAg., Provincial Irrigation Agrologist

Co-operator(s): Paul Hofer, Arm River Hutterite Colony, Disley West Irrigation District

Project Objective

To demonstrate the field-scale potential of ethanol-type wheat under high-management irrigation conditions to irrigation farmers and the ethanol industry.

To measure yield and record disease pressure for producer-managed energy cereals.

Demonstration/Project Plan

The Arm River Hutterite Colony operates the Disley West Irrigation District, with about 800 acres of irrigation. Disley West uses water from the Qu'Appelle River downstream of Buffalo Pound Lake. The Arm River Hutterite Colony had a production contract with Terra Grains to grow AC Andrew soft white spring wheat for the 2007 season. Co-operator Paul Hofer wanted to assess fungicide efficacy on two quarters of AC Andrew soft wheat.

Demonstration Site

The demonstration fields were in the Disley West Irrigation District on two quarter section pivots on the S ½ 25 -19 - 23 - W2. The soil type is a loam and the topography is flat. There are no salinity or soil structural problems. The irrigation systems have drop nozzles.

Field History: barley in 2006, canola in 2005 for both fields.

Project Methods and Observations

Establishment and Crop Management

The field was seeded at 120 lb./ac. on April 29th following an application of 100 lb./ac. N and 35 lb. P. Fall soil test results are listed in Table 1.

Table 1. Nutrient profile of demonstration project.

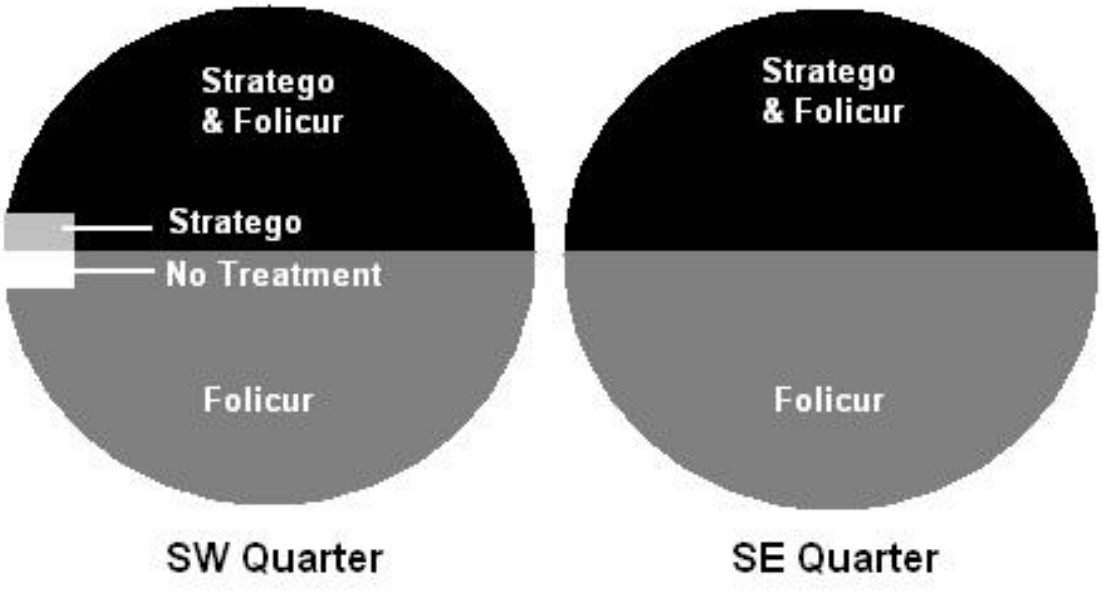
Nutrient	Soil Residual (0-12")	Spring Applied
Nitrogen	25	110 lb./ac.
Phosphorus	28	35
Potassium	878	15

Establishment was excellent. The stand was thick and even. Harmony K was used for in-crop weed control, which was effective. The fields looked excellent in June and early July, with seven to nine long heads per plant.

Disease Observations

The north half of each of the two pivots was sprayed with ½ rate of Stratego fungicide in a tank mix with Harmony Total herbicide. The entire area of both pivots was sprayed with Folicur fungicide at head emergence, except for a small area that was left untreated on the SW quarter to assess the efficacy of the fungicides (Figure 1). Folicur was used to control fusarium head blight (FHB) as well as late leaf disease.

Figure 1. Layout of Hofer project fungicide comparison.



By the end of July, evidence of FHB was beginning to show. The field was sampled for the cereal leaf disease and fusarium head blight survey on Aug. 1st at early dough stage. Results of the fusarium survey showed a high level of infection and yield loss from FHB. Leaf diseases found in the survey were tan spot and other leaf spotting fungal diseases.

Yield Measurement

On Aug. 29th, the co-operator and ICDC completed harvest operations for the SE and SW quarters with weigh wagon yields and grain samples. Fusarium was noticeable in samples. The SW field had an average yield of 59 bu./ac. with high levels of fusarium damaged kernels (FDK). One sample from the SW field was downgraded to common feed because of the presence of fusarium damaged kernels.

Hofer demonstration – July 18

The SW field had been in silage corn about five years ago and we concluded that corn was likely the source of inoculum for the field. The SE field with no history of corn had less visible fusarium damage, and higher yield at 65 bu./ac. There were no consistent differences in yield between the fungicide treatment areas.

Protein level for the fields averaged 13%. The average bushel weight for the two fields was 58.3 lb./bu. The samples generally graded #2. The main grading factors were fusarium damage, midge damage, and stress shrivelling.

Final Discussion

Heat stress damage and fusarium damage were reflected in the grain samples and were both factors in reducing yield. While the co-operator did spray Folicur to reduce fusarium damage, the application timing may have been a few days early for full effectiveness.

iv Ethanol Wheat Demonstration – King Site

Project Lead: Lana Shaw, PAg., Provincial Irrigation Agrologist

Producer Co-operator: Roy King, Luck Lake Irrigation District

Industry Co-operator:Gardiner Dam Terminal

Project Objectives

To demonstrate the field scale potential of ethanol-type wheat under high-management irrigation conditions to irrigation farmers and the ethanol industry.

To measure yield and record disease pressure for producer-managed energy cereals.

Demonstration/Project Plan

A demonstration site was organized with Roy King on the Luck Lake Irrigation District. Co-operator Roy King worked with ICDC in demonstrating production of AC Andrew soft wheat in comparison with Superb hard wheat on a single irrigation pivot on the Luck Lake Irrigation District. Gardiner Dam Terminal and Gardiner Dam Agri-Energy expressed interest in helping to co-ordinate a field event for August 2007. Gardiner Dam Terminal donated Tilt fungicide for the demonstration.

Demonstration Site

The demonstration site at SE 25 -24 - 8 - W3 was a clay to clay loam textured soil with no salinity, pH or structural problems. The pivot is a high pressure system with impact sprinklers. Water for the Luck Lake Irrigation District is supplied by pressurized pipeline out of Lake Diefenbaker.
Field history: 60 bu./ac. of Liberty Link canola in 2006, 65 bu./ac. of Superb wheat in 2005, 40 bu./ac. of flax in 2004. This is a productive field with a history of excellent management and production.

Project Methods and Observations

Establishment and Crop Management

The field had a fall drilled application of nitrogen and phosphate and a spring application of nitrogen (Table 1). For a yield goal of 110 bu./ac. of soft wheat, ALS laboratories recommended total soil residual and applied N of 160-170 lb./ac. N.

Table 1. Nutrient Profile of Demonstration Project

Nutrient	Soil Residual	Fall Applied	Spring Applied
Nitrogen	26 lb./ac.	100 lb./ac.	50 lb./ac.
Phosphate	34 lb./ac.	50 lb./ac.	--------
Potassium	>1080 lb./ac.	----------	--------

The co-operator planted half of this quarter section to AC Andrew soft wheat and half to Superb hard red spring wheat at 110 lb./ac. in early May. The field was treated with Dyvel and Horizon to control broadleaf and grassy weeds; control was very good.

Disease Observations

The demonstration field was sprayed with Tilt fungicide at head emergence, with a check strip left untreated on the AC Andrew area to evaluate the effectiveness of the application. Flag leaf and head samples from both the Superb and AC Andrew areas were submitted to the fusarium and leaf disease survey conducted by SAF and AAFC Swift Current.

The leaves of both varieties were affected by tan spot and other fungal spotting diseases (8% flag leaf affected based on leaf disease survey). Levels for both AC Andrew and Superb hard wheat were similar. There was little difference noted where Tilt was applied.

The Fusarium Head Blight (FHB) levels reported for this field (Table 2) are higher than we have seen in Luck Lake Irrigation District for a number of years. FHB is favoured by moist, warm conditions, which were created under irrigation during the hot month of July. Improved varietal resistance to this disease is the primary way to address this problem on irrigation, since restricting irrigation application during this hot dry period in July would have decreased yields.

Table 2. Fusarium Head Blight (FHB) Severity

Variety	Overall FHB Severity
AC Andrew	4.4 %
Superb	2.8 %

Yield Measurement

The demonstration field was harvested on Sept. 10th and 11th (Table 3). The co-operator combined the Superb wheat on Sept.10th and weighed trucks because the weigh wagon was unavailable. On Sept.11th, the weigh wagon was used to measure yield of AC Andrew, including the Tilt check-strip. Samples were taken from each variety and graded.

The Superb hard wheat averaged 55 bu./ac. AC Andrew averaged 62 bu./ac. There was no appreciable difference in yield between the fungicide check strip and the rest of the field. Yield for AC Andrew was well below expectations for such a good looking crop. The protein level for the AC Andrew wheat was 13.5%.

Table 3. Harvest results for Roy King's demonstration.

Variety	Yield	Bushel Weight	Grade	Grading Factors
AC Andrew	62 bu./ac.	59.6 lb./bu.	#2 SWS	Stress, midge
Superb	55 bu./ac.	63.5 lb./bu.	#2 HRS	Stress, midge

Final Discussion

Co-operator Roy King did an excellent job managing this field. These moderate levels of fusarium found this year are not surprising, since fusarium head blight has been present in the Luck Lake Irrigation District for a number of years. The relative difference in FHB for AC Andrew and Superb is consistent with expectations, since the hard red spring wheat class is known to be less susceptible to the disease than soft wheat varieties registered to date.

v Ethanol Wheat Demonstration – Loeppky Site

Project Lead: Lana Shaw, P.Ag. Provincial Irrigation Agrologist

Co-operator(s): Rick Loeppky, River Lake Irrigation District, Central Butte

Project Objectives

To demonstrate the field-scale potential of ethanol-type wheat under high-management irrigation conditions to irrigation farmers and the ethanol industry.

To record disease pressure and measure yield for producer-managed cereals grown for ethanol production.

Demonstration/Project Plan

The co-operators' farm is in proximity to the proposed Gardiner Dam Agri-Energy ethanol plant at Strongfield, and they are interested in determining how soft wheat will perform on their land under irrigation. The co-operator grew AC Andrew soft white wheat but without a production contract. The project plan was to measure yield with a weigh wagon and obtain a grade from the harvested grain. Both were completed.

Demonstration Site

The demonstration field is in the River Lake Irrigation District at SW 20 -24 -5 -W3. The irrigators in this district individually pump out of Lake Deifenbaker. The co-operator planted one quarter section pivot of AC Andrew in 2007. Field history: oats (150 bu./ac.) in 2006, Liberty Link canola (55 bu./ac.) in 2005 and potatoes in 2004. The soil texture is a loam with no salinity or structure problems. The topography was gently rolling.

Project Methods and Observations

Establishment and Field Management

Fertilizer applied: 50 lb. nitrogen, 25 lb. phosphate, and 60 lb. potassium. The field was seeded on May 12th at 150 lb./ac. Seeding depth was a problem in parts of the field, and establishment was thin in these areas. Herbicide application: full rate of Horizon, half rate of Estaprop and half rate of Buctril M. About 11.5 inches of irrigation water was applied. The system applied 0.75 inches every 2.5 days during the irrigation season.

Disease Observations

The demonstration site was sampled for fusarium head blight and leaf diseases on August 9th. Fungal leaf disease covered 8% of the flag leaf, but the flag leaf sample was taken at the late dough stage of development and could reflect late disease development. The fusarium level in the heads at this time was moderate (about 4%). The co-operators' field had an average of 91 kernels per head, compared with an average 71 kernels per head from hard spring wheat sampled in the fusarium head blight survey in 2007.

Yield Measurement

The demonstration site was swathed on August 26th. Weigh wagon yield was determined on September 5th from three areas of the field. Average yield for the field was 62 bu./ac. with a bushel weight of 62 lb./bu. The sample graded #2 with 4.6% midge damage and also heat stress damage being downgrading factors

Final Discussion

Yield was lower than the co-operator expected, which seems to be caused by the extreme heat in July. The other demonstration sites had similar low yield. Weather data is discussed for this site in the project conclusion.

vi Summary

The ethanol wheat demonstrations were generally managed very well but with disappointing results. The average yield for AC Andrew from the four demonstrations was 60 bu./ac., which is about 40 bu./ac. less than the producers' target.

Yields from this demonstration were depressed by the extreme heat in July of 2007 (Table 1). The average maximum daily temperature for the month of July 2007 was about 3.5^0C higher near the demonstration sites than the long term average for the month. Heat stress damage was reflected in the grain samples. The samples generally graded #2 because of shrunken kernels, but the bushel weights were generally adequate.

Table 1 Maximum July 2007 temperatures compared to long-term normal.

Demo Site	Weather Station	July Average Daily Max. Temperature		Max. Temperatures over 30^0C	
		Normal	2007	Normal	2007
Hofer, Stacheruk	Moose Jaw	26.3 ^{0}C	29.9 ^{0}C	6.1 days	12 days
King	Rock Point	25.3 ^{0}C	28.9 ^{0}C	4.1 days	12 days
Loeppky	Elbow	26.1 ^{0}C	29.5 ^{0}C	n/a	15 days

One of the sites had a significant Fusarium Head Blight problem, which may also have caused a significant amount of yield loss. Fusarium head blight development is generally promoted by hot, moist conditions, particularly during flowering. Fusarium severity on irrigation (average 1.8%) was higher in 2007 than in the last four years on irrigation.

Irrigation growers have moved away from growing durum because of its high susceptibility to FHB. Soft wheats, as a class, are nearly as susceptible as durum wheats. At the King demonstration site, AC Andrew had higher FHB levels than Superb hard wheat. Varieties are being developed with improved resistance to FHB, which will be very helpful to irrigation producers who want to produce soft wheat or “general purpose” wheat.

The ethanol wheat demonstration projects did what they set out to do, which was to measure yield and watch for needs that could be addressed by another year of demonstration. To date, some of the agronomic issues identified are fertility and fungicides. The demonstration projects also created a tangible point of contact with ethanol manufacturing and local crop input agrologists.

vii Industry Connection Events

ICDC met with co-operator Kent Stacheruk and representatives from Heartland Agro and Agrium at the Baildon wheat demonstration on June 13th. Fertility challenges of an irrigated sandy soil and the advantages of a slow-release urea product were discussed. The demonstration field and an adjacent canola field had an application of Environmentally Smart Nitrogen (ESN), a polymer-coated urea from Agrium retailed through Heartland Agro. The ESN was applied in a 70:30 mix with regular urea to reduce leaching of the nutrient through this sandy irrigated soil. There may be potential for co-operating with Agrium in other demonstrations of this product on irrigation.

The ICDC Baildon Irrigation Crop Tour on July 25th served to connect and inform local irrigation farmers, industry and SAF staff about irrigation cropping. A total of 18 people attended, including 10 farmers. We visited Stacheruk's ethanol wheat demonstration site and discussed the co-operator's goals and management plan for the field. This field stop also included an update on the Terra Grain Fuels ethanol plant, which is under construction at Belle Plaine. Gordon Nolan, Terra Grain Fuel's manager of supply and logistics, explained the needs and requirements Terra Grain Fuels will have for ethanol-type grains. The group toured a field of registered AC Andrew soft wheat and a corn variety demonstration. The event also included an irrigation scheduling demonstration given by SAF Irrigation Agrologist Korvin Olfert. Barry Rapp of Heartland Agro also discussed the role of Agrium's Environmentally Smart Nitrogen (ESN) in a fertility package for irrigation. The event coincided with the 25th anniversary of the Baildon effluent irrigation project.

ICDC hosted a field walk at Roy King's demonstration field near Birsay on August 12th. Participants included five irrigation farmers, five representatives from Gardiner Dam Terminal and Gardiner Dam Agri-Energy, and four provincial and federal government staff. At the demonstration field, Mr. King noted that the AC Andrew was standing up better than the Superb hard wheat, which was starting to lodge. Lionel Labelle, president and CEO of Gardiner Dam Agri-Energy discussed their current initiatives and the role that irrigation plays in the planned supply of feedstock. CSIDC Agrologist Terry Hogg was also invited to tell the group about current cereal variety and agronomic trials.

b) CSIDC Crop Varieties for Irrigation

Principal Investigators: Terry Hogg PAg. and Don David

Organization: Canada-Saskatchewan Irrigation Diversification Centre, AAFC/PFRA

Co-Investigators: Gerry Gross, PAg., Korvin Olfert, PAg., Lana Shaw, PAg., and Sarah Sommerfeld, AAg., ICDC

Objective: (1) To evaluate crop varieties for intensive irrigated production.

(2) To update the ***Crop Varieties For Irrigation*** guide.

Research Plan

The Canada-Saskatchewan Irrigation Diversification Centre as well as selected producer sites were used as test locations in 2007 for conducting variety trials under intensive irrigated conditions. The sites selected included a range of soil types (Table 1) and agro-climatic conditions. Crop and variety selection for the project were made in consultation with plant breeders from AAFC, Universities and the private sector as well as associated producer groups. Trials were conducted for registered varieties of cereals (spring wheat, barley, corn), oilseeds (canola, flax, soybean, sunflower) and pulses (pea, dry bean, faba bean). Further, pre-registration co-op trials were conducted for selected crops to assess the adaptability of new lines to irrigated conditions. This project was conducted in collaboration with federal government, academic institutions, and industry partners including AAFC Research Centres, Crop Development Centre, University of Saskatchewan, etc. (Table 2). Data collection included days to flower and maturity, plant height, lodge rating, seed yield, test weight and seed weight. All field operations including land preparation, seeding, herbicide, fungicide and insecticide application, irrigation, data collection and harvest were conducted by CSIDC staff. Irrigation applications were conducted by the farmer co-operator at the producer sites.

The trials consisted of small plots (ie. 1.2m x 4m; 1.5m x 4m; 1.5m x 6m) which were appropriately designed (RCBD, Lattice, etc.) with multiple replications (3 or 4 reps) so that statistical analyses could be performed to determine differences among varieties and to determine the variability of the data.

Results

The 2007 variety trials were established within recommended seeding date guidelines for the selected crops (Table 3). Climatic conditions in 2007 were generally cooler and wetter than the long term average resulting in lower than average accumulated heat units. July was the exception being warmer and drier than the long term average. As a result some of the warm season crops (ie. dry bean, soybean, corn, sunflower) showed slower emergence, lower established plant population, greater length of time to reach maturity and lower average yields. In fact some crops, mainly dry bean, soybean and sunflower, had several varieties that did not reach full maturity before the first killing frost of -2^0 C which occurred on September 14th, 2007. As well, a severe storm with strong wind, hard pounding rain and a small amount of hail went through the Outlook area on July 31st, 2007 causing a small amount of damage to the trials at the CSIDC main and off station sites. As a result, the canola plots at the CSIDC main site had severe lodging leading to high white mold disease incidence and subsequent reduced yields. The canola trial at the CSIDC off station site was lost to wind damage after the trial was swathed. The barley and soft wheat trials at the CSIDC main site had some shelling due to high wind and pounding rain that occurred at different times in August resulting in reduced yields. The two farmer co-operator sites had excellent yields, especially for the pea and wheat trials.

The data from the trials was analyzed and only data that met minimum statistical criteria for variability were used to update the CSIDC variety database. The *Crop Varieties For Irrigation* guide will be updated with the addition of the new data collected and printed in time for distribution at the 2008 Crop Production Show. As well, the variety guide will be mailed to all irrigators early in 2008.

This work provides current and comprehensive variety information to assist irrigators in selecting crop varieties suited to intensive irrigated production conditions.

Table 1. Variety trial locations and soil type.

Site	Legal Location	Soil Type
CSIDC main	SW15-29-08-W3	Bradwell very fine sandy loam
CSIDC off station	NW12-29-08W3	Asquith sandy loam
Pederson	NE17-28-07-W3	Elstow loam
Weiterman	SE & SW16-31-07-W3	Asquith sandy loam – fine sandy loam

Table 2. 2007 CSIDC variety trials and collaborators.			
Trial	**Collaborators**	**Location**	**Seeding Date**
I. Cereals			
1. Irrigated Wheat Regional	ICDC	CSIDC – main CSIDC – off station Pederson Weiterman	May 14/07 May 11/07 May 16/07 May 11/07
2. SVPG Wheat Regional	Dr. R. Depauw, AAFC B. Recksiedler, SAF	CSIDC - main	May 14/07
3. Soft White Spring Wheat Coop	Dr. R. Graf, AAFC	CSIDC - main	May 10/07
4. Soft White Spring Wheat Regional	Dr. R. Graf, AAFC	CSIDC - main	May 10/07
5. Durum Central Semi-dwarf Adapted A Coop	Dr. J. Clarke, AAFC	CSIDC – main	May 11/07
6. SVPG Barley Regional (2-row & 6-row)	Dr. B. Rossnagel, CDC B. Recksiedler, SAF	CSIDC - main	May 14/07
7. ACC Hybrid Grain & Silage Corn Performance Trials	B. Beres, AAFC	CSIDC - main	May 17/07
II. Oilseeds			
1. Irrigated Canola Regional	ICDC	CSIDC – main CSIDC – off station Pederson Weiterman	May 15/07 May 15/07 May 16/07 May 16/07
2. Canola Coop	R. Gadoua, CCC	CSIDC - main	May 15/07
3. Prairie Canola Variety Trial	R. Gadoua, CCC	CSIDC - main	May 15/07
4. Irrigated Flax Regional	Dr. G. Rowland, CDC B. Recksiedler, SAF ICDC	CSIDC – main CSIDC – off station Pederson Weiterman	May 15/07 May 15/07 May 16/07 May 16/07
5. Soybean Variety Adaptation	B. Brolley, MAFRI ICDC	CSIDC – main CSIDC – off station	May 16/07 May 17/07
6. Oilseed Sunflower Coop	C. Powlowski, AAFC	CSIDC – main	May 17/07
III. Pulses			
1. Irrigated Bean Variety Trial - Wide Row (Alberta)	Dr. P. Balasubramanian, AAFC ICDC	CSIDC – main CSIDC – off station	May 25/07 May 30/07
2. Dry Bean Wide Row Co-op	Dr. P. Balasubramanian, AAFC	CSIDC – main	May 25/07
3. Dry Bean Narrow Row Regional (Saskatchewan)	Dr. A. Vandenberg, CDC ICDC	CSIDC – main CSIDC – off station	May 25/07 May 30/07
4. Irrigated Bean Variety Trial – Narrow Row (Alberta)	Dr. P. Balasubramanian, AAFC ICDC	CSIDC – main CSIDC – off station	May 25/07 May 30/07
5. Dry Bean Narrow Row Co-op A&B	Dr. A. Vandenberg, CDC	CSIDC – off station	May 31/07
6. Irrigated Pea Regional	Dr. T. Warkentin, CDC ICDC	CSIDC – main CSIDC – off station Pederson Weiterman	May 15/07 May 11/07 May 16/07 May 11/07
7. Pea Coop A&B	Dr. D. Bing, AAFC Dr. T. Warkentin, CDC	CSIDC – off station	May 12/07
8. Faba Bean Co-op	Dr. A. Vandenberg, CDC	CSIDC – off station	May 12/07

CSIDC = Canada-Saskatchewan Irrigation Diversification Centre

ICDC = Irrigation Crop Diversification Corporation

SAF = Saskatchewan Agriculture and Food

SVPG = Saskatchewan Variety Performance Group

AAFC = Agriculture and AgriFood Canada

CDC = Crop Development Centre, U of S

ACC = Alberta Corn Committee

CCC = Canola Council of Canada

MAFRI = Manitoba Agriculture, Food and Rural Initiatives

2. Forage Crops

a) Intensive Rotational Grazing Demonstrations

Project Lead: Sarah Sommerfeld, AAg., Provincial Irrigation Agrologist

Co-investigators: Charlotte Ward, AAg., Regional Forage Development Specialist

Producer Co-operators: Trevor Unruh, Outlook, SK
Neil Haaland; Chad Haaland, Hanley, SK

Industry Co-operator: Neil McLeod, Northstar Seeds

i Project Overview

Within Western Canada, the majority of intensive rotational irrigated grazing has occurred in southern Alberta. In Saskatchewan, irrigated grazing does occur, but at a significantly decreased amount. Grazing of cow/calf pairs under irrigation has predominated, but the grazing of yearling animals could offer greater economic returns per acre. Over the past crop year, the substantial increase in the cost of feed grains and the appreciation of the Canadian dollar have caused livestock market prices to decline. This has created the opportunity for irrigation farmers and/or livestock producers to examine the cost/benefit scenario of retaining ownership or custom grazing calves and yearlings as a probable lower cost of gain alternative.

ii Intensive Rotational Grazing Demonstration – Unruh Site

Project Lead: Sarah Sommerfeld, AAg., Provincial Irrigation Agrologist

Co-investigators: Charlotte Ward, AAg., Regional Forage Development Specialist

Co-operator: Trevor Unruh, Outlook, SK

Project Objective

The objective of this project was to document forage, animal and economic data related to intensive grazing and provide information and recommendations to Saskatchewan producers.

Demonstration Plan

The project demonstration plan consisted of placing feeder heifers, owned by the co-operator, on the pasture in the spring of 2007. The stand was to be intensively grazed. Cattle were to be moved every two to four days under the management of the co-operator. SAF/ICDC staff's role was to conduct soil testing for nutrient recommendations and also do forage quality analysis. Budget was allocated for the rental of a cattle scale. Staff were to summarize the grazing data to provide the number of grazing days, average daily gain (ADG) and stocking rate (head/acre). The intent was to profile the use of irrigated pasture based on the potential of increased economic returns per acre. Summer and fall field events at the demonstration site were to be planned with a follow up information session to be held during the winter.

Demonstration Site

SE 24 -30 -8 - W3
The soils are classified as a fine sandy loam to loamy sand over sandy clay till. The west part of the quarter has some salinity. In June 2006, the co-operator seeded a grass/legume mixture, at a rate of 12 lb./ac, consisting of 70% meadow brome (cv Paddock), 20% alfalfa (cv AC Longview) and 10% orchard grass (cv Potomac). A 10 acre area of tall fescue (cv Courtney) was seeded near the pivot point in a low lying area. This area was previously seeded with the pasture mix but established poorly due to flooding, resulting in a tall fescue/alfalfa pasture composition. In the establishment year, the pasture was not grazed and a silage cut was harvested for weed control purposes.

In April 2007, a soil test was performed. Table 1 illustrates soil nutrient levels. Previous crop rotation included alfalfa in 2004 and canola in 2005. The site is

irrigated with a Zimmatic centre pivot within the South Saskatchewan River Irrigation District (SSRID #1).

Table 1. Soil nutrient levels present at the 0 – 12 inch depth.

	Nutrient (lbs/acre)			
Soil Depth	**Nitrogen**	**Phosphorus**	**Potassium**	**Sulphur**
0 - 12 "	12	24	623	>96

Project Methods and Observations

Grazing and Animal Management

One hundred and seventy feeder heifers were purchased in late January 2007 by the co-operator. From February 1st to mid May, the heifers were backgrounded in a custom drylot. Prior to turnout onto pasture, the heifers grazed the dry land alfalfa corners (approximately seven acres each). Cattle were moved onto the irrigated stand on May 17th, having an average weight of 580 lb. per animal.

At turnout, the grass/alfalfa forage mixture measured 10-12” in height. The stand was at the vegetative stage of maturity, but no bloat incidences occurred. The grazing management plan design was 16 pie-shaped paddocks utilizing the pivot point as the central hub. Animals were placed on approximately 10 acre paddocks for three to four days. One rotation was complete in 40 days. Forage utilization was maintained at 75% to allow for adequate stand regrowth and management. Two watering sites were established. A trough was situated at the pivot point equipped with a float; it received its water supply from the mainline pipe of the pivot. The co-operator also utilized a solar powered watering system. Water was pumped from a slough through 1” above ground pipe to a trough equipped with a float. This trough was situated next to an electric cross fence about half the distance from the pivot point to the end of paddock. Free choice salt was offered to the cattle.

Animals were not implanted prior to turnout onto grass. Vaccinations were administered by the previous livestock owner and no booster shots were provided by the co-operator. Treatment for foot rot, via long acting oxy-tetracycline, was minimal and pinkeye infection did not occur.

The grazing period lasted until September 9th, for a total grazing period of 117 days. Cattle completed three rotations on the pasture. Cattle were removed from pasture and transported to JGL Order Buyers in Moose Jaw. Final average weight (no shrink) was 901 lb. per animal and ADG (no shrink) was 2.74 lb.

Forage Stand Management

The fertility program included an application of Urea Ammonium Nitrate (UAN) at a rate of 30 lb. N per acre via fertigation during the week of July 9th. No herbicide was applied in 2007.

Irrigation

The total amount of water released, from SSRID #1 operations records, is recorded to be 61.1 acre feet. This translates to 140.0 mm (5.51 inches) irrigation applied for the months of June through to August. Early in the growing season, minimal irrigation was applied. Environment Canada has recorded the rainfall for the Outlook area, from March to August, to be 203.1 mm (8.0 inches). In total, the pasture received 343.1 mm (13.51 inches) of moisture from March to August.

Data Collection

Pasture Composition

A paddock plant species composition assessment was performed by Charlotte Ward on June 28th, 2007. The selected paddock had been grazed approximately one month prior and was the next paddock to be grazed. Plant counts per square foot were measured to determine the percent composition of available forage. This assessment is to be used as a benchmark indicator to determine what changes, if any, occur in pasture composition.

Table 2. Irrigated pasture assessment, measured on June 28th, 2007, to determine plant counts per square foot and percent composition of available forage.

Waypoints	Meadow Brome	Orchard grass	Alfalfa	Tall Fescue	Dandelion	Other broadleafs
32	1 (10%)	3 (40%)	1 (50%)			
33	4 (10%)	4 (50%)	3 (40%)			
34	5 (70%)	2 (30%)			1	
35	1 (10%)	3 (40%)	3 (50%)			
36	3 (25%)	2 (25%)	2 (50%)			
37	6 (50%)	3.5 (50%)				
38	8 (40%)	6 (45%)	2 (5%)			10%
39	5 (15%)	2 (10%)	6 (60%)		1	15%
40	5 (15%)	5 (15%)	4 (60%)		4 (10%)	
41	6 (30%)	2 (30%)	3 (40%)			

Forage Quality

Samples were collected on June 28th and analyzed at ALS Laboratories in Saskatoon. Two pasture samples were collected - an orchard grass/meadow brome/alfalfa mixture and a tall fescue/alfalfa mixture - to provide an overview of the potential differences in forage quality available.

Table 3. Forage quality analysis of the orchard grass/meadow brome/alfalfa pasture mixture.

		As Received	100 % DM
Moisture	%	72.7	
Protein	%	30.8	13.8
NDF	%	12.5	45.7
ADF	%	8.2	29.9
RFV	%		134.0
TDN	%	18.2	66.7
DE	Mcal/kg	0.8	2.9

Table 4. Forage quality analysis of the tall fescue/alfalfa pasture mixture.

		As Received	100 % DM
Moisture	%	74.0	
Protein	%	4.0	15.5
NDF	%	13.4	51.5
ADF	%	7.6	29.3
RFV	%		119.0
TDN	%	17.5	67.4
DE	Mcal/kg	0.8	3.0

Economics

Table 5. Pasture and animal productivity with respect to economic analysis.

Initial Number of Head	170
Final Number of Head	170
Death Loss	0.0%
Initial Weight (No shrink) (lb.)	580
Final Weight (No shrink) (lb.)	901
Gain (No shrink) (lb.)	321
Gain per acre (No shrink) (lb./ac)	410
Acres	133
Stocking Rate (Head/acre)	1.28
Days of Grazing	117
Average Daily Gain (lb./day)	2.7
COST PER LB OF GAIN (Excluding Labor)	
Annual cash & fixed costs per head less the purchase price of livestock (per head)	$110.13
Pounds of gain per animal* (Shrunk)	308
Cost per lb of gain	**$0.36**
COST PER LB OF GAIN (Including Labor)	
Annual cash & fixed costs per head less the purchase price of livestock (per head)	$130.77
Pounds of gain per animal* (Shrunk)	308
Cost per lb of gain	**$0.42**

* Gain (unshrunk) multiplied by 4 % shrink value

Technology Transfer

A summer field event highlighting irrigated forages was held on August 7th. There were 17 attendees, including six local producers. The tour viewed the AAFC Western Forage Trial 2007 seedlings, ICDC Annual Forage trial and the

Alberta Corn Committee Silage Corn trial on site at CSIDC. Following the plot tour, the group traveled to the demonstration site. Discussion surrounded the issues of stocking rate, grazing plan, forage composition, necessity to fertilize to maintain productivity and animal health. A follow-up winter session is planned for mid-January.

Final Discussion

During the grazing season, the co-operator applied 140 mm (5.51 inches) of irrigation and 30 lb. N per acre. This achieved a pasture stand that yielded 117 grazing days, from May 17th to September 9th, at a stocking rate of 1.28 head per acre. Average Daily Gain (ADG) (no shrink) was 2.74 pounds per day, based on 133 acres. Interpretation of the pasture composition assessment suggests that the meadow brome, orchard grass and alfalfa plant species are nearly equal in contributing to the stand composition. The pasture mixture is also competitive enough to suppress invasion by weed species.

Forage quality analysis indicated that the crude protein (CP) value of the tall fescue/alfalfa mixture is higher than the meadow brome/orchard grass/alfalfa mixture. This could merely reflect a higher percentage of alfalfa collected in the sample rather than a lower nutrient value of the grasses present. The greater neutral detergent fiber (NDF) value of the tall fescue/alfalfa sample limits the intake slightly in comparison to the meadow brome/orchard grass/alfalfa sample.

The economic analysis indicated that the cost per pound of gain (including labour) to be valued at $0.42 per pound. This number is relative only to this specific project, as the co-operator's annual cash and fixed costs were utilized. To determine if intensive rotational grazing is an option for an enterprise, producers must use their own numbers to calculate a cost of gain figure.

Potential areas for future project development should focus on increasing the stocking rate to maximize pasture production and increase profitability. Greater attention needs to be directed towards providing an adequate fertility plan that will sustain pasture productivity over the course of the pasture's life.

ii Intensive Rotational Grazing Demonstration - Haaland Site

Project Lead: Sarah Sommerfeld, AAg., Provincial Irrigation Agrologist

Co-investigators: Charlotte Ward, AAg., Regional Forage Development Specialist

Co-operators: Neil Haaland; Chad Haaland, Hanley, SK

Industry Co-operator: Neil McLeod, Northstar Seeds

Project Objective

The objective is to document an intensive rotational grazing operation utilizing a newly established irrigated pasture. Based on intensive livestock management practices, this project will determine if the potential higher returns per acre can compensate for the additional management required.

Demonstration Plan

Pasture establishment was to occur in the spring of 2007. All pre-seed and seeding operations were left to the responsibility of the co-operators, Neil and Chad Haaland. The Haalands sourced seed from industry co-operator Neil McLeod of Northstar Seeds. SAF/ICDC staff's role was to conduct a soil test and to assist the co-operators with paddock design and placement.

Grazing is to begin in spring of 2008. The co-operators will place cattle on the paddocks, rotate cattle frequently (every one to two days), and periodically weigh cattle to determine rate of gain. SAF/ICDC staff will summarize the data collected, focusing on average daily gain (ADG), stocking rate (head/ac) and grazing days per season.

Demonstration Site

NE 14 - 30 - 5 - W3
The soils are classified as a fine textured loam to clay loam located within the dark brown soil zone. In 2006, crops included 40 acres of corn, 40 acres of oats and 40 acres of alfalfa. Soil sampling was performed on May 8th, 2007. Three sites were sampled based on the previous year's crop. Table 1 illustrates the soil nutrients available at the 0 – 12" depth.

Table 1. Soil nutrients available at the 0 – 12" depth from three different cropping areas.

Nutrient (lb./ac)	Crop		
	Oat Stubble	Corn Stubble	Alfalfa
Nitrogen	40	90	29
Phosphorus	7	17	9
Potassium	435	830	511
Sulphur	37	57	28

The site is irrigated with a centre pivot operated by a diesel powered pump. Water supply is from the South Saskatchewan East Water Supply (SSEWS) canal leading to the Brightwater Reservoir.

Project Methods and Observations

Seeding 2007
On July 7th, the Haalands seeded 64 acres to a grass legume mixture, at a rate of 12 lb/acre. The mix consisted of 43% meadow brome, 22% cicer milk vetch, 21% annual rye grass, 7% tall fescue, 5% orchard grass and 2% creeping red fescue. All seeding operations were performed with a John Deere 750 zero till drill. No fertilizer was blended with the seed or applied at seeding.

The 40 acre alfalfa crop was maintained during the 2007 crop year to harvest as stored feed and to provide late fall grazing for dry cows. On October 11th, the alfalfa crop was sprayed out by a custom applicator.

Final Discussion

Spring 2008 will indicate if the pasture mixture successfully established and if the project plan can proceed.

b) Corn Varieties and Agronomy Demonstrations

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operators: Kate Kelk, Sansamente Ranch Ltd., Dunblane
Phillip Tschetter, Estuary Hutterite Colony, Estuary
Rick Swenson, Wheaton Bee Farm Ltd., Baildon
Kim Watts, Leader

i Overview

Corn acres have increased to about 15,000 acres in Saskatchewan. Corn is an excellent source of feed for livestock both in terms of dry matter production and energy content, especially under irrigation. One of the drawbacks of corn is the risk associated with maturing a crop. The single largest risk management decision is choosing a corn variety that is suitable to the local environment (Corn Heat Units expected). Corn heat units are calculated from the daily high and low temperature from the 15th of May until the first killing frost of -3.0°C.

Project Objective

To establish four sites where corn production can be demonstrated to assist producers in identifying suitable varieties for their regions and needs (grain, silage or grazing); to provide agronomic information; and to provide opportunities for SAF/ICDC to link with producers who are interested in evaluating corn production as a way to increase production and profitability on their farms.

Demonstration/Project Plan

Identify four current growers who would be willing to work with SAF/ICDC in increasing the knowledge base for corn production in Saskatchewan. Assist these producers in variety selection based on previous ICDC work and establish at least two varieties per site for evaluation and comparison. Once planting decisions are made, monitor the growth and production and document the agronomic information generated for use in encouraging other growers to utilize this high value crop.

This project will be one of four sites, spread out geographically, established in Saskatchewan this year which are. Variety performance data and agronomic data will be collected at each site to give producers the opportunity to see the crop in the field and to have variety, seeding rate, fertility, weed control, growth stage and yield data made available to them. The accumulation of information on

varieties suitable for each area and end use, in combination with production information, will increase the comfort level of potential growers. This demonstration is designed simply to show potential growers the way other growers are successfully producing corn on their operations and to compare varieties on-farm.

The plots were visited twice during the growing season. The first visit was the first week of August when the plants were near tasseling. The objective is to have tasseling by August 1st. After tasseling the corn plant will drop pollen into the silk. The silk starts out as a yellow green color and turns brown and dries as the pollen infects it. The second visit was the first week in September when cob samples were taken. This visit is conducted to estimate the grain potential in a worst case scenario. In most places in the province, the earliest a -3^{o}C frost would occur is at the beginning of September. The grain is filled from the top of the kernel down to the base. The milk line is clearly visible as it moves down. Once it reaches the base, a black layer forms, cutting off the kernel from the rest of the plant. This occurs around 32% kernel moisture.

Each visit included sampling at two positions within the plot. Cob samples included 10 adjacent cobs (a total of 20 cobs per plot). The distance was measured (along with row spacing) for an estimate of the area sampled.

Final Reports

Information specific to the four fields included in this corn demonstration project is provided in the following reports.

ii Corn Varieties and Agronomy Demonstration – Dunblane Site

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operator: Kate Kelk, Sansamente Ranch Ltd., Dunblane

Demonstration Site

This site was located south of Outlook near Macrorie at Sansamente Ranch Ltd. This site was located under a pivot with impact sprinklers. The varieties grown here were Pioneer 39M26 and 39F57. The Pioneer 39M26 was located on a quarter section pivot up on top (120 acres, NE11-26-7-W3), as well as half of the smaller pivot (15 acres, NW12–26-7-W3). The 39F57 was on the other half of the smaller pivot (15 acres).

The target seeding rate for corn is 32,000 plants per acre. At this site, the plant population counts ranged from 27,000 to 30,000 plants per acre at the first sampling date (August 7) and 23,000 to 30,000 plants per acre at the second sampling date (September 10). This was on a 30 inch row spacing. The overall fertility worked out to 80 lb of N, 30 lb of P 20 lb of K and 10 lb of S per acre which was coultered in before seeding. There was a pre-burnoff of Roundup (1L/acre) before seeding, as well as an application of 0.5L/acre in crop. The water source is directly from Lake Diefenbaker, and the producer can irrigate when necessary. This demonstration is located in the brown soil zone and the soil type is a sandy loam. Last year, the smaller pivot on NW12 grew a crop of Fenugreek at 25 bushels per acre, and the quarter section pivot on NE11 grew a HRSW crop at 50 bushels per acre. The nearest weather station is at Elbow, which received 2028 CHUs this year ending September 14th. Nine years out of 10 they can expect at least1893 CHUs and, on average, 2210 CHUs.

Project Methods and Observations

Variety Description

Pioneer 39M26 – This is a 2100 CHU RR variety first marketed in 2006. It is one of Pioneers highest yielding grain varieties. However, in 2007, it yielded the second highest of the silage varieties (of 33) at the Alberta Corn Committee trial at CSIDC. It is an early hybrid with exceptional yields for maturity. 39M26 is an excellent choice if considering grazing corn. The conventional sister variety without the RR gene is 39M27. 39M27 also has the corn borer gene which adds 50 CHUs.

Pioneer 39F57 – This is a 2200 CHU RR variety first marketed in 2007. It is a replacement for the older 39T67. It is higher yielding that 39T67. 39F57 maintains stable yields across all yield environments. It has good drydown characteristics and above average test weights. There is also a conventional sister variety, 39F59, without the RR gene.

Results

Table 1. August 7th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (“)
39M26 NE11	2100	Silk starting to brown	112
39M26	2100	Silk brown	128
39F57	2200	Silk brown	128

Table 2. September 10th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (“)
39M26 NE11	2100	Starting to dent, milk line starting	111
39M26	2100	Denting, milk line starting	122
39F57	2200	Denting, no milk line	119

Table 3. September 10th Average Cob Results

Variety	CHUs	# Kernels	Cob Circum	Cob Length	Core Diameter
39M26 NE11	2100	468	13.5 kernels	34.9 kernels	24 mm
39M26	2100	522	14.8 kernels	35.4 kernels	24 mm
39F57	2200	534	15.2 kernels	35.2 kernels	24 mm

There is always an even number of kernels in the circumference; this is an average. Some varieties have short fat cobs, and others are longer and thinner. The most important thing is the number of kernels. Sometimes cattle can sort out and leave large cob cores in the feed bunk, so a smaller core diameter is desirable, although overall yield is probably a more important trait.

Table 4. September 10th Estimated Grain Results

Variety	CHUs	10 Cob Dist (inches)	Grain Wt (g)	Yield (bu/acre)	Bu Wt (lb)	Cob Moist (%)
39M26 NE11	2100	175	512	72	49.2	60
39M26	2100	197	750	83	53.9	57
39F57	2200	179	683	85	52.3	55

These fields were harvested for grain November 14th. The 30 acre pivot yielded 4000 bushels which works out to 133 bushel per acre. The 39M26 NE 11 yielded about 80 bushels per acre, bushels weights were for both were 50 – 55 lb/bushel.

Aim to combine corn under 30% moisture. Safe storage is 14-15% moisture. These results were as of September 10th, whereas the first killing frost was September 14th. The yields and bushel weights might have increased in that four-day period.

Final Discussion

With a cool spring, hot July, and cool August and September this turned out to be a poor year for corn. Only the lowest CHU variety hit full maturity at this site. The bushel weights tracked perfectly the CHU ratings of the varieties, with the lowest Heat Unit variety (39M26) producing the highest bushel weight. 39F57 did well, yielding higher than 39M26, but had a lower bushel weight.

iii Corn Varieties and Agronomy – Estuary Site

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operator: Phillip Tschetter, Estuary Hutterite Colony, Estuary

Demonstration Site

This site is located northwest of Leader at the Estuary Hutterite Colony. The varieties grown at this site were Pioneer 39H83, Dekalb 33-01 and Dekalb 33-10. This site was located under pivots with drop nozzles. One pivot west of the yard site (185 acres, SW9-23-28-W3) was seeded to Dekalb 33-10 with two strips of 33-01 running through the middle. The second wiper pivot was located east of the yard site (160 acres, NW1-23-28-W3) and was seeded to 39H83. These fields were seeded with 30 inch row spacing. The target seeding rate for corn is 32,000 plants per acre. At this site, the plant population counts ranged from 25,000 to 33,000 plants per acre at the first sampling date (August 9) and 24,000 to 30,000 plants per acre at the second sampling date (September 5). They were broadcast with a blend equaling 120-50-0 lb per acre of actual N, incorporated and sprayed twice with a 0.5L application of glyphosate in crop. Their soils vary from a loam to sandy loam. Last year, both these fields grew corn. The Estuary colony accesses their water directly from the South Saskatchewan River. They are an individual non-district irrigator and can pump whenever it is required. The nearest weather station is at Leader which received 2339 CHUs this year ending October 7th. Nine out of 10 years, this site will receive 2116 CHUs and, on average, 2327 CHUs.

Project Methods and Observations

Variety Descriptions

Pioneer 39H83 – This is a 2450 CHU Roundup Ready variety first marketed in 2004. The conventional sister variety without the RR gene is 39H84. It has outstanding silage characteristics and digestibility scores. It is one of the higher yielding Pioneer silage varieties. In 2007, it was the fifth highest yielding silage variety (of 33) at the Alberta Corn Committee trial at CSIDC.

Dekalb 33-01 – This is a new RR variety for which limited information is available.

Dekalb 33-10– This is a 2550 CHU RR variety first marketed in 2004. The conventional sister variety without the RR gene is 33-08. It is one of Monsanto's highest yielding silage varieties.

Results

Table 1. August 9th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (")
39H83	2450	Silk all brown	100
33-01		Silk browning	105
33-10	2550	Silk starting to brown	100

Table 2. September 5th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (")
39H83	2450	Dented, ¼ milk line	103
33-01		Dented, no milk line	103
33-10	2550	No milk line	99

Table 3. September 5th Average Cob Results

Variety	CHUs	# Kernels	Cob Circum	Cob Length	Core Diameter
39H83	2450	475	14.4 kernels	33.1 kernels	22 mm
33-01		503	13.4 kernels	37.7 kernels	21 mm
33-10	2550	499	13.8 kernels	36.1 kernels	22 mm

There is always an even number of kernels in the circumference; this is an average. Some varieties have short fat cobs, and others are longer and thinner. The most important thing is the number of kernels. Sometimes, cattle can sort out and leave large cob cores in the feed bunk, so a smaller core diameter is desirable, although overall yield is probably a more important trait.

Table 4. September 5th Estimated Grain Results

Variety	CHUs	10 Cob Dist (inches)	Grain Wt (g)	Yield (bu/acre)	Bu Wt (lb)	Cob Moist (%)
39H83	2450	202	899	67	58.9	49
33-01		177	637	82	54.4	60
33-10	2550	194	489	54	44.9	69

Aim to combine corn under 30% moisture. Safe storage is 14-15% moisture. These results were as of September 10th, whereas the first killing frost was October 7th. The yields and bushel weights would have increased in that 23-day period.

Table 5. Silage Results on 100% Dry Matter Basis

Variety	%P	%K	%Ca	%Mg	%S	%ADF	%Protein	%TDN
39H83	0.24	1.26	0.27	0.27	0.134	22.6	10.4	74.51
33-10	0.21	1.26	0.26	0.27	0.126	27.7	9.8	69.06

These fields were all harvested as silage. The 33-01 strips were silaged together and combined with the rest of the field of 33-10. Overall, silage yields averaged about 18.75 tons/acre at silage moisture. It was difficult to tell the difference in silage yields between the two varieties, since they had different moisture contents. The 39H83 averaged about 63% moisture and the 33-10 averaged about 67% moisture. There was also more green leaf material on the 33-10. Perhaps the frost didn't damage this pivot quite as hard as the 39H83.

Final Discussion

With a cool spring, hot July, and cool August and September, this turned out to be a poor year for corn. Not even the lowest CHU variety hit full maturity at this site. However, these were higher heat unit varieties than many people in the province plant. The bushel weights tracked perfectly the CHU ratings of the varieties, with the lowest Heat Unit variety (39H83) producing the highest bushel weight. In spite of these cool conditions, the 33-01 did well and yielded the highest. The 33-01 had a higher yield as well as a higher bushel weight than the 33-10. The 33-10 was not as mature, which accounts for a very poor bushel weight.

iv Corn Varieties and Agronomy – Leader Site

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operator: Kim Watts, Leader

Demonstration Site

This site was located north of Leader at Watts' feedlot. There were three different corn fields at this site. The varieties grown were Maizex 755, Maizex 855 and Pioneer 39T67. The target seeding rate for corn is 32,000 plants per acre. At this site, the plant population counts ranged from 27,000 to 35,000 plants per acre at the first sampling date (August 9) and 21,000 to 30,000 plants per acre at the second sampling date (September 5). This was on a 30 inch row spacing. This site was located under two pivots equipped with drop nozzles. The pivot west of the yard (95 acres, NE21-23-26-W3) was seeded to 39T67 and one of the pivots east of the yard was split with the north half (70 acres, NW18-23-25-W3) containing Maizex 855 and the south half (70 acres, SW18-23-25-W3) containing Maizex 755. Each of these fields grew corn last year. The water source is the South Saskatchewan River, with the pump site directly on the river so the producer can irrigate when necessary. This demonstration is located in the brown soil zone. The soil type on the pivot on NE21 is a clay and the one on NW18 is a clay loam. Eighty lb of N and 50 lb of P per acre were applied with the seeder at planting, with an additional 40 lb of N per acre fertigated on before tasseling. Roundup was sprayed at the 1L/acre rate as the crop was emerging, and a second 1L/acre application was made at about the six leaf stage. The nearest weather station is at Leader, which received 2339 CHUs this year ending October 7th. Nine out of 10 years, this site will receive at least 2116 CHUs and, on average, 2327 CHUs.

Project Methods and Observations

Variety Description

Maizex LF755BT/RR – This is a 2400 CHU variety first marketed in 2005. It is based on the conventional LF753 genetics and contains both the Roundup Ready gene and the Corn Borer gene. The Corn Borer gene adds 50 CHUs. The sister variety without the Bt gene is LF 755RR (2350 CHUs). It is a leafy variety and does well for silage.

Maizex LF 855RR/CRW – This is a 2650 CHU variety first marketed in 2006 and contains both the Roundup Ready gene and the YieldGard (rootworm) gene. It also has a sister variety without the YieldGard gene (LF850RR). Both of the Maizex varieties are the new leafy releases.

Pioneer 39T67 – This is a 2250 CHU RR variety first marketed in 2004. It has been around for a while and will be replaced by 39F57. 39F57 has a lower CHU rating and is higher yielding that 39T67. There is also a conventional sister variety, 39F59, without the RR gene.

Results

Table 1. August 9th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (“)
755	2400	Most silk brown	88
855	2650	Silk not all brown	98
39T67	2250	Silk dried	103

Table 2. September 5th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (“)
755	2400	Starting to dent, milk line starting	94
855	2650	Denting and milk line barely starting	100
39T67	2250	Denting, some milk line starting	103

Table 3. September 5th Average Cob Results

Variety	CHUs	# Kernels	Cob Circum	Cob Length	Core Diameter (mm)
755	2400	520	15.4 kernels	33.9 kernels	25
855	2650	568	16.2 kernels	35.1 kernels	23
39T67	2250	416	13.8 kernels	30.5 kernels	23

There is always an even number of kernels in the circumference; this is an average. Some varieties have short fat cobs, and others are longer and thinner. The most important thing is the number of kernels. Sometimes cattle can sort out and leave large cob cores in the feed bunk, so a smaller core diameter is desirable, although overall yield is probably a more important trait.

Table 4. September 5th Estimated Grain Results

Variety	CHUs	10 Cob Dist (inches)	Grain Wt (g)	Yield (bu/acre)	Bu Wt (lb)	Cob Moist (%)
755	2400	198	827	91	55.8	56
855	2650	194	660	79	52.6	59
39T67	2250	197	719	76	58.4	52

Aim to combine corn under 30% moisture. Safe storage is 14-15% moisture. These results were as of September 10th, whereas the first killing frost was October 7th. The Yields and Bushel Weights would have increased in that 27-day period.

Table 5. Silage Results on 100% Dry Matter Basis

Variety	%P	%K	%Ca	%Mg	%S	%ADF	%Protein	%TDN
855	0.23	0.80	0.18	0.30	0.103	27.5	8.1	69.26
39T67	0.24	1.60	0.23	0.26	0.117	28.2	8.9	68.51

The 755 was located at the bottom of the pit underneath the 855 when sampling occurred. Consequently, there was no silage sample taken for Maizex 755.

Each of these pivots was ensiled in a pit for the feedlot. The Pioneer 39T67 yielded about 16 tons/acre, and the Maizex varieties yielded about 18 tons/acre both at 65% moisture. There were corn borers found in the 39T67, which may have affected the yield.

Final Discussion

With a cool spring, hot July, and cool August and September this turned out to be a poor year for corn. 39T67 was the only variety to hit full maturity at this site. The bushel weights tracked perfectly the CHU ratings of the varieties, with the lowest Heat Unit variety (755) producing the highest bushel weight. In spite of these cool conditions, the 755 did quite well and yielded the highest. The 855 yielded higher than the 39T67, but had a lower bushel weight.

v Corn Varieties and Agronomy – Baildon Site

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operator: Rick Swenson, Wheaton Bee Farm Ltd., Baildon

Demonstration Site

This site is located south of Moose Jaw near Baildon at Wheaton Bee Farm Ltd. The varieties grown here were Dekalb 26-78, 27-44 and 30-02, and Pioneer 39D95, 39F57 and 39M26. The grain varieties (39D95 and 26-78) were seeded at 36 inch row spacing, while all the others were seeded at 30 inch row spacing. The target seeding rate for corn is 32,000 plants per acre. At this site, the plant population counts ranged from 26,000 to 34,000 plants per acre at the first sampling date (August 10) and 25,000 to 39,000 plants per acre at the second sampling date (September 6). There was a mistake in seeding equipment calibration, and the 39M26 was seeded at double the seeding rate. The plant populations in this plot were 53,000 to 61,000 plants per acre at the first sampling date and 52,000 to 61,000 plants per acre at the second sampling date.

These fields are located under a high pressure impact pivot on the Baildon Effluent Irrigation Project. The Baildon Irrigation Project utilizes effluent from the city of Moose Jaw. This year, there was a breakdown during the growing season and water was limited during kernel filling. This is unusual in that, normally, there is an effort to dispose of all the effluent that the city of Moose Jaw produces. Last year, these fields all grew corn. This demonstration is located in the dark brown soil zone and the soil type is a sandy loam. At the time of seeding 60 lb of N, 20 lb of P and 8 lb of S per acre were added. Each field received two additional fertilizer applications of 30 lb of N per acre each through the pivot. All fields received an application of glyphosate (1L/acre). The nearest weather station is at Moose Jaw, which received 2169 CHUs this year ending September 14th. Nine out of 10 years, this site will receive at least 2138 CHUs and, on average, 2405 CHUs.

Project Methods and Observations

Variety Description

Dekalb 26-78 – This is a 2150 CHU RR variety first marketed in 2004. It is an established variety that has been around for a couple of years. 39D95 will probably be replacing this variety. 26-75 is a conventional sister variety without the RR gene.

Dekalb 27-44 – This is a 2300 CHU RR variety first marketed in 2007. This is a bit higher heat unit grain variety from Monsanto.

Dekalb 30-02 – This is a 2475 CHU RR variety first marketed in 2004. This is another of Monsanto's varieties that has been around for a few years. It is a higher heat unit variety and one of the highest yielding in years when it matures.

Pioneer 39D95 – This is a 2150 CHU RR variety first marketed in 2007. It is a new low heat unit grain corn and looks quite promising.

Pioneer 39F57 – This is a 2200 CHU RR variety first marketed in 2007. It is a replacement for the older 39T67. It is higher yielding that 39T67. 39F57 maintains stable yields across all yield environments. It has good drydown characteristics and above average test weights. There is also a conventional sister variety, 39F59, without the RR gene.

Pioneer 39M26 – This is a 2100 CHU RR variety first marketed in 2006. It is one of Pioneers highest yielding grain varieties. In 2007, it yielded the second highest of the silage varieties (of 33) at the Alberta Corn Committee trial at CSIDC. It is an early hybrid with exceptional yields for maturity. 39M26 is an excellent choice if considering grazing corn. The conventional sister variety without the RR gene is 39M27. 39M27 also has the corn borer gene which adds 50CHUs.

Results

Table 1. August 10th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (")
26-78	2150	Silk brown, not quite done silking	96
27-44	2300	Silk brown	107
30-02	2375	Silk mostly brown	99
39D95	2150	Silk brown	101
39F57	2200	Silk not all brown yet	93
39M26	2100	Silk not all brown yet	102

*39M26 was seeded at double the seeding rate.

Table 2. September 6th Maturity Ratings

Variety	CHUs	Maturity Notes	Height (")
26-78	2150	Denting, milk line starting	97
27-44	2300	Denting, milk line starting	107
30-02	2375	Starting to dent, milk line starting	102
39D95	2150	Denting, some milk line starting	99
39F57	2200	Denting, milk line starting	103
39M26	2100	Some denting, milk line starting	98

*39M26 was seeded at double the seeding rate.

Table 3. September 6th Average Cob Results

Variety	CHUs	# Kernels	Cob Circum	Cob Length	Core Diameter
26-78	2150	375	14.5 kernels	26.2 kernels	23 mm
27-44	2300	408	13.7 kernels	29.8 kernels	21 mm
30-02	2375	500	13.2 kernels	38.0 kernels	22 mm
39D95	2150	442	15.2 kernels	29.1 kernels	29 mm
39F57	2200	435	14.1 kernels	30.9 kernels	22 mm
39M26*	2100	202	12.9 kernels	15.4 kernels	21 mm

*39M26 was seeded at double the seeding rate.

There is always an even number of kernels in the circumference; this is an average. Some varieties have short fat cobs, and others are longer and thinner. The most important thing is the number of kernels. Sometimes cattle can sort out and leave large cob cores in the feed bunk, so a smaller core diameter is desirable, although overall yield is probably a more important trait.

Table 4. September 6th Estimated Grain Results

Variety	CHUs	10 Cob Dist (inches)	Grain Wt (g)	Yield (bu./acre)	Bu Wt (lb)	Cob Moist (%)
26-78	2150	114	719	103	59.5	54
27-44	2300	185	687	76	59.4	54
30-02	2375	192	571	67	54.1	60
39D95	2150	128	752	97	59.0	53
39F57	2200	155	826	87	59.6	51
39M26	2100	122	272	38	60.2	54

*39M26 was seeded at double the seeding rate.

Table 5. October 24th Combined Grain Results

Variety	CHUs	Acres	Lb/acre	Yield (bu/acre)	Moisture (%)	Bu Wt (lb)
26-78	2150	0.35	6741	116	18.9	58.3
27-44	2300	0.21	5005	90	24.5	55.5
30-02	2375	0.21	5410	97	20.1	55.6
39D95	2150	0.34	7212	130	18.1	55.3
39F57	2200	0.23	6624	116	16.1	56.9

Aim to combine corn under 30% moisture. Safe storage is 14-15% moisture. These results were as of Sept 10th, whereas the first killing frost was September 14th. The Yields and Bushel Weights would have increased some in that four-day period.

Table 6. Silage Results on 100% Dry Matter Basis

Variety	%P	%K	%Ca	%Mg	%S	%ADF	%Protein	%TDN
39F57	0.33	1.09	0.14	0.19	0.109	26.6	9.0	70.26
30-02	0.23	0.96	0.18	0.19	0.125	28.8	9.1	67.87
27-44	0.30	1.37	0.20	0.20	0.115	29.2	9.9	67.41
39M26	0.28	1.11	0.15	0.22	0.114	33.5	9.3	62.83

*39M26 was seeded at double the seeding rate.

All varieties were silaged together. The average silage yield was about 16 tons/acre at 65% moisture.

Final Discussion

With a cool spring, hot July, and cool August and September this turned out to be a poor year for corn. Not even the lowest CHU variety hit full maturity at this site. The bushel weights of all varieties were fairly similar, with 30-02 being the exception. The 30-02 had a lower bushel weight and yielded lower than all the other varieties, which makes sense as it has the highest CHU rating and was not given enough time to mature. In spite of the cool conditions, several of the varieties did surprisingly well. The 26-78, 39D95 and the 39F57 all yielded fairly well. The 39D95 yielded the highest, followed by the 26-78 and 39F57. The 26-78 had a higher bushel weight than the 39F57. The bushel weights at this site were surprisingly high for the amount of CHUs received.

c) Osler Forage Centre – Osler Site

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operator: Peter Fehr, Fairhaven Farms, Osler

Project Objective

To demonstrate the latest recommended varieties of forage legumes and grasses to irrigation farmers in the Osler area of Saskatchewan, where dairy production is prevalent.

The purpose of this trial was to highlight the potential production of forages under irrigation with an intensively managed system and to compare how the varieties responded to this intensive management. Much of the forage information currently available is collected from plots with less intensive management (one or two cuts), while dairy producers typically utilize a three cut system. This plot was to form a linkage between the dairy industry and the missing forage information.

Demonstration/Project Plan

To continue collecting results from a forage test which was established in 2003 with the co-operation of the Saskatchewan Forage Council. The test consists of a randomized, replicated small plot of 14 varieties of alfalfa and 14 species and varieties of grasses.

The results of three cuts of forage per year will continue to be documented for use in the preparation of extension materials and programs. In addition, field days will be planned to share the information and allow local irrigators to view the plots.

Demonstration Site

In the spring of 2003, a randomized replicated trial was established east of Osler (north of Saskatoon) at Fairhaven Farms (NW13–39–4–W3). Fourteen different varieties of alfalfa and 14 different species and varieties of grasses were included. The site is irrigated by a pivot with drop nozzles and accesses its water supply straight from the South Saskatchewan River. These plots are located in the black soil zone and the soil texture is a loamy sand. Fertilizer applied on the plots was 100 lb actual N on the grasses, and 50 lb actual P over the whole plot in the spring. After first cut, the grasses were fertilized again with 100 lb actual N. In addition the entire field was fertilized with 100 lb of $Ca(NO_3)_2$ (15.5-0-0) in the spring, and 15,000 gallons of dairy manure per acre in the fall. Soil samples were taken and sent to ALS Labs in Saskatoon for analysis. The

recommendations that were sent back were to add 5-15 lb/acre of N, up to 50 lb/acre of K_20 and 5-20 lb/acre of S.

Project Methods and Observations

This site was cut three times during 2004 (June 22, August 5, and October 6), three times during 2005 (June 24, August 10, October 6), three times during 2006 (June 14, July 20, and September 8) and three times during 2007 (June 20, July 16, August 28).

The weight of the each plot was recorded. Grab samples were taken from each different variety of alfalfa and grass, fresh weights were taken, and the samples were dried and dry weights taken to determine the moisture content. Height and maturity data was collected for each of the alfalfa varieties. Samples from one block of alfalfa and one block of grass were sent to ALS Labs in Saskatoon for quality analysis.

The yield results from 2007 for the alfalfas are shown in Table 1, and the grasses in Table 2. The quality analysis is shown in Table 3 for the alfalfas and Table 4 for the grasses.

Table 1. Alfalfa yields (tons/acre 15%M) for 2007

Alfalfa	Cut 1	Cut 2	Cut 3	Total 2007		5 Yr Total	% of Beaver
AC Longview	2.76	1.27	1.19	5.22	ab	25.7	111%
54V54	2.64	1.29	1.31	5.23	a	25.6	111%
PS8925MF	2.18	1.37	1.58	5.13	abc	25.3	110%
AmeriStand	2.71	1.13	1.18	5.02	abc	25.0	108%
AC Nordica	1.93	1.16	1.07	4.16	d	25.0	108%
Geneva	2.14	1.42	1.47	5.04	abc	24.7	107%
PS2065MF	2.03	1.33	1.38	4.74	abcd	24.3	105%
Hornet	2.07	1.20	1.17	4.45	cd	24.1	105%
Gala	2.03	1.32	1.27	4.62	abcd	24.1	104%
53Q60	2.10	1.18	1.34	4.63	abcd	24.0	104%
Stockwell	1.99	1.35	1.18	4.51	bcd	23.4	101%
AC Grazeland	2.17	1.13	1.40	4.70	abcd	23.4	101%
Beaver	2.02	1.07	1.19	4.29	d	23.1	100%
LSD	0.77*	0.24	0.32	0.71			
CV	24.54*	13.44	17.56	10.57			

Values are rounded to one decimal place. There was also a significant block interaction in the statistics for first cut. Varieties with the same letter are not statistically different.

Table 2. Grass yields (tons/acre, 15%M) for 2007

Grass	Cut 1	Cut 2	Total 2007		5 Yr Total	%of Bravo
Paddock Meadow Brome	3.83	0.82	4.65	a	28.05	112%
Common Tall Wheat Grass	1.76	0.72	2.48	cdef	27.08	108%
AC Parkland Crested Wheat Grass	3.32	0.85	4.17	ab	26.97	108%
AC Knowles Hybrid Brome	2.97	0.44	3.42	abcde	25.32	101%
Bravo Smooth Brome	3.31	0.70	4.01	ab	25.01	100%
Chief Intermediate Wheat Grass	3.37	0.46	3.83	ab	24.93	100%
Garrison Creeping Foxtail	2.83	0.94	3.76	abc	24.56	98%
Joliette Timothy	2.78	0.83	3.60	abc	21.10	84%
Arctic Orchard Grasss	2.20	0.90	3.10	bcde	19.80	79%
Revenue Slender Wheat Grass	0.90	0.36	1.26	f	19.46	78%
Aurora Timothy	1.59	0.51	2.10	ef	18.80	75%
Authur Dahurian Wild Rye	1.19	0.35	1.54	f	18.14	73%
Kay Orchard Grass	2.67	0.85	3.52	abcd	17.02	68%
Courtney Tall Fescue	1.67	0.58	2.25	def	14.35	57%
LSD	1.18	0.34	1.32			
CV	33.50	35.88	29.70			

The CVs are quite high for this plot, because after five years some of the plots have crept into the adjacent plots.

Table 3. Quality analysis for the alfalfa plots for first cut.

Alfalfa	%CP	%ADF	%NDF	RFV
AC Nordica	27.1	20.7	26.7	253
Beaver	25.4	23.1	30.0	220
53Q60	24.5	23.7	30.9	212
Geneva	23.7	25.8	33.2	193
PS2065MF	24.2	29.0	33.4	185
AC Grazeland	23.0	28.5	34.5	180
Stockwell	22.6	28.0	35.2	177
Gala	22.1	27.2	35.6	177
AC Longview	22.0	30.8	36.7	164
AmeriStand	21.5	30.0	37.1	164
Hornet	24.3	29.7	38.7	158
54V54	21.2	33.8	39.4	148

Table 4. Quality analysis for the alfalfa plots for second cut.

Alfalfa	%CP	%ADF	%NDF	RFV
AmeriStand	27.3	23.2	30.2	218
Beaver	27.1	25.5	31.9	201
AC Longview	24.6	30.1	31.8	191
Geneva	24.1	28.4	33.3	186
Stockwell	21.5	31.2	34.3	175
AC Grazeland	21.1	28.4	37.1	167
Gala	22.1	35.7	38.8	146
AC Nordica	21.5	32.5	41.6	142
54V54	17.8	33.9	42.3	137
Hornet	19.8	35.4	42.7	134
53Q60	19.7	38.0	42.2	131
PS2065MF	19.4	36.5	46.5	121

Table 5. Quality analysis for the alfalfa plots for third cut.

Alfalfa	%CP	%ADF	%NDF	RFV
AC Grazeland	27.1	24.1	28.6	228
Beaver	26.1	24.8	30.1	215
PS8925MF	25.4	24.8	31.2	207
54V54	26.4	25.4	31.1	207
AmeriStand	26.4	25.4	31.2	206
Stockwell	25.5	25.9	31.3	204
Gala	25.9	26.1	31.3	204
AC Longview	25.7	25.3	32.1	201
Hornet	24.7	27.3	31.4	200
PS2065MF	25.5	26.5	31.9	199
53Q60	25.7	26.6	33.6	189
Geneva	21.7	35.1	30.5	173
AC Nordica	22.5	29.3	34.7	177

In all three cuts, only one block was sampled for quality (CP, NDF, and ADF). As such, no statistics were gathered on the quality. The analysis performed measured Crude Protein (CP), Neutral Detergent Fibre (NDF), and Acid Detergent Fibre (ADF). With the ADF and NDF a Relative Feed Value (RFV) can be calculated for the alfalfas. The average RFV for first cut was 183, with second cut lower at 157. The average RFV for the third cut was the highest of the three cuts at 202. An alfalfa at 100% bloom should have a RFV of around 100 and RFV 150 is usually considered the cut off for dairy quality. All three cuts met dairy quality in this trial.

Table 6. Quality analysis for the grass plots.

	Quality 1st Cut				Quality 2nd Cut			
	CP	ADF	NDF	TDN	CP	ADF	NDF	TDN
Bravo Smooth Brome	16.4	35.5	60.6	61.5	23.2	35.0	59.3	62.2
Paddock Meadow Brome	12.6	40.0	64.5	54.7	28.5	29.6	50.1	70.3
AC Knowles Hybrid Brome	13.7	33.4	60.9	64.6	24.9	32.1	57.2	66.5
Chief Intermediate Wheat Grass	14.6	36.4	64.5	60.1	24.8	35.1	55.6	62.1
Common Tall Wheat Grass	13.3	35.5	65.2	61.5	23.7	35.3	60.9	61.8
AC Parkland Crested Wheat Grass	11.0	35.0	64.2	62.2	29.0	33.0	54.6	65.2
Garrison Creeping Foxtail	17.8	31.9	58.1	66.8	28.5	33.4	56.7	64.6
Courtney Tall Fescue	17.1	31.9	55.8	66.8	19.3	33.6	59.1	64.3
Kay Orchard Grass	17.9	35.2	58.0	61.9	26.1	31.8	54.8	67.0
Arctic Orchard Grass	21.0	33.1	55.6	65.0	27.8	29.4	53.8	70.6
Aurora Timothy	13.0	32.5	58.3	65.9	23.4	34.1	59.8	63.5
Joliette Timothy	13.1	31.8	58.7	67.0	23.5	31.3	52.8	67.7
Revenue Slender Wheat Grass	12.8	32.0	58.9	66.7	21.1	32.2	57.4	66.4
Authur Dahurian Wild Rye	19.6	31.8	59.1	67.0	22.3	37.1	64.4	59.1

Table 7. Alfalfa Heights (cm) for 2007

Alfalfa	Cut 1	Cut 2	Cut 3	Total 2007	
Gala	72	78	69	219	A
AC Grazeland	71	78	69	219	A
Stockwell	71	76	68	215	AB
Geneva	66	80	69	214	ABC
Hornet	70	77	66	213	ABC
PS8925MF	66	78	69	213	ABC
AC Longview	66	78	69	212	ABCD
PS2065MF	70	75	64	209	ABCDE
53Q60	68	71	65	204	BCDEF
AmeriStand	65	75	59	199	DEFG
54V54	63	72	62	197	EFG
Beaver	63	67	61	191	FG
AC Nordica	64	66	59	188	G
LSD	6.5	5.6	6.9	13.5	
CV	6.78	5.29	7.44	4.57	

Each individual alfalfa plot was also assigned a maturity rating based on the most mature stem in the plot. There was no significant difference between the varieties in first cut, second cut, third cut or in the sum of the ratings of the three cuts.

Final Discussion

Alfalfa Results

All of the alfalfa types are tap rooted varieties (although there are a few varieties with a branched tap root), which generally out-yield creeping rooted varieties under hay production. Creeping rooted varieties are better suited for pasture, as they tolerate trampling better. The varieties in this trial include the top varieties of a number of seed companies. As a group, they are all high yielding (over four tons/acre) and have fast regrowth.

Beaver was included in the trial as a check. It is an old variety that has been used as a standard for many years. Beaver is quite winter-hardy, although winterkill was noticed in some of the plots. This site is located north of Saskatoon near Osler and can experience cold conditions.

Right at the top for yield was **AC Longview**. AC Longview and **Hornet** are two FarmPure Seeds varieties. AC Longview comes from Lethbridge, AB, while Hornet was bred in Wisconsin. In the U.S., Hornet is sold as Magnum V. Hornet is supposed to have slightly slower regrowth and AC Longview is very winter-hardy. This was observed this year since AC Longview out-yielded Hornet.

54V54 and **53Q60** are two of the Pioneer varieties. 54V54 out-yielded 53Q60 here, in spite of 54V54 having a higher fall dormancy rating (four vs. three) which would suggest that 53Q60 is more winter-hardy. 53Q60 is supposed to have lower fibre levels and is targeted at the dairy market. 54V54 also had the lowest RFV in first cut, which would indicate more mature stems and quick regrowth. It moved into the second highest yielding spot, up from third last year.

PS8925MF and **PS2065MF** are two Pickseed (PS) multi-foliate (MF) varieties. Both are quickly regrowing varieties, with PS8925MF out-yielding PS2065MF this year. PS8925MF has a slightly higher fall dormancy rating (3.7 vs. three), so over time winterkill could be expected to lower the yield potential. However, this is not yet showing up. **AC Grazeland**, also distributed by Pickseed, was bred to have a lower initial rate of digestion and is the first alfalfa to have a lower bloat incidence. Although it is not completely bloat safe, with proper management it can be successfully grazed. This trait also shows up in the quality in that AC Grazeland generally has higher fibre levels. However, this year it was in the middle of the pack for first and second cut. In third cut, it had the highest RFV which would indicate a younger plant and slower regrowth.

Geneva and **Gala** are two Proven Seed multi-foliate tap rooted varieties. Both do quite well; however, here, Geneva out-yielded Gala. Gala is supposed to be a bit more winter-hardy, with a fall dormancy rating of two compared to Geneva's rating of four. In previous years, Gala had out-yielded Geneva, but these two varieties are not statistically different this year. Geneva is supposed to be faster

at regrowing. **Ameristand** is another Proven Seed variety. It has a deep set crown and should tolerate heavy traffic better than others varieties. Ameristand has a fall dormancy rating of two, which indicates excellent winter-hardiness. Ameristand had the highest RFV in second cut.

AC Nordica came in fifth place this year, down from first place last year. It has done very well in the past and this is the first year it dropped out of first place. It had a disappointing first cut, which is unusual. In first cut it had the highest RFV, which would indicate younger and slower growing plants. AC Nordica is a Viterra variety. It has a branched tap root, and is very winter-hardy.

Stockwell is a Seed-Link variety. Like AC Nordica it is a branched tap root, although it yields slightly less (but not statistically different) than AC Nordica.

Overall, the alfalfas still performed well. The average yield this year (4.75 tons/acre) was lower than 2006 (5.59 tons/acre), but higher than 2005 (3.87 tons/acre) and lower than 2004 (5.24 tons/acre). There was some evidence of winterkill, with some winter annual weeds showing up in the empty spaces where winterkill took out the alfalfa. Generally, the highest yielding varieties are showing up as the poorest quality, which would make sense as they are the fastest regrowing and are being harvested at a later stage of maturity compared to the slower growing/lower yielding varieties.

Grass Results

In the past, grass has not usually been recommended under intensive irrigation, since it is generally lower yielding, always lower quality, and requires nitrogen fertilization when compared with alfalfa. When it was recommended, it was in a mix with alfalfa to lengthen the life expectancy of the stand. However, in these plots, with some aggressive fertilization, several grasses significantly out-yielded the alfalfas. Perhaps, in the future, more grasses will be recommended and grown.

Paddock meadow brome was the highest yielding grass again this year. Meadow brome grass has predominantly basal growth with the leaves initiating from the ground. Smooth brome grass has alternating leaves all the way up the stem. As such, meadow brome is more suited to pasture situations, while smooth brome is more suited to making hay. The leaves are high enough for the haybine to cut on smooth brome and low enough on meadow brome that the cows can't take it all, leaving some for faster regrowth. Smooth brome is more aggressively creeping than meadow brome. In nature, the two flower at different times and do not interbreed. In a greenhouse, Dr. Knowles was able to time the seeding correctly to cross pollinate the two species and produce viable virile seed. **AC Knowles** is the hybrid that is intermediate in most growth characteristics. Its regrowth is slower than meadow brome, but faster than smooth brome. It is also supposed to yield less than smooth brome and more

than meadow brome in a hay situation, although just the opposite was the case here. On the five year total, AC Knowles yielded less than the meadow brome and more than the smooth brome. Of these three, **Bravo smooth brome** had the highest CP in first cut; however, AC Knowles had slightly better fibre levels. Paddock had the best quality for second cut.

Tall wheat grass is known for its tolerance to salinity. It also well adapted to high moisture situations and is tolerant to some flooding, but not drought. It is the second highest yielding grass over the five years of this trial. A problem with tall wheat grass is that its quality drops off quite quickly as it matures. It had one of the highest NDF levels in first cut and the second highest NDF in second cut.

AC Parkland crested wheat grass is the only crested wheat grass in this trial. Crested wheat grass is known for its early growth in the spring and very long life span. It is very drought tolerant, but not flood tolerant. It was the third highest yielding grass at first cut and second cut. Generally the quality is fairly good early, but drops off considerably once the plant has matured. This is evident in the second cut, where AC Parkland had the highest CP. It was also quite young when harvested the second time. This variety of crested wheat grass was bred to have lower fibre levels and is more palatable over the whole year. However, it still had one of the highest NDF values in first cut. Certified seed is now available.

Chief Intermediate wheat grass is not a long lived grass under intensive management. However, it was still one of the higher yielding grasses this year at almost 4 tons/acre. It is slow to mature and combines well with alfalfa in a mix.

Garrison creeping foxtail has excellent flood tolerance. It also is long lived and strongly creeping rooted. Garrison creeping foxtail had the highest second cut yield. Garrison has also started to invade some of the adjacent plots when it is adjacent to a less aggressive species.

Orchard grass is a highly palatable bunchgrass with excellent re-growth and midseason production. **Arctic orchard grass** had the highest average protein of the grasses in first cut. Generally, the orchard grasses have marginal winter-hardiness. Arctic is a variety bred to have more winter-hardiness, which is very evident in our trials early on. **Kay orchard grass** died out after the first winter with virtually no production the next year. Arctic, although it did suffer damage, still survived. Some of the seed must have stayed dormant because there are noticeably more plants this year in both varieties. Also this is the first year that Kay out-yielded Arctic.

Timothy used to be one of the more profitable crops to grow under irrigation. The price of timothy has fallen significantly in recent years, due to the high Canadian dollar and high ocean freight rates. It used to be the only grass worth fertilizing to these fertility levels, but now with a lower price, it is probably not

economically beneficial. The two timothy varieties included here did not yield as much as some of the top yielding species, probably because the plot wasn't managed for timothy. Properly managed timothy (cut mid July and late August) can yield four to five tons/acre. These plots were all cut at the same time as the alfalfas, which is too early for the timothy. Timothy loves water and is tolerant to spring flooding, but not to drought or salinity. Once again this year, **Joliette** yielded higher than **Aurora**. Joliette also had the lowest fibre levels of the grasses in first cut.

Revenue Slender wheat grass is the only native grass included in this trial. It is a short lived but quite productive native species. Of the native grasses, it is one that is relatively easy to establish. In this trial under irrigation and intensive management, it out-yielded the alfalfas in the first couple of years. This year, it is beginning to see the end of its life span and the yield has dropped off.

Arthur Dahurian Wild Rye is another productive, short lived grass. It is a shallow-rooted bunch grass, easy to establish and adapted well to saline conditions. It is also nearing the end of its stand life span and the yield is dropping.

The other grass that winterkilled was **Courtenay Tall Fescue**. Tall fescue is a pasture grass tolerant to saline, acidic and alkaline soils. It is also drought tolerant, but not winter-hardy. Some varieties have high alkaloids which can cause animal health problems. There are also palatability issues with its coarse texture and feel.

Conclusion

This report shows some of the results obtained from a randomized, replicated small plot near Osler. It demonstrates some of the high qualities and yields that can be obtained from alfalfa under an intensive three cut system, as well as the upper end yields from some of the grass species when they are fertilized. These numbers, however, are limited to this site. As such, they should not be used for variety recommendations. For variety recommendations, please check the booklet Crop Varieties for Irrigation published by CSIDC. All of the data presented in this article is included in the dataset used for that publication. To obtain this guide, please call one of the ICDC Agrologists.

Special Thanks goes to Peter J. Fehr who generously supplied the land for this plot, put up with all the hassles and phone calls imposed by this ICDC Agrologist and provided a very aggressive management style to try and keep ahead of.

d) Waldeck Forage Demonstration – Waldeck Site

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operators: Lane Wilms, Waldeck
Peter Novak, Proven Seed, Regina
Art Klassen, Brett Young Seeds, Saskatoon
Kevin Dunse, Pickseed, Lethbridge

Project Objective

To demonstrate a number of the latest recommended alfalfa varieties on a field scale to irrigation farmers in the Swift Current area of Saskatchewan.

The purpose of this demonstration was to highlight the production capability of alfalfa under a two cut system destined for the beef market. It is an excellent example of the interdependence of the beef industry on the crops/forage industry and the use of irrigation as a tool to enhance production.

Demonstration/Project Plan

To collect yield and forage quality data from a forage demonstration of 10 alfalfa varieties which were established in 2006 on Lane Wilms's plot on the Waldeck irrigation project. The demonstration consists of 10 varieties planted side by side, one each per border dyke strip. Yield and forage quality results from two cuts/year of the 10 alfalfa varieties will be demonstrated. The bales will be counted, weighed and sampled for quality. Field days, annual reports and final reports will be used to share this information.

Demonstration Site

This demonstration is located north east of Swift Current in the Waldeck irrigation district (NE27-16-12-W3). This field scale demonstration was established in the spring of 2006 with 10 varieties from four different seed companies seeded at 12 lb/acre. Convoy, Equinox, Geneva, Gala, Ameristand-201, and Spredor 4 are Proven Seed Varieties. Hybriforce 400 and Magnum 3801 are Brett Young varieties. Starbuck is a Pickseed variety and Longview is a FarmPure variety. The plots were 40' wide (one per border dike) and a total of 0.7 acres each. These were not randomized or replicated, but rather just a demonstration of the varieties, so the information presented here should be considered accordingly. This site is located in the brown soil zone and the soil texture is clay. Soil samples were taken and sent to ALS Labs in Saskatoon for analysis. The previous crop was an alfalfa grass mix. This site is irrigated by flood irrigation.

The Waldeck Irrigation Project received two full irrigations (May 20th and July 20th) in 2007.

Project Methods and Observations

Quarter meter swards were taken on June 29th to measure maturity. Bales were counted, weighed, and samples were taken for quality analysis. First cut was July 7th, which was late due to continuing rain. On July 20th, a strong wind blew away and mixed the swaths. What remained was baled July 21st and amounted to less than a bale per plot. Second cut was taken September 9th after a killing frost.

A field day was held Wednesday July 4th with most of the irrigators from the Waldeck Project. Peter Novak (Proven Seed), and Art Klassen (Brett-Young Seeds) described their varieties. Kevin Dunse (Pickseed) was unable to attend due to illness. Darren Steinley gave an overview of the Environmental Farm Plan process in regards to irrigation.

Table 1. Quarter Meter Swards taken June 29th

	MSC*	Yield (tons/acre)	Height (cm)
Convoy	3.7	3.1	73
Equinox	3.5	3.8	69
Geneva	2.8	3.3	61
Hybriforce 400	4.3	3.0	65
Gala	4.4	3.1	60
Magnum 3801	3.7	3.4	68
Starbuck	3.5	3.2	62
AC Longview	3.7	3.7	68
Ameristand	3.6	3.2	61
Spredor 4	3.7	3.6	61

* Mean Stage Count is a weighted average of the maturity of each stem in the sward.

Table 2. Yield (tons/acre)

	First Cut	Second Cut	Total
Convoy	Blew Away	1.2	1.2
Equinox	Blew Away	1.1	1.1
Geneva	Blew Away	1.2	1.2
Hybriforce 400	Blew Away	1.6	1.6
Gala	Blew Away	1.4	1.4
Magnum 3801	Blew Away	1.2	1.2
Starbuck	Blew Away	1.4	1.4
AC Longview	Blew Away	1.5	1.5
Ameristand	Blew Away	1.5	1.5
Spredor 4	Blew Away	1.6	1.6

Table 3. Quality from Second Cut

	%CP	%NDF	%ADF	RFV
Convoy	20.3	36.9	27.7	170
Equinox	18.7	36.2	29.6	169
Geneva	19.3	37.2	30.7	163
Hybriforce 400	20.0	31.7	26.9	199
Gala	19.8	33.8	28.3	184
Magnum 3801	20.3	33.4	27.6	187
Starbuck	18.8	37.7	31.6	158
AC Longview	18.6	35.2	30.2	173
Ameristand	18.9	37.6	30.8	161
Spredor 4	20.6	33.9	27.1	186

Table 4. Soil Samples results from Oct 9th, 2007

Nutrient	Lab Result (lb/ac)	ALS Recommendation (lb/ac)
NO3-N	27	0
P	29	65-75
K	792	0-30
SO4-S	>82	0-5

Final Discussion

Convoy is a brand new variety from Proven Seed being evaluated this year. It was included in this plot as an experimental variety. It has established quite well here; however in other parts of the province, it did not perform as well. For now Proven Seed is postponing the release of this variety.

Equinox is also a brand new variety from Proven Seed. It was included in this plot as an experimental variety and was registered by Proven Seed in 2006. It is a high yielding, high quality alfalfa.

Geneva is an older multifoliate variety from Proven Seed. It has quick regrowth and has done quite well in the past. It is highly resistant to most diseases however it is not winter-hardy.

Hybriforce-400 is a hybrid alfalfa from Brett-Young Seeds. It was registered in 2004, has good winterhardiness and yields similar to Geneva.

Gala is also an older Proven Seed variety. It is less resistant to most diseases than Geneva, yields slightly less, but has about a 75% expression of multifoliate leaves.

Magnum 3801 Wet is another Brett-Young variety. It has lower fibre levels and is targeted at the dairy market. It has good winterhardiness and has a branched or floating root system which makes it more tolerant to flooding.

Starbuck is a Pickseed variety with excellent winterhardiness. According to the Crop Varieties for Irrigation published by CSIDC, it should be one of the highest yielding varieties in this plot. It has about an 85% expression of multifoliate leaves. It has a high protein content which gives it excellent forage quality.

AC Longview is an older FarmPure Seeds variety, registered in 1999 from AAFC in Lethbridge, Alberta. It has a deep set crown and a branching tap root. It has performed well under irrigation in the past.

Ameristand 201+Z is a Proven Seed variety with a sunken crown. As such it is supposed to tolerate heavy traffic and grazing better than other alfalfas.

Spredor 4 is another Proven Seed variety. It has a creeping root. Although normally creeping rooted varieties yield less than tap rooted varieties for hay, this creeping root does remarkably well.

This demonstration shows the high yields that can be achieved under irrigation. With a two cut system, producers can achieve similar yields to three cuts, although the quality is more suitable for a beef cow than a dairy cow. The yields shown here should not be taken as variety recommendations, since the varieties are not replicated. For variety recommendations see the Crop Varieties for Irrigation published by CSIDC.

e) Consul Forage Demonstration – Consul Site

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-operators: Scott Sanderson, Consul
Ellis Clayton, Pioneer, Saskatoon
Kevin Dunse, Pickseed, Lethbridge
Monica Gerbrandt, Ponderosa Ag Sales, Swift Current
Art Klassen, Brett-Young, Regina
Peter Novak, Proven Seed, Regina
Nicole Tanner, FarmPure Seeds, Regina
Ron Tittle, Northstar Seeds, Consul

Project Objective

To demonstrate a number of the latest recommended alfalfa varieties on a field scale to irrigation farmers in the Consul area of Saskatchewan.

The purpose of this demonstration was to highlight the production capability of alfalfa under a two cut system destined for the beef market. It is an excellent example of the interdependence of the beef industry on the crops/forage industry and the use of irrigation as a tool to enhance that.

Demonstration/Project Plan

The project plan is to collect yield and forage quality data from a forage demonstration of 17 alfalfa varieties on the Consul Irrigation project. The demonstration would consist of 17 varieties planted side by side, one each per border dyke strip.

Yield and forage quality results from two cuts per year of the alfalfa varieties will be demonstrated. Field days, annual reports and final reports will be used to share the information.

The project was established in 2007 with the cooperation of Proven Seed, Brett Young Seeds, FarmPure Seeds, Northstar Seeds, Pioneer, and Pickseed. The alfalfa varieties grown in the demonstration are planted side by side on 22 40’ by 744’ border dyke strips. Also included in this demonstration are two strips of without the phosphorus application and a new crested wheat grass variety (Goliath). The varieties were chosen in cooperation with the seed companies with each company providing their own seed. The plan is to collect data for two seasons, 2008 and 2009. An extension event may be considered thereafter if the results prove to be useful.

Demonstration Site

The demonstration site is located at SW-14-4-27-W3. This demonstration is located in the brown soil zone and the soil type is a clay to clay loam. The plots are irrigated by flood irrigation with one flood per year. The Consul and Vidora Irrigation Projects received a full irrigation in 2007 and this plot received about eight inches of water in the middle of May. The plot was fertilized with 300 lb of 11-52-0 which was incorporated prior to seeding. No phosphorous was added to two of the Beaver plots. This demonstration site was seeded June 14th, 2007. The seeding mixture was eight pounds of alfalfa, 1/3 bushel of wheat, and ¾ pound of crested wheatgrass. Soil samples were taken in the fall (October 10th, 2007), and sent to ALS Labs in Saskatoon for analysis. The recommendations that were sent back were to add 30-35 lb/ac of P_2O_5, up to 15 lb/ac of K_20 and up to 15 lb/ac of S. This plot was chemfallowed in 2006 and prior to that was a cereal.

Project Methods and Observations

There was good growth after seeding. However, as the season progressed, the soil became dry with the clay showing significant cracks. The crested wheat grass was particularly difficult to find.

Variety Descriptions

Beaver was included in the trial as a standard against which to compare the others to. It is an old variety that has been used as a standard for many years.

Pioneer varieties

54V46 is a replacement for 54V54 which has done well under irrigation in the past. 54V46 is supposed to yield higher than 54V54. This is one of Pioneer's highest yielding varieties.

53Q60 is Pioneer's high yielding dairy quality alfalfa. It boasts lower fiber levels and higher milk production.

53V52 is a newly released variety. It is winter-hardy and persistent under a wide range of conditions.

Proven Seed varieties

Equinox is a winter-hardy variety. It has rapid re-growth allowing it to be used in a multiple cut system while maintaining high quality. It is one of the newest Proven varieties.

Spredor 4 is a combination of Spredor 2 and Spredor 3. It is a creeping rooted variety with very good winter-hardiness and it is very drought tolerant. Generally tap rooted varieties outyield creeping rooted varieties. However, Spredor 3 and 4 have done surprisingly well under irrigation.

Ameristand has a sunken crown. The crown is actually located below the ground rather than at the surface. The benefit of this is to reduce trampling in a pasture situation and reduce the impact of traffic. Heavy traffic will significantly impact yield.

Brett Young varieties

Hybriforce 400 is a hybrid alfalfa variety. Some of its features are improved establishment, winter-hardiness and rapid re-growth.

FarmPure Seeds varieties

AC Longview was developed by AAFC in Lethbridge, Alberta. It has excellent re-growth characteristics and is a winter-hardy variety. It is one of FarmPure's highest yielding varieties.

Algonquin is an older variety tap rooted variety. It has done well in past years and could be considered a second check along with Beaver. It is a public variety.

Rangelander is another older variety. It is a strongly creeping rooted variety that has done well in past years. It also is a public variety

Northstar varieties

TopHand is a high yielding multifoliate variety. It also has good winter-hardiness. It is one of Northstar's highest yielding varieties.

Runner is a creeping rooted variety. It is winter-hardy and drought tolerant. There have been mistakes made in some of the research regarding Runner. Some of the plots seeded in 2003 across the province included seed mislabeled as Runner.

Rhino is a tap rooted variety known for its disease and insect resistance, as well as its quality. It is also quite winter-hardy.

Pickseed varieties

Starbuck is a variety with high multifoliate expression, excellent winter-hardiness and one of the highest protein contents giving excellent forage quality. It is a variety with rapid re-growth.

AC Grazeland was bred to have a lower initial rate of digestion and is the first alfalfa to have a lower bloat incidence. Although it is not completely bloat safe, with proper management it can be included as a higher proportion of a pasture for better feed quality without incurring a higher risk of bloat. It also has excellent leaf retention.

2065MF has very rapid regrowth and very good winter-hardiness. It is a multifoliate variety that is very persistent and has good forage quality. It has been one of Pickseed's highest yielding varieties.

3006 is a highly creeping rooted variety that is meant to replace other pasture varieties like Rangelander and Rambler. It also shows some multifoliate expression for improved feed quality.

Final Discussion

No data was collected on this demonstration site, as it was just seeded this spring. The cover crop of HRSW produced 22 bushels per acre with a protein content of 14.8%.

f) Annual Cereal Forage Varieties for Irrigation

Project Lead: Korvin Olfert PAg., Provincial Irrigation Agrologist and Jessica Williams AAg., Co-op Student

Co-Investigators: Terry Hogg, CSIDC

Co-operators: Dr. Alan Iwaasa, AAFC
Russ Muri, AAFC

Project Objective

To assess the annual cereal forage production potential under irrigated conditions in Saskatchewan using current and newly released varieties.

Silage is a common method of feed storage, particularly under irrigation for intensive livestock operations. Most of the variety comparisons produced use grain yields, not total plant biomass. The objective of this project is to compare current and new varieties of barley, oats and triticale with respect to total plant biomass production for silage or green feed.

Demonstration/Project Plan

This site at the Semi-Arid Prairie Agricultural Research Center (SPARC) in Swift Current was a replicate of a site at the Canada-Saskatchewan Irrigation Diversification Center (CSIDC) in Outlook. Two sites are desirable to increase the range of soil and agro-climatic conditions it is applicable to and to increase the numbers of site-years to more quickly evaluate emerging varieties. These sites included 13 barley varieties, five oat varieties and five triticale varieties in a randomized complete block, replicated small plot experiment (4' x 20', four blocks). Both total dry matter yield and quality information were collected. The quality information was collected for only one of the blocks for each site and, as such, does not have any associated statistics.

Demonstration Site

This site is located at the Semi-Arid Prairie Agricultural Research Centre in Swift Current. The plot was seeded May 17th, 2007 at 2.3 bushels per acre. It was fertilized to achieve a total of 100-50-0-0 actual NPK lb per acre. One hundred lb of 11-52-0 was placed with the seed, and 200 lb of 46-0-0 was broadcast after seeding and irrigated in. It was sprayed with Buctril M on June 1st, 2007. The irrigation system was lateral wheel moves with water sourced from the Duncairn-Highfield canal. There were no water restrictions during the irrigation season.

This site was summerfallowed in 2006. The barley and oats were harvested at the soft dough stage. The triticale was harvested at early flower.

Barley

CDC Battleford is a six row malt variety with smooth awns and normal straw length registered from the Crop Development Center at the U of S in 2001. SeCan is the distributor. It is a nice short variety that has been around for a little while and has done well. Lodging is a serious problem under the intensive irrigation conditions and can significantly impact yield. CDC Battleford has good resistance to lodging.

Dillon is a six row hooded forage barley with normal straw length. It comes from Westbred LCC, Montana and was registered in Canada in 2000. Viterra is the distributor. It is a replacement for Westford which had significant smut problems. Dillon has improved smut resistance.

Vivar is a six row, rough awned, late semi-dwarf feed barley. It was bred at AAFC Lacombe, Alberta and registered in 2000. It is a very popular silage variety in the feedlot alley region of Alberta. It has very strong short straw and nice plump grain. SeCan is the distributor.

CDC Copeland is a two-row malt barley with rough awns and normal straw length. It was bred at the Crop Development Center at the U of S and registered in 1999. It is supposed to be approved for malt in 2007. It also has an increased resistance to Fusarium Head Blight (FHB). SeCan is the distributor. CDC Copeland was the highest yielding two row malt in this trial last year.

CDC Bold is a two row rough awned feed barley. It was bred at the Crop Development Center at the U of S and registered in 1999. Canterra is the distributor. It is a semi-dwarf feed barley suited for silage, but with later maturity.

AC Ranger is a six row smooth awned forage barley with normal straw length. It was bred at AAFC Brandon, Manitoba and registered in 2000. FarmPure Seeds is the distributor. It is more susceptible to rust and has a lower grain test weight; however, it has done very well over the years. AC Ranger was the highest yielding six row barley in this trial last year.

Stockford is a two row hooded forage barley. It also was bred in Montana and registered in Canada in 2005. Stockford is distributed by Viterra. It is supposed to have a higher yield and quality than Westford. Lodging and days to maturity are similar to Westford.

AC Hawkeye is a six row hulless feed barley with normal straw length. It was bred at AAFC Brandon, Manitoba and registered in 1996. Viterra is the distributor. It is a taller, older variety that has done well in the past.

Binscarth is a six-row rough awned forage barley with normal straw length. It was bred at AAFC Brandon, Manitoba and registered in 2006. Wagon Wheel Seed Corp. is the distributor. Its forage quality is superior to AC Ranger. It can also be used for emergency grazing, as it can be regrazed.

CDC Cowboy is a two row rough awned forage barley with normal straw length. It was bred at the Crop Development Center at the U of S and registered in 2004 as the first two row forage barley in Western Canada. SeCan is the distributor. It is a newer forage type barley that has a lot of potential in spite of it being a bit later maturing. CDC Cowboy was the highest yielding two row forage barley in these plots in 2006.

Newdale is a two row rough awned malt barley with normal straw length. It was bred at AAFC Brandon, Manitoba and registered in 2001. FarmPure Seeds is the distributor. In 2007, there was a small trial to evaluate the malt potential. It is 24% higher yielding than Harrington. SeCan is the distributor.

AC Rosser is a six row smooth awned feed barley with normal straw length. It was bred at the Crop Development Center at the U of S and registered in 1996. It is an older, taller variety, better yielding than Harrington, but two days later in maturity.

Trochu is a six row smooth awned feed barley with normal straw length. It was bred at AAFC Lacombe, Alberta and registered in 2000. SeCan is the distributor. It has a nice plump grain.

Oats

Calibre was bred at the U of S and registered in 1983. It is poor for lodging and is a general purpose oat, suited for both forage and milling. SeCan is the distributor.

AC Pinnacle was bred at AAFC Cereal Research Centre in Winnipeg, Manitoba and registered in 1999. It also is a dual purpose oat although a bit later maturing than Calibre. FarmPure Seeds is the distributor. AC Pinnacle was the highest yielding oat variety in this trial in 2006.

AC Morgan was bred at AAFC Lacombe, Alberta. It was registered in 1999 and is distributed by SeCan. It is suited as a milling oat variety.

CDC Baler was bred at the Crop Development Center at the U of S and registered in 2000. FarmPure Seeds is the distributor. It is a forage oat with very wide leaves and stays green in a bale longer than other oat varieties.

CDC Bell was bred at the Crop Development Center at the U of S and registered in 1998 as a forage oat variety. Viterra is the distributor.

Triticale

Comet is a variety registered in the US but not in Canada. It cannot be grown for seed production but can be grown and harvested as a forage. Comet, along with Viking tied for the highest yielding triticale varieties in these trials in 2006.

AC Ultima was bred at AAFC SPARC in Swift Current and registered in 1999. Quality Assured Seeds is the distributor.

Viking is also not registered in Canada. It cannot be grown for seed production but can be grown and harvested as a forage.

Banjo was bred at the University of Manitoba and registered in 1991. Value Added Seeds is the distributor. It is a bit later maturing than the other varieties included in this trial.

Pronghorn was bred at AAFC Lacombe, Alberta and registered in 1995. Progressive Seeds is the distributor.

Project Methods and Observations

Table 1. Barley Yields (tons/acre Dry Matter)

	CSIDC		SPARC	
AC Ranger	7.84	A	6.27	ABC
Newdale	7.66	AB	6.64	ABC
CDC Copeland	7.30	ABC	5.89	ABC
AC Rosser	7.26	ABC	5.39	BC
CDC Bold	7.09	ABC	4.60	BC
CDC Battleford	7.06	ABC	5.40	BC
Vivar	7.04	ABC	5.67	BC
Trochu	6.99	ABC	4.23	C
CDC Cowboy	6.72	BC	8.38	A
Binscarth	6.70	BC	7.21	AB
AC Hawkeye	6.64	C	6.48	ABC
Dillon	6.48	C	5.74	ABC
Stockford	6.39	C	6.77	ABC
LSD	0.97		2.66	
CV	9.67		30.61	

Both CSIDC and SPARC had a significant block interaction. There was a significant gopher problem at the SPARC site. This plot was adjacent to a hay field infested with gophers.

Table 2. Oats Yields (tons/acre Dry Matter)

	CSIDC		SPARC	
CDC Bell	6.29	A	5.86	AB
Pinnacle	5.62	B	6.01	AB
AC Morgan	5.5	B	6.22	AB
CDC Baler	5.49	B	4.95	B
Calibre	5.14	B	6.36	A
LSD	0.57		1.35	
CV	6.9		14.9	

SPARC had a significant block interaction but CSIDC did not.

Table 3. Triticale Yields (tons/acre Dry Matter)

	CSIDC		SPARC	
Banjo	4.99	A	4.80	AB
Comet	4.84	AB	4.67	AB
Viking	4.41	BC	4.44	B
AC Ultima	4.40	BC	4.47	B
Pronghorn	4.29	C	5.59	A
LSD	0.55		1.10	
CV	7.75		14.9	

SPARC had a significant block interaction but CSIDC did not.

Table 4. CSIDC Forage Qualities.

Sample	Feed Type	CP	NDF	ADF	TDN
CDC Bold	Barley	10.7	49.8	28.2	60.6
Vivar	Barley	10.5	60.7	35.1	52.9
AC Rosser	Barley	10.6	51.6	31.8	56.6
Newdale	Barley	9.8	55.4	33.1	55.1
CCD Copeland	Barley	10.1	50.3	30.0	58.6
Dillon	Barley	9.7	58.6	36.0	51.9
Stockford	Barley	11.5	57.2	35.5	52.4
CDC Battleford	Barley	9.7	45.9	28.6	60.2
Binscarth	Barley	10.0	53.6	32.9	55.4
CDC Cowboy	Barley	10.1	56.1	35.1	52.9
AC Hawkeye	Barley	10.9	55.8	34.0	54.1
AC Ranger	Barley	9.3	56.3	32.1	56.2
Trochu	Barley	9.1	52.5	32.2	56.1
Average		10.2	54.1	32.7	55.6
CDC Baler	Oats	11.3	57.0	38.0	49.6
Pinnacle	Oats	10.6	51.5	33.5	54.7
Calibre	Oats	11.3	55.2	38.7	48.9
CDC Bell	Oats	11.9	54.5	35.8	52.1
AC Morgan	Oats	10.9	49.4	33.0	55.2
Average		11.2	53.5	35.8	52.1
Comet	Triticale	13.3	56.0	36.2	51.7
Viking	Triticale	12.9	56.6	36.3	51.5
Banjo	Triticale	13.3	56.3	36.9	50.9
AC Ultima	Triticale	13.0	53.0	32.3	56.0
Pronghorn	Triticale	14.3	52.6	33.2	55.0
Average		13.4	54.9	35.0	53.0

Table 5. SPARC Forage Qualities.

Sample	Feed Type	CP	NDF	ADF	TDN
CDC Bold	Barley	15.9	47.8	30.0	58.6
Vivar	Barley	12.7	50.9	32.0	56.4
AC Rosser	Barley	14.0	50.1	32.0	56.4
Newdale	Barley	13.5	50.2	31.4	57.0
CCD Copeland	Barley	13.1	57.0	37.1	50.6
Dillon	Barley	14.1	54.6	35.4	52.6
Stockford	Barley	12.9	51.1	34.1	54.0
CDC Battleford	Barley	11.8	46.0	30.8	57.7
Binscarth	Barley	14.9	52.8	33.9	54.2
CDC Cowboy	Barley	13.6	54.0	35.2	52.8
AC Hawkeye	Barley	13.5	56.9	36.1	51.8
AC Ranger	Barley	13.0	50.5	32.1	56.2
Trochu	Barley	14.0	48.1	29.7	58.9
Average		13.6	51.5	33.1	55.2
CDC Baler	Oats	13.7	56.9	38.4	49.2
Pinnacle	Oats	12.2	54.5	36.5	51.3
Calibre	Oats	12.7	52.3	35.9	52.0
CDC Bell	Oats	14.4	55.9	36.8	51.0
AC Morgan	Oats	11.7	50.9	34.1	54.0
Average		12.9	54.1	36.3	51.5
Comet	Triticale	14.9	63.7	43.1	43.9
Viking	Triticale	15.9	61.2	39.6	47.8
Banjo	Triticale	18.2	58.1	36.2	51.7
AC Ultima	Triticale	15.7	60.4	39.2	48.3
Pronghorn	Triticale	19.0	56.5	35.9	52.0
Average		16.7	60.0	38.8	48.7

There was no statistical information from the qualities, as only one of the four blocks was analyzed. Also, each of the species was harvested when the plot average reached the recommended time. For example, barley should be harvested at mid dough, so when the average of the plot reached this point the entire plot was harvested. Some of the early varieties would be more mature (higher grain yield, more energy) and the late ones would be less mature (higher protein, less grain), which would also affect the qualities.

Final Discussion

The highest yielding barley at CSIDC was AC Ranger, and the highest yielding barley at SPARC was CDC Cowboy. AC Ranger was the highest yielding six row barley, and CDC Cowboy was the highest yielding two row forage barley in 2006. Once again, these two varieties have done well. In the oat and triticale trials

there was a change this year compared to previous years. The lowest yielding oat and triticale varieties at CSIDC turned out to be the highest yielding at SPARC. The highest yielding varieties this year were not the highest yielding from other years. This highlights the variability among locations and years. Generally, barley and oats yields are similar with barley having slightly better quality. Triticale and oats usually have similar quality. All of the information from this year is included in the database for the Crop Variety Guide published by CSIDC. That guide incorporates all of the previous year's data and would be a better source of varietal information than this single year.

3. Pulse Crops

a) White Mountain Dry Bean Demonstration

Project Lead: Lana Shaw, PAg., Provincial Irrigation Agrologist

Co-operator(s): none

Project Objective

To investigate the agronomic profile of the new White Mountain branded bean SD1533-15 with the slow-darkening trait. To identify initiatives for ICDC which will promote growth in the dry bean production and processing industry in Saskatchewan.

Demonstration/Project Plan

The primary needs in Saskatchewan's irrigated dry bean industry are to reduce production risk and to evaluate new varieties. The newest variety to become available, White Mountain line SD1533-15, is the first in a series of slow-darkening pinto beans, branded White Mountain by Walker Seeds. ICDC looked for co-operators who were growing this new variety side-by-side with an established variety of pinto bean to compare yield, quality, maturity, plant structure and disease susceptibility. No co-operators were found for this demonstration.

Project Methods and Observations

ICDC was involved in planning the KEG Agro / Walker Seeds White Mountain bean event on Aug. 8th at Outlook. The event included tours of White Mountain

producer fields and a tour of plots at CSIDC by Terry Hogg and Bert Vandenberg. CTV News covered the event.

Dry bean variety evaluation plots and agronomic plots were toured at Carman, Morden, Winkler and Portage La Prairie, Manitoba. The new bean processing plant at Carman, MB was also toured.

Generally, 2007 was a good bean year. The White Mountain variety had a lower yield level than varieties like Winchester and Othello. The price premium gained by the White Mountain brand will be established as the crop is marketed this winter. Producers who are growing beans next year will be looking at the relative yield and price of the White Mountain branded beans.

Final Discussion

The White Mountain dry bean program had a good year, with all of the production coming off the field in relatively good condition. ICDC will be following the progress of this variety and other new varieties for the 2008 crop year.

Activities for 2008 could include rating relative disease levels in CSIDC's regional dry bean trials to evaluate relative disease susceptibility. Disease levels are not currently evaluated on the bean trials. This data could be reported in the ICDC demonstration report.

4. Ultra Value Crops

a) Strawberry Crown Commercialization

Project Lead: Strawberry Crown Steering Committee
Sarah Sommerfeld, AAg.; Gerry Gross, PAg., SAF/ICDC;
John Linsley, PAg.; Dr. Jazeem Wahab; Greg Larson, CSIDC;
Dr. Karen Tanino, U of S;
James Lokken; Dr. Gary Storey, Consultants

Project Objective

Initiative for this project is based on previous agronomic and economic research through the University of Saskatchewan, AgriARM demonstration sites and the production, regulatory and market knowledge collected and documented by the operators of a commercial crown operation in 2000. The project's purpose is to assist in forming and advancing commercial strawberry crown production in Saskatchewan.

Project Plan

The intent of the project is to document the production and economic data and develop market contacts, in an attempt to successfully commercialize strawberry crown production. Crowns are planted in the spring, maintained throughout the growing season and are harvested in October. A fall planting of crowns is undertaken to document if the crowns are at an advantage over spring planted crowns. Harvested crowns are shipped to public researchers and commercial growers in Florida and California to be field tested in comparison to strawberry plants produced in Eastern Canada and California. All data collected and contacts established are intended to be shared as a tool to support interested growers in successfully undertaking this initiative.

Demonstration Site

The project site is located at CSIDC, which provides the staff and facility resources to manage and co-ordinate crown production and harvest.

Project Methods and Observations

Planting 2007

Two treatments were designed for the spring planting. An organic soil based fumigant, MOSS, was applied to half the planting area, and the remainder served as a control. Prior to planting, plant material and soil samples were submitted for

testing of pathogenic nematodes. Analysis showed no significant levels of pathogenic nematodes were present. Spring planting of two California varieties, Camarosa and Festival, and two Florida varieties, Carmine and Treasure, occurred on May 15th using CSIDC's Water-Wheel Planter. Plants were purchased from Canadian and American sources.

Plant care and maintenance throughout the season included covering runners with soil to promote root development, weeding, de-blossoming and frequent, light irrigation applications. On July 31st, plants sustained damage from pea-sized hail and harsh rain. The impact of the damage resulted in leaf injury, delayed plant development and decreased runner production.

The fall planting area was relocated to a site on CSIDC under the solar pivot that provided more shelter and efficient irrigation scheduling and application. Two varieties of plants, Camarosa and Carmine (1600 plants per variety), were planted August 1 on two treatments of soil, MOSS application and control. Plant material and soil samples were submitted for pathogenic nematode testing, and analysis indicated none to be present.

Field Inspection 2007

The steering committee in co-operation with representatives from SAF, CFIA and the U of S performed a field inspection in both spring and fall plantings on September 13th. No obvious signs of disease were detected in the spring plantings. Necrotic lesions observed on the runners and stems were accredited to hail damage. Poor growth, believed to be caused by cool growing conditions, was noted in the fall planting. The dead plants observed in the fall planting were due to a lack of new root growth.

An irrigation water sample was taken from the Broderick Reservoir and sent to Ever-Green Nematode Testing Labs in Redmond, Washington and Olaf Ribeiro, Ph.D, Certified Professional Plant Pathologist in Washington. Results indicated that no plant parasitic nematodes or disease pathogens were present in the water.

Harvest 2007

Three harvest dates of spring planted crowns occurred. All harvest operations were carried out by members of the steering committee and staff of SAF/ICDC and CSIDC. Over three dates, October 1st, 9th and 22nd, a total of 16 000 marketable crowns were harvested, trimmed, packaged and shipped to Florida commercial growers. Florida researcher Dr. Craig Chandler received 50 plants per variety per source, in an effort to document the productivity of the 2007 Saskatchewan grown crowns.

Final Discussion

The yield of marketable crowns for 2007 was less than expected due to the poor growing conditions and hail damage. Currently, no proponent has been identified to move forward as a commercial grower of strawberry crowns in Saskatchewan. Two poor production years, due to unfavourable weather conditions, lead to the question of whether the commercialization of strawberry crowns can be viable within Saskatchewan over the long term. This project is scheduled to continue through to 2008.

b) Fruit Production and Processing Initiative

Project Lead: Lana Shaw, PAg., Provincial Irrigation Agrologist

Co-operator: None

Project Objectives

To communicate the potential of irrigation in the strategic development of a processed fruit industry in Saskatchewan.

To forge a network with the various players in this development initiative in order to facilitate the development and encourage concentration of fruit production and processing in irrigation districts.

Demonstration/Project Plan

Throughout 2007, the project lead organized and participated in meetings to find ways that ICDC could assist in the development of a commercial fruit production and processing industry. The original project idea proposed in the application included working with the University of Saskatchewan's Agriculture and Bioresource Engineering's Dr. Meda to develop fruit processing techniques and capability in Saskatchewan. However, ICDC did not work directly with Dr. Meda to provide cherries or haskap for processing studies, as the supply of fruit was not available locally.

Project Details

Sour Cherry

The Canadian Cherry Producers and the Saskatchewan Fruit Growers held meetings in Outlook in the spring of 2007 to determine what contribution and collaboration might be possible with ICDC, CSIDC and SAF Irrigation Development Branch. The group discussed plans for use of CSIDC's facility and orchard at CSIDC.

Provincial irrigation agrologists Lana Shaw and Kelly Farden were invited to speak at a Canadian Cherry Producers Inc. (CCPI) producer workshop during the Bruno Cherry Festival on August 11th. Irrigation staff also participated in the Canadian Cherry Producers Inc. tour and member meeting held on Oct. 13th at CSIDC. The meeting included a discussion of R&D needs. Harvest timing, fruit handling, and processing information needs were important for the members, but the more common need among members was for pruning information of dwarf sour cherry varieties. CSIDC and ICDC were invited to participate in helping CCPI meet its R&D needs.

Haskap

Irrigation staff attended the Haskap Days held by the University of Saskatchewan and Haskap Canada. Haskap Days participants identified a need for agronomic demonstration capacity to address the many questions they had about cultural practices for haskap.

Outlook Fruit Tour

ICDC's Outlook Fruit Tour was a public event held on July 31st. It was attended by over 30 people. The tour was featured on the CTV evening Farm News on July 31st and on FarmGate the following Saturday.

The tour visited three locations around Outlook: CSIDC, King's Market Garden and the Agroforestry Demonstration.

The Orchard Tour at CSIDC included:

- Saskatoon berry rejuvenation at CSIDC – Barry Vestre, CSIDC field operations supervisor
- Sour Cherry – Bruce Hill, Secretary/Treasurer of CCPI
- Haskap (Blue Honeysuckle) – Larry White, Agrologist with the Saskatchewan Forest Centre

- Fruit harvester demonstration – Marty Elder, director of CCPI

Fruit Harvester Demonstration at CSIDC

The CSIDC portion of the tour included a presentation by Russ McPherson of MidSask Community Futures, which covered their relevant programs and services for developing post-harvest handling and processing. Joanne Huber of the Canadian Farm Business Advisory Services talked about the programs available to producers wishing to review their current operation and examine options for new ventures. Trickle irrigation equipment and pruning equipment were also displayed.

At J.W.D. Market Garden, Bill and Jean King gave the group a tour of their market garden and orchard. Bill is a retired irrigation specialist, so he was able to offer plenty of practical advice on irrigation solutions for orchards and on production of fruit crops, including saskatoons, sour cherries, apples, plums, and strawberries.

At the AgroForestry Demonstration, Larry White of the Saskatchewan Forest Centre gave the group a tour of the site established outside Outlook in 2007, including the irrigation system comparison.

Orchard Development

Elder's Cherry Orchard, Outlook

Claire and Marty Elder have a 17 acre sour cherry orchard north of Outlook. This orchard was planted in the spring of 2006 under a portion of the outside two spans of their quarter section pivot. Their orchard is the first within the South Saskatchewan River Irrigation District #1. They have also purchased a fruit harvester, which was demonstrated at the Fruit Tour in Outlook.

CSIDC Orchard, Outlook

CSIDC has renewed its orchard to reflect current momentum in the commercial fruit industry. As a result of the spring meetings, new plantings of U of S sour cherry and haskap have been established in the orchard at CSIDC in 2007. CSIDC has also pruned the original plantings of saskatoons and sour cherries to dimensions that will fit through Elder's fruit harvester. Mechanical harvest will be demonstrated at CSIDC in coming years as a way to reduce labour costs associated with fruit production.

Developing Industry for New Fruit Crops

Sour Cherry

Currently, processing is keeping up with the small amounts of cherry production available at this time. Orchards have been selling cherries before harvest or shortly after at around $3/lb. pitted and frozen. Several small processors are turning cherries and haskap into high-value food products, and these are moving into specialty retail outlets.

About three million pounds of cherries are anticipated to come into production in Saskatchewan around 2010. This is based on the number of cherry trees planted as of 2007 in Saskatchewan. Three million pounds of cherries would represent a 30% increase in Canadian production and a 1% increase in North American production (based on 2005 statistics). Primary processing (cooling, washing, pitting, freezing), secondary processing, and marketing of the products will soon become constraints for the industry. Capacity in these three areas will have to be increased substantially.

Due to the geographical spread of production across the province, Canadian Cherry Producers Inc. is working hard to develop the plan for regional primary processing plants.

The Saskatchewan Fruit Growers Association commissioned Meyers Norris Penny to conduct two sour cherry studies and to develop a plan to move the sour

cherry industry ahead. The studies concluded that Saskatchewan producers are going to have to differentiate their production from the existing commodity market in Canada, the U.S. and Europe based on the quality, colour, and higher sugar content of the U of S sour cherry varieties. They can also differentiate in the market based on the low levels of agrochemicals required to produce cherries on the prairies. Organic production is another potential high value niche.

Haskap

Initial reports about the demand for haskap in Japan indicated that buyers and processors of haskap could handle large volumes of Canadian production and receive a very attractive price. A group from Haskap Canada and Parkland Agro-Forestry went to Japan to investigate the haskap market and to determine what opportunities there might be for prairie fruit producers. The report, prepared by Eric Lefol, determined that the Japanese market has some significant obstacles and that total production of their crop is smaller than first thought. The present market access for Canadian fruit is now considered to be smaller than originally reported.

Development of this crop will be slower than originally envisioned, with processing and market development acting as a constraint to production. Little or no haskap fruit is available at present, since most of the acreage was planted in 2007. A small number of food processors are developing products based on haskap. Both domestic and international market development will be required for this crop to reach a commercial scale.

Final Discussion

The challenge to the cherry and haskap industries is to increase processing and marketing capacity in concert with the rapid increase in supply foreseen within the next five years. If this capacity is not developed, there is little to prevent surplus production, causing a substantial drop in expected producer receipts.

By opening discussions with the producer organizations driving the industry, ICDC has made inroads in the fruit industry. The producer groups and Saskatchewan's fruit breeder Bob Bors have identified a role for ICDC and CSIDC in helping to fill the knowledge gap in production and cultural practices. Irrigation staff will be developing a plan for delivering research or demonstration projects on such topics as pruning, irrigation and fertility, with essential involvement from the producer groups (Saskatchewan Fruit Growers Association, Canadian Cherry Producers Inc. and Haskap Canada) as industry co-operators, as well as the new SAF Fruit Development Specialist Forrest Scharf.

5. Water Management

a) Irrigation Scheduling with the AIMM (Alberta Irrigation Management Model) Program

Project Lead: Garth Weiterman, PAg., Senior Provincial Irrigation Agrologist

Co-Investigators: AEU and ICDC staff

Co-operator(s): Weiterman Farms Ltd.
Terry Hogg, PAg., CSIDC Regional Variety Plots

Project Objective

To field check a decision support system based on climate data and compare its findings and recommendations with more commonly accepted methods of irrigation scheduling.

Demonstration/Project Plan

Irrigated crops were monitored for moisture use utilizing tensiometers, Watermark sensors, gypsum blocks, rainfall and irrigation rain gauges, gravimetric soil moisture, and in field moisture determination by the feel method. These methods were compared with model findings to check the applicability and ease of use of the computerized output. This demonstration is done in conjunction with the Regional Variety trial work conducted by CSIDC. In past years, one on-station and two off-station sites have been monitored. Data collected and experience gained will be used to re-write and update irrigation scheduling information extended from the branch.

Demonstration Sites

SE, SW, NW 16-31-07-W3M & SE 8-31-07-W3M - The co-operator's field adjacent to the regional trials is instrumented and data collected is compared to model predictions. This year's sites were four pivot-irrigated off-station locations within the SSRID #1.

Project Methods and Observations

Data Collection – consisted of installation of tensiometers, Watermark sensors, gypsum blocks and rain gauges coupled with weekly readings of the sensors and gravimetric moisture determination, as well as approximating moisture content by the feel method. Daily weather data updates were downloaded to the model and

its measurement of consumptive use and predictions for irrigation requirements compared with the collected field data.

Irrigation – ultimate irrigation decisions were left to the co-operator, but recommendations were made based on review and interpretation of the collected data and expected crop water use.

Technology Transfer – The results of this ongoing work will be used to assist with the revision of extension materials related to irrigation scheduling. These updated publications will be available on the SAF website and at www.irrigationsaskatchewan.com

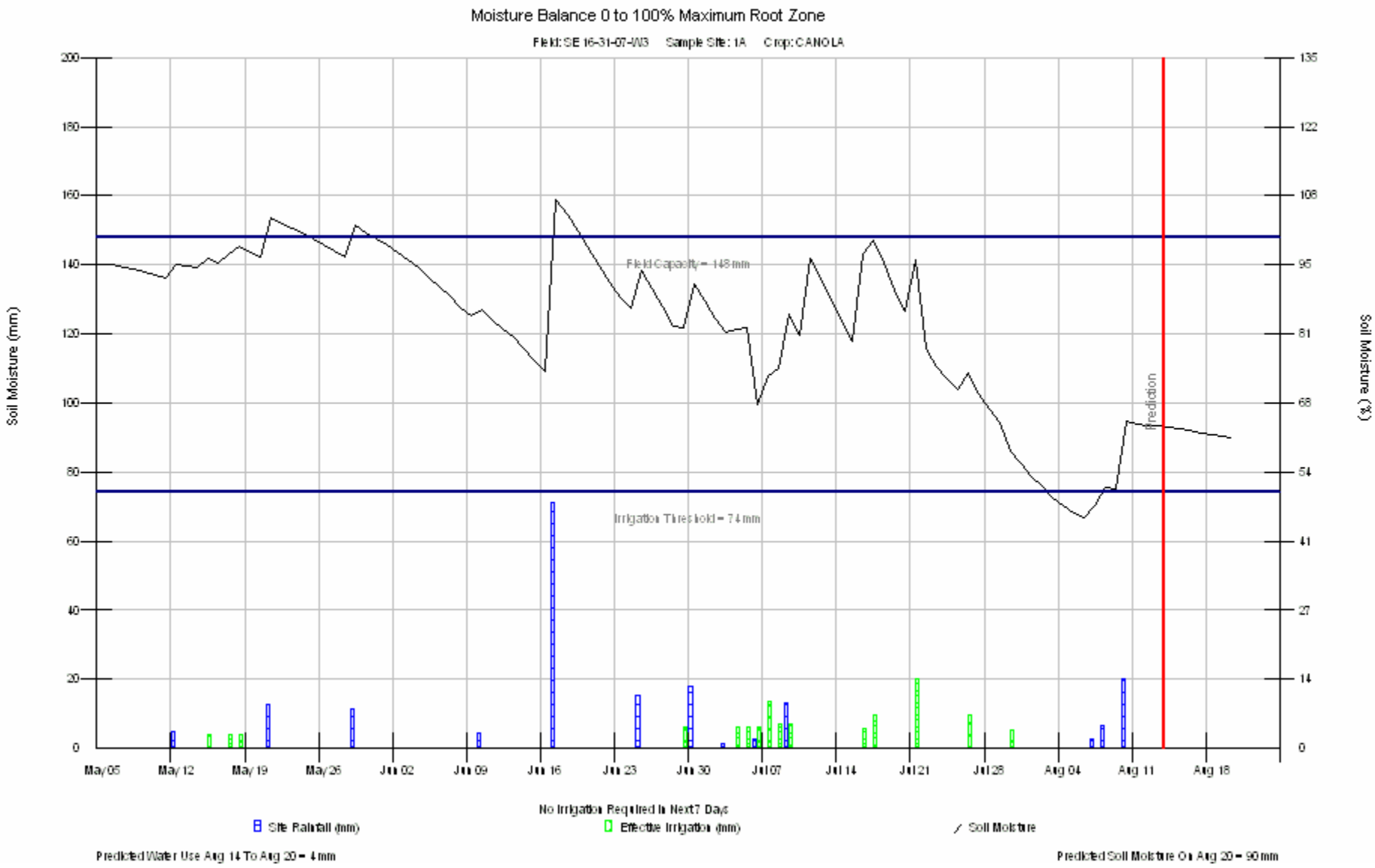
Project Constraints – A major problem is the need to work in a reasonable proximity to a weather station that collects the parameters required to run the model. The parameters that are required by AIMM are: Year, Month, Day, Temperature Max Degrees C, Temperature Min Degrees C, Wind run at 2 m in Km/day, Precip in mm, RH (Relative Humidity) Max %, RH Min %, Solar Radiation in kJ/day. The weather file must be a comma delimited (csv) file in Excel and have the headings and data arranged as shown above. The majority of stations do not collect all of these parameters. Unfortunately, attempts to expand the network of weather stations within the province have as yet been unsuccessful.

Final Discussion

ICDC continued working with Alberta Agriculture's Irrigation Division staff to field check a decision support system based on climate data. This system, known as Irrigation Management Climate Information Network (IMCIN), utilizes the nearest meteorological station data to assist with irrigation scheduling. The meteorologic (met) data is used in the Alberta Irrigation Management Model (AIMM), and, with input by the producer, helps determine appropriate times for irrigating. The model requires input on seeding date and beginning soil moisture content. It then tracks moisture use based on the met data. The moisture use curve can be corrected to measured values throughout the season if desired. AIMM will also predict moisture use (to the right of the red line on the attached graph) for an upcoming period based on the historic record for the selected met site. This allows a producer to forecast an irrigation requirement.

Moisture use within the root zone is modelled based on commonly agreed rooting zone depths. One of the most useful graphical presentations of the data is to look at the entire root zone, which is expressed in both a volume and percentage basis. Irrigation and rainfall to keep the use curve above the allowable depletion line for the crop should allow for maximum yield. All weather or irrigation information can also be depicted in tabular form. This is useful when looking at the details of moisture use.

The 2007 growing year could be summarized as starting with a cool early season, followed with an extremely hot and humid July (+2.6 degree C average mean temperature), followed by a cool August (-2.1 degree C). This caused early maturation of most crops. The canola example shown below was swathed August 10th, roughly two weeks ahead of normal. Total accumulated evapotranspiration (ET) was 326 mm. Growing season rainfall was 190 mm and gross irrigation amounted to 151 mm. Growing season maximum ET of 8 mm occurred July 19th. July had 12 days with an ET of 6 mm or greater and, on five of these days, ET was 7 mm or greater.


Moisture Balance 0 to 100% Maximum Root Zone
Field: SE 16-31-07-W3 Sample Site: 1A Crop: CANOLA
Soil Moisture (mm)
Soil Moisture (%)
Field Capacity = 148 mm
Irrigation Threshold = 74 mm
Prediction
200
180
160
140
120
100
80
60
40
20
0
135
122
108
95
81
68
54
41
27
14
0
May 05
May 12
May 19
May 26
Jun 02
Jun 09
Jun 16
Jun 23
Jun 30
Jul 07
Jul 14
Jul 21
Jul 28
Aug 04
Aug 11
Aug 18
No Irrigation Required In Next 7 Days
Site Rainfall (mm)
Effective Irrigation (mm)
Soil Moisture
Predicted Water Use Aug 14 To Aug 20 = 4 mm
Predicted Soil Moisture On Aug 20 = 90 mm

The graph of seasonal water use shows that the site was kept above 50% field capacity until August 3rd. The soils at the site are coarse textured, but irrigation was able to keep the field well watered for the entire season.

The regional variety trial yields at this site were some of the highest ever obtained in such a test. Peas yielded from 80 to 117 bushels per acre, and canola from 50 to 85 bushels per acre. The surrounding canola field yield was very disappointing. It was sown 10 days earlier than the trial area. The delay in flowering due to this seeding date difference did not allow the heat of July to take such a toll on the trial yields. Agronomic work conducted previously has shown advantages to earlier seeding, which in this instance did not occur.

ICDC will continue to collaborate with our counterparts in Alberta, and is actively working to see more Saskatchewan stations added for 2008. This would allow producers in other parts of the province to use the program, and would assist them with their irrigation decisions. For more information about this tool, visit the IMCIN website at www.agric.gov.ab/app49/imcin/index.jsp.

6. Other Activities

a) South West Irrigation Development Area Crop Survey and R&D Needs Assessment

Project Lead: Korvin Olfert, PAg., Provincial Irrigation Agrologist

Project Objectives

To determine the crops currently grown on the South West irrigation districts in the South West Irrigation Development Area and to determine current and future R&D needs in order to direct and develop ICDC's program for the area.

Demonstration/Project Plan

In order to identify opportunities and develop more profitable and sustainable irrigation based crop and livestock products it is necessary to first determine the current state of the industry. This project will greatly enhance ICDC's ability to address the needs of the South West region once the information has been collected and the final report written.

Project Details

The project plan is to visit and contact irrigators, district representatives and PFRA, to document the crops grown in 2007 and discuss future R& D needs for the districts.

Cooperation from District representatives and PFRA will be necessary in order to successfully complete this project and we expect their participation to be forthcoming once the project is underway.

Final Discussion

The final result will be a document that describes the districts and projects in the South West Development area, quantifies the crops grown, identifies constraints and opportunities and documents activities that should be undertaken by ICDC to realize the potential of the irrigated lands in South West Saskatchewan.

Completion Date

Proposed to be completed by March 31, 2008

7. Technology Transfer

a) SAF/ICDC Agrologist Technology Transfer Events 2007

Field Days

- 4-H Regional Forage Judging Competition – Korvin Olfert, PAg. – June 28th
- Baildon Irrigation Crop Tour – Lana Shaw, PAg. – July 5th
- ICDC Waldeck Alfalfa Demonstration Field Day – Korvin Olfert, PAg. & Jessica Williams, AAg. – July 4th
- CSIDC Field Day Tour Leaders – Gerry Gross, PAg.; Garth Weiterman, PAg.; Sarah Sommerfeld, AAg. – July 12th
- Outlook Fruit Tour – Lana Shaw, PAg. – July 31st
- ICDC Irrigated Pasture Project Irrigated Forage Tour – Sarah Sommerfeld, AAg. – August 7th
- Ethanol Wheat Field Walk – Lana Shaw, PAg. – August 13th

Presentations

- "Irrigation Corn and Grazing" – Korvin Olfert, PAg. – Beef Symposium, Saskatoon – February 7-8th
- "Annual Forage Varieties – Greenfeed vs. Silage Production" – Korvin Olfert, PAg. - SPARC Forage and Grazing Research Tour – June 26th
- "Trickle Irrigation" – Treasure Valley Market Field Day – Korvin Olfert, PAg. – Cadillac – July 4th

- "Soil and Water Compatibility Study for Irrigation Development" – Kelly Farden, AAg. - Bruno Cherry Festival, Bruno, SK – August 11th

- "Irrigation Development" – Lana Shaw, PAg. – Bruno Cherry Festival – August 11th

- ICDC/SIPA Annual Conference – Moose Jaw – December 3-4th

Booth Display

- Crop Production Week – Saskatoon – January 8-11th

- CSIDC Field Day – Outlook - July 12th

- ICDC/SIPA Annual Meeting – Moose Jaw – December 3-4th

Publication Contributions

- "Irrigation Certification" – Kelly Farden, AAg. and Garth Weiterman, PAg. - Agriview

- "Irrigation Crop Varieties" – Gerry Gross, PAg. - Agriview

- "Finding the Value – Driven by Water" – Lana Shaw, PAg. - Agriview

- "Fruit Tour to Discuss New Markets and Techniques" – Lana Shaw, PAg. – Farm and Food Report

- "Saskatchewan Fruit – Just Add Water" – Lana Shaw, PAg. – Agriview

b) SAF Agrologist Activities

Fusarium Head Blight Survey

Lana Shaw, PAg.
Korvin Olfert, PAg.
Jessica Williams, AAg.
Saskatchewan Agriculture and Food (SAF) provincial specialists co-ordinate the annual Fusarium and Cereal Leaf Disease surveys. ICDC/SAF Irrigation agrologists collect random samples from cereal and corn crops across south and central Saskatchewan. The samples are submitted to the Crop Protection Laboratory in Regina where each sample is rated for Fusarium Head Blight (FHB) symptoms.

Saskatchewan Advisory Council on Forage Crops

Korvin Olfert, PAg.
Jessica Williams, AAg.
The Saskatchewan Advisory Council on Forage Crops provides members with an opportunity to profile new research projects or initiatives within the forage sector.

Council members evaluate new varieties prior to registration and vote to either support or not support the registration application to CFIA. The Council also provides recommendations to the Canadian Forum on Forages and Rangeland, where industry, stakeholders and researchers put forward new ideas for further discussion.

Saskatchewan Advisory Council on Grain Crops

Sarah Sommerfeld, AAg.
Lana Shaw, PAg.
Regional crop variety testing occurs throughout different agro-climatic regions of Saskatchewan to collect performance data for various grain crops. The collected data is reviewed by the members of the Saskatchewan Advisory Council on Grain Crops (SACGC) and compiled into the SAF "Varieties of Grain Crops" publication. This publication provides producers with the ability to evaluate new grain crop varieties.

Soil Fertility Committee

Garth Weiterman, PAg.
Kelly Farden, AAg.
Participation on the Soil Fertility Committee was initiated to represent the fertility issues that irrigation farmers experience in comparison to a dry land system. Members of this committee have documented and monitored the micronutrient levels of irrigated soils to establish a benchmark and determine the residual effects of irrigation on soil micronutrient levels. There has also been a focus on monitoring soil fertility levels at effluent irrigation locations.

CSIDC Publications Committee

Sarah Sommerfeld, AAg.
Lana Shaw, PAg.
Garth Weiterman, PAg.
Korvin Olfert, PAg.
Agrologists participate in the review and update of CSIDC publications, as related to each person's specific areas of specialty.

Irrigation Scheduling Publications

Garth Weiterman, PAg.
Sarah Sommerfeld, AAg.
Previous irrigation scheduling fact sheets are being reviewed by SAF Irrigation Agrologists to provide irrigation farmers with current information and data with respect to crop water use efficiency and soil water monitoring equipment and techniques.

ICDC Website

Lana Shaw, PAg.
The ICDC/SIPA website (www.irrigationsaskatchewan.com) came into operation in the fall of 2005. The ICDC portion of the site hosts articles, publications and reports prepared by SAF/ICDC Irrigation Agrologists.

SAF Website

Sarah Sommerfeld, AAg.
The Irrigation Development Branch of SAF has initiated the process of raising the profile and accessibility of irrigation information on the Agriculture and Food website (http://www.agriculture.gov.sk.ca/).

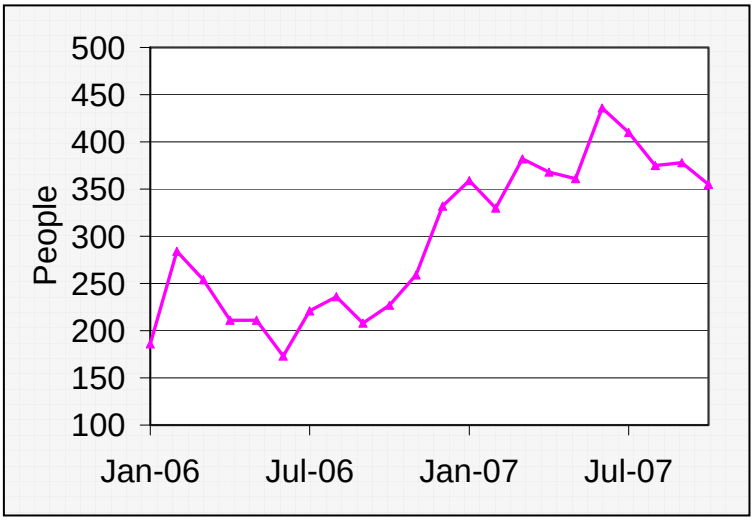
Irrigation Water Quality and Food Safety Study

Agro-Environmental Unit
The principal investigator of this study, funded by the Agriculture Development Fund (ADF), is Terry Hogg, CSIDC Agronomist. The Agro-Environmental Unit assists with a portion of the water sampling within the Lake Diefenbaker Development Area.

c) Website Report

Website Usage
The redesigned joint ICDC/ SIPA website was launched in fall 2005. Over the last two years, the average number of monthly visitors to the site has increased from 230 visitors in 2006 to 375 visitors in 2007.

Figure 1. Unique website visitors recorded each month in 2006 and 2007.



Website Additions

The "Feature Articles" module on the home page has been used to highlight new publications, events and articles throughout 2006 and 2007. The 15 articles posted to the home page in 2007 were read an average of 260 times. In 2006, 36 articles were posted to the home page and were read 55 times on average. Many of these articles are still available and being viewed in 2007. As of November 2007, 36 articles were available for viewing on a variety of topics, and have been read an average of 225 times.

The interactive Corn Heat Unit map was updated in 2007 to include 2006 data. The 2007 data will be added this winter.

New ICDC publications have been posted to the website as they are completed. The 2006 ICDC Annual Report was broken into four sections and made available on the website. The 2007 Irrigation Economics and Agronomics publication was also

published on the website. Other irrigation publications, articles and fact sheets will be posted on the website as they are prepared. Several are planned for this winter.

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