Irrigation Crop Diversification Corporation

www.irrigationsaskatchewan.com

ICDC Program
Final Report
2008

ICDC – Delivering "value for money R&D" to Saskatchewan irrigators

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 2008:

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	’10 (2)
Larry Lee	Alt. Vice Chair	Macrorie ID	SIPA rep.	app.
Kevin Plummer	Director	Moon Lake ID	NDA	’09 (2)
Paul Heglund	Director	Vidora ID	SWDA	’10 (2)
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.
Rob Oldhaver	Director	Miry Creek ID	SWDA	’08 (1)
John Babcock	Director		SA rep.	app.
Abdul Jalil	Director		SA 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 (SA) 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) Bio-Fuel Grains

i) Ethanol Wheat Demonstration

Project Lead: Lana Shaw, PAg, Provincial Irrigation Agrologist

Co-Investigators: Korvin Olfert PAg, Provincial Irrigation Agrologist
Nicole Beatty, Co-op Student

Co-operators:

- **Ron Mathies**
- **Bayer CropScience**

Project Objectives

The purpose of the project was to demonstrate the field-scale potential of high yielding wheat under high-management irrigation conditions to irrigation farmers.

Demonstration / Project Plan

The Mathies demonstration site served as an evaluation of the efficacy of Folicur fungicide in reducing the severity of Fusarium head blight (FHB) on an irrigated soft white spring wheat crop, in concert with two other evaluation sites. Co-operator Ron Mathies established a field of AC Andrew wheat, utilizing appropriate fertilizer and pesticide. Korvin Olfert and Nicole Beatty provided weekly irrigation scheduling assistance and crop monitoring throughout the growing season. Lana Shaw assisted the co-operator with the timing of application of the Folicur product and laying out a Folicur efficacy demonstration. Bayer Crop Science donated 40 acres of Folicur to the project. Korvin, Nicole and Lana worked with the co-operator to obtain the harvest yield measurement. Yield was determined separately for the two check strips and was compared to an adjacent area of Folicur treated wheat.

Demonstration Site

The demonstration site was located on the Herbert Irrigation District on a quarter section wiper pivot of 125 acres.

Table 1. Demonstration site characteristics

Land Location	SW-22-17-10-W3
Soil Type	Loam to Clay Loam
Previous Crop	Peas
Irrigation System	125 acre low pressure wiper pivot with drop tubes

Project Methods and Observations

Crop Management

AC Andrew wheat was seeded on May 4 following a glyphosate burn-off. Conditions in May following seeding were cool and dry, which slowed emergence and reduced stand establishment. Gophers were also present in many areas of the field, and their damage reduced the stand. Post-emergent herbicides were applied (Table 2) and some areas were spot-sprayed with a later application of Horizon. There were still patches of wild oats present in the crop.

Table 2. Agronomic management of Mathies demonstration site

Nutrients	N	P	K
Soil Residual	80 lb./acre	41 lb./acre	>1180 lb./acre
Applied	65 lb./acre	25 lb./acre	0 lb./acre
Variety	AC Andrew Soft White Spring Wheat		
Seeding	May 4 at 115 lb./acre, 2 inches deep		
Herbicide	Pre-seeding glyphosate (0.5 L/acre) Horizon, Target		
Fungicide	Folicur applied July 14		
Available Moisture			
Irrigation & Rain	409 mm (16.1 inches)		
Harvest	Swathed Sept. 5; Combined on Sept. 16		

Irrigation

Soil moisture was monitored throughout the irrigation season using gypsum blocks. Irrigation and rainfall were collected with a rain gauge. Weekly irrigation scheduling recommendations were made to the co-operator.

Fungicide Evaluation

Fungicide was applied to the whole field with the exception of two check strips left in separate areas of the field. The amount of head and leaf disease pressure in this field was quite low through the summer. Head and leaf samples were

compared for evidence of disease damage and no difference was apparent between the treatments.

Harvest

At two locations in the field, side-by-side treated and untreated areas were harvested and yield was determined on September 16. There was not a consistent advantage at this site to using Folicur, but when the strips were averaged, the net gain in yield was 7.6 bushels (Table 3).

Table 3. Harvest results for Folicur evaluation

Folicur	Treated	Untreated
Yield	74.9 bu./acre	67.3 bu./acre
Grade	2 SWS	2 SWS
FDK	None	None
Fusarium infected seeds	1.5	5

Samples were graded at a No. 2 SWS (Table 3) with the main downgrading factors being mildew. Fusarium damaged kernels (FDK) was not a grading factor. The percentage of wheat seeds infected with Fusarium was determined by Discovery Seed Labs by plating out seeds. The results from seed testing at this site showed a decrease in the amount of total viable fusarium on the harvested seed with Folicur treatment (Table 3).

Final Discussion

Yield from this site was lower than anticipated due to poor conditions during emergence, gopher damage and wild oat control problems. Rain in late August caused sprouting and mildew, which reduced quality.

With a yield difference of 7.6 bushels and a price for soft wheat of $4.50, the application of Folicur resulted in a benefit of $34/acre. With a Folicur product cost of $11/acre and an application cost of $4/acre, the net advantage to the application was $19/acre. Effectively, a dollar spent on fungicide in this demonstration returned $1.30 in crop yield. Because of the variable response to the fungicide application at this site, confidence in this response is lower than at the other two fungicide evaluation locations conducted this year. The effect of the Folicur application on this site is likely due to a suppression of a variety of fungal pathogens and opportunistic fungi, rather than a strong effect in reducing FHB damage.

ii) Ethanol Wheat Demonstration

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-Investigator: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Co-operators:

- **Kevin Plummer**
- **Bayer CropScience**

Project Objectives

The purpose of the project was to demonstrate the field-scale potential of high yielding wheat under high management irrigation conditions to irrigation farmers.

Demonstration / Project Plan

The Plummer demonstration site served as an evaluation of the efficacy of Folicur fungicide in reducing severity of Fusarium head blight (FHB) on an irrigated Canada Prairie Spring (CPS) wheat crop, in concert with two other evaluation sites. Bayer CropScience donated 40 acres of Folicur to this demonstration. Yield was determined separately for the two check strips and was compared to an adjacent area of Folicur-treated wheat.

Demonstration Site

Kevin Plummer's site was located in the Moon Lake Irrigation District. It is a clay loam to clay soil with a shallow water table and incomplete drainage. The irrigation system is a 102 acre low-pressure centre pivot with drop tubes and a capacity of 9.8 gallons per minute per acre.

Table 1. Demonstration site characteristics

Land Location	SW-23-35-06-W3
Soil Type	Clay to Clay Loam, Non-saline
Previous Crop	Peas

Project Methods and Observations

Crop Management

Canada Prairie Spring wheat AC Crystal was seeded on May 22 following a pre-seeding glyphosate burn-off. Fertilizer was applied at seeding with a double shoot system. The soil was very slow to warm in the spring, so that even though seeding was done later in May, germination was slow and crop development was retarded by the low soil temperatures.

Table 2. Agronomic management at Plummer demonstration site

Nutrients	N	P	K
Soil Residual	54 lb./acre	28 lb./acre	>1080 lb./acre
Applied	100 lb./acre	50 lb./acre	
Variety	AC Crystal CPS Red Wheat		
Seeding	May 22 at 120 lb./acre, 2 inches deep		
Herbicide	0.3 L/acre Glyphosate		
	Puma Super, Refine Extra, MCPA		
Fungicide / Insecticide	Folicur, Lorsban		
Available Moisture			
Irrigation	165 mm (6.5 inches)		
Irrigation, Rain, Soil	365 mm (14.5 inches)		

Herbicides were applied at the five-leaf stage (Table 2). Weed control was not complete in this field in spite of herbicide applications. Late flushes of buckwheat and cleavers were present in the crop, as well as a late flush of wild oats.

Irrigation

Irrigation scheduling equipment was installed in the demonstration, including Watermark™ sensors and rain gauges. These were monitored throughout the season to assist with irrigation scheduling. This soil exceeded field capacity at seeding through most of the root zone because of a late thawing at depth and water table at around four feet depth. Irrigation has to be managed to prevent a contribution to the high water table. Spring soil moisture contributed an estimated 75 mm to the total available moisture for this crop (Table 2). Rainfall contributed 125 mm through the season.

Fungicide Evaluation

Folicur fungicide was applied on July 29 at flowering, which is the appropriate timing for control of FHB. It also generally has some effect on leaf disease when applied at this time. Bayer had requested that two check strips be left in the field in separate areas for evaluation of efficacy of the fungicide as disease development was very late and minimal. FHB pressure was low in this field.

Harvest

Harvest yield measurement was completed on Oct. 3 (Table 3). Yield difference between treated and untreated areas was measured in two different areas of the field. Both showed a yield response to the application of Folicur. The average of the two untreated and treated harvested yields are shown in Table 3. The wheat was downgraded to feed due to frost damage. The percentage of wheat seeds infected with Fusarium was determined by Discovery Seed Labs by plating out seeds.

Table 3. Averaged yield from Folicur treated and untreated strips.

Folicur Application	Treated	Untreated
Yield	71 bu./acre	63 bu./acre
Grade	Feed	Feed
FDK	None	None
Fusarium infected seeds	2%	2%

Final Discussion

This demonstration showed a positive yield and economic response to the application of Folicur. With a yield difference of 7.6 bushels and assuming a price for CPS wheat of $5.50, the application of Folicur resulted in a benefit of $42/acre. With a Folicur product cost of $11/acre and an application cost of $4/acre, the net advantage to the application was $27/acre. Effectively, a dollar spent on fungicide in this demonstration returned $2.80 in crop yield.

b) Wheat Fungicide Demonstration

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-operators:

- **Roy King**
- **Bayer CropScience**

Project Objective

The purpose of the project was to demonstrate the field-scale potential of high yielding wheat under high-management irrigation conditions to irrigation farmers.

Demonstration/Project Plan

The King demonstration site served as an evaluation of the efficacy of Folicur fungicide in an irrigated durum wheat crop to control Fusarium head blight (FHB) and leaf diseases. The durum demonstration mirrored the ethanol wheat demonstrations in having a comparison of two untreated check areas with adjacent Folicur treated areas. Bayer CropScience donated 40 acres of Folicur to the project. Yield was determined separately for the two check strips and was compared to an adjacent area of Folicur-treated durum wheat.

Demonstration Site

The demonstration site was located on the Luck Lake Irrigation District on a small 60-acre pivot. This field has been in irrigated for many years and has been managed with minimum tillage for several years.

Table 1. Demonstration site characteristics

Land Location	SE-26-24-08-W3
Soil Type	Clay Loam, Haverhill / Sceptre Soil Association
Previous Crop	Canola
Irrigation System	Low Pressure Centre Pivot

Project Methods and Observations

Crop Management

Strongfield durum was seeded on May 15 following a pre-seeding application of glyphosate. Establishment was very good. Weed control was very effective. The crop had some hail damage on June 26, but it was not noticeable later in the season.

Table 2. Agronomic management of King demonstration site

Nutrients	N	P	K
Soil Residual	62 lb./acre	58 lb./acre	>1020 lb./acre
Applied	125 lb./acre	28 lb./acre	
Variety	Strongfield Durum		
Seeding	May 15 at 120 lb./acre, 2 inches deep		
Herbicide	0.75 L/acre glyphosate Dyvel and Horizon		
Fungicide / Insecticide	Folicur and Lorsban – July 16th		
Available Moisture			
Irrigation	200 mm (8 inches)		
Irrigation and Rain	330 mm (13 inches)		
Harvest	Sept. 20 straight cut		

Irrigation

The co-operator maintained very good moisture conditions for the crop through emergence, tillering, flowering and early grain development stages. Irrigation was ended in the first week of August because further attempts to irrigate were causing the crop to lodge. Since there was some FHB developing in the field, the early shut-down of irrigation also would help protect the crop from spreading the disease. The soil reserve was drawn down through August and early September.

Fungicide Evaluation

The site was sprayed as planned with Folicur on July 16. Irrigation was managed to minimize irrigation frequency during the flowering period but without lowering soil moisture reserves excessively. In early August, there was an obvious difference in the amount of leaf disease between the treated and untreated areas (Figure 1). There was also a recorded difference in the percentage of heads showing head infection symptoms typical of FHB: Treated – 10 per cent; Untreated 27 per cent.

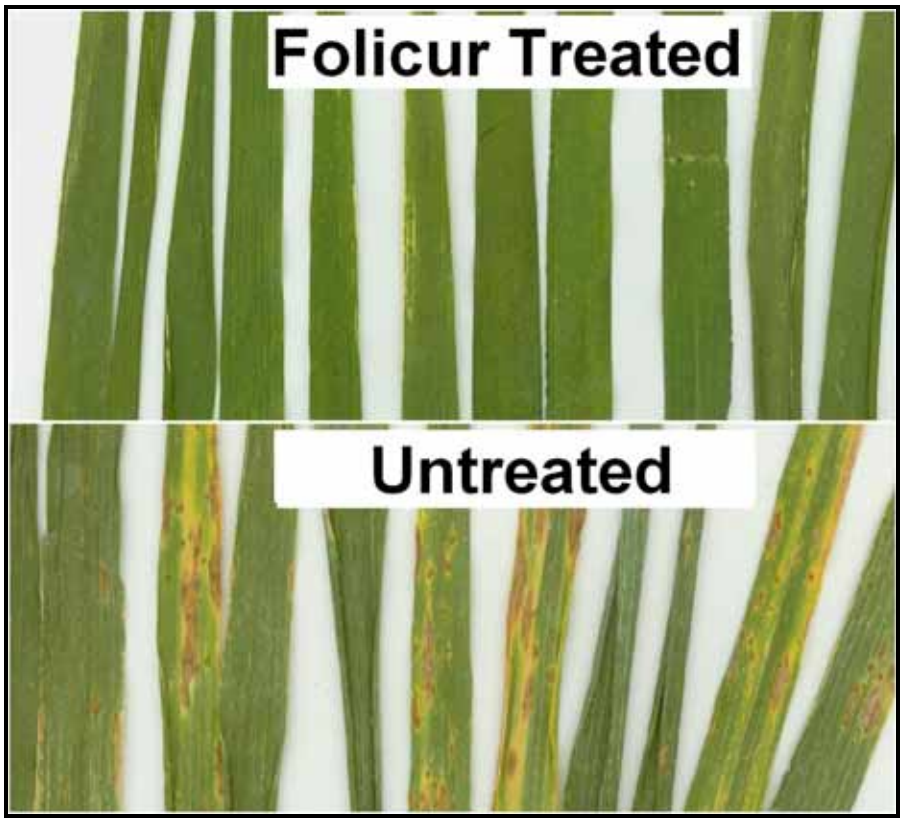


Figure 1. Treated and untreated flag leaves collected August 11 from King durum fungicide demonstration.

Harvest

At two locations in the field, side-by-side treated and untreated areas were harvested and yield was determined on Sept 20. Both areas in the field had a yield improvement at this demonstration from the Folicur application. The main factor causing downgrading was Fusarium damaged kernels (FDK). The percentage of wheat seeds infected with Fusarium was determined by Discovery Seed Labs by plating out seeds.

Table 3. Harvest results for Folicur evaluation

Fungicide	Folicur Treated	Untreated Check
Yield	95 bu./acre	86 bu./acre
Grade	#2 Durum	#3 Durum
FDK	0.4%	1.3%
Fusarium infected seeds	16.5%	11.0%

Final Discussion
This 95 bushel durum crop was the best crop in terms of combined yield and quality that this co-operator has grown in many years of irrigating cereal crops. Assuming a price for durum of $8/bushel and with a 9 bushel yield advantage, that is a value of $72/acre. The Folicur fungicide costs about $11/acre and including a $4/acre application cost, the total cost would have been $15/acre. The net advantage to the application was $58/acre. Effectively, a dollar spent on fungicide in this demonstration returned over $4.80 in crop yield.

Summary of Ethanol Wheat Demonstrations and Durum Wheat Fungicide Demonstration
The Folicur evaluation was done on three sites with three different types of wheat. The yield response in these fields of irrigated wheat was sufficiently consistent to give some confidence that we are seeing a real effect of the fungicide with these demonstrations.

Table 1. Summary of yield from three irrigated wheat demonstration sites

Fungicide	Average Yield
Untreated	72 bu./acre
Treated	80 bu./acre

When Folicur is applied at flowering stage in wheat, the primary intent is to manage FHB and also Septoria glume blotch, another head disease. There is usually an added benefit, though, of reducing leaf disease severity as well. When control of leaf diseases like Tan Spot, Septoria Leaf Blotch, and Rust is the primary concern, an application between flag emergence and flowering will usually be more effective.

When determining whether or not to apply fungicide, a producer should keep in mind the economics of the application. Treatment will be most effectual in a crop with strong establishment and high yield potential. Since Fusarium establishes locally in irrigation districts, it is worthwhile knowing whether there have been past outbreaks of FHB in your district. If it has been a problem in the past, the likely effectiveness of the application increases. Irrigators should determine the cost effectiveness based on a yield response of six to eight bushels per acre and a cost of $15. Wheat prices over $5 per bushel will likely result in a return on investment of 2:1 or more.

c) Crop Varieties for Irrigation - CSIDC

Principal Investigators: Terry Hogg PAg and Don David

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

Co-Investigators:

Gerry Gross PAg, Senior Provincial Irrigation Agrologist
Korvin Olfert PAg, Provincial Irrigation Agrologist
Lana Shaw PAg, Provincial Irrigation Agrologist
Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

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 2008 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). 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; 1.2 m x 6 m; 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 2008 variety trials were established within recommended seeding date guidelines for the selected crops (Table 2). Climatic conditions in 2008 were slightly cooler in May and June and slightly warmer in July, August and September than the long term average. Precipitation was less than the long term average for all months except August. May was particularly dry resulting in poor emergence for some of the canola and flax trials. However, timely irrigation applications rectified the poor emergence problem. The dry and warm conditions later in September allowed for excellent harvest conditions. Accumulated heat units were higher than the long term average due to the extended growing conditions in the fall with the first killing frost of -2^0 C occurring on October 10 . As a result most of the warm season crops (ie. dry bean, soybean, corn, sunflower) reached physiological maturity, the exception being one high heat unit soybean variety. As well, a storm with a small amount of hail went through the Outlook area on August 21, 2008. A small amount of damage occurred to the trials at the CSIDC off station site. There was a small amount of shattering in the cereal and canola trials while the dry bean trials showed some leaf damage.

Overall, yields were generally good for the 2008 trials. Yields for the cereal and canola trials were excellent with highest yields obtained at the CSIDC site. The pea and flax yields varied among the sites probably affected by site management. The Pederson site had excellent pea yields, the CSIDC pea trial was lost due to poor emergence and growth and the CSIDC off station pea trial had a small amount of shattering loss due to the hail storm that passed through the area on August 21. The warm season crops (ie. dry bean, corn, soybean, sunflower) had average to above average yields.

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 2009 Crop Production Show. As well, the variety guide will be mailed to all irrigators early in 2009.

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	SE20-28-07-W3	Elstow loam
Weiterman	NW16-31-07-W3	Bradwell very fine sandy loam

Table 2. 2008 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 14/08 May 9/08 May 13/08 May 13/08
2. SVPG CWRS Wheat Regional	Dr. R. Depauw, AAFC B. Recksiedler, SA	CSIDC - main	May 14/08
3. SVPG High Yield Wheat Regional	Dr. R. Depauw, AAFC B. Recksiedler, SA	CSIDC - main	May 14/08
4. SVPG CWAD Wheat Regional	Dr. R. Depauw, AAFC B. Recksiedler, SA	CSIDC – main CSIDC – off station	May 14/08 May 14/08
5. Soft White Spring Wheat Coop	Dr. H. Randhawa, AAFC	CSIDC – main	May 14/08
6. Soft White Spring Wheat Regional	Dr. H. Randhawa, AAFC	CSIDC - main	May 14/08
7. Cereal Ethanol Feedstock	Dr. C. Pozniak, CDC	CSIDC – main	May 14/08
8. SVPG Barley Regional (2-row & 6-row)	Dr. B. Rossnagel, CDC B. Recksiedler, SA	CSIDC - main	May 14/08
9. Annual Cereal Forage (Barley, Triticale & Oats)	ICDC	CSIDC - main	May 14/08
10. ACC Hybrid Grain & Silage Corn Performance Trials	B. Beres, AAFC	CSIDC - main	May 15/08
II. Oilseeds			
1. Irrigated Canola Regional	ICDC	CSIDC – main CSIDC – off station Pederson Weiterman	May 9/08 May 9/08 May 13/08 May 13/08
2. Canola Coop	R. Gadoua, CCC	CSIDC - main	May 12/08
3. Prairie Canola Variety Trial	R. Gadoua, CCC	CSIDC - main	May 12/08
4. Irrigated Flax Regional	Dr. G. Rowland, CDC B. Recksiedler, SA ICDC	CSIDC – main CSIDC – off station Pederson Weiterman	May 9/08 May 9/08 May 13/08 May 13/08
5. Soybean Variety Adaptation	B. Brolley, MAFRI ICDC	CSIDC – main	May 14/08
6. Oilseed Sunflower Coop	C. Powlowski, AAFC	CSIDC – main	May 15/08

Table 2. continued			
Trial	**Collaborators**	**Location**	**Seeding Date**
III. Pulses			
1. Irrigated Bean Variety Trial - Wide Row (Alberta)	Dr. P. Balasubramanian, AAFC ICDC	CSIDC – main CSIDC – off station	May 27/08 May 27/08
2. Dry Bean Wide Row Co-op	Dr. P. Balasubramanian, AAFC	CSIDC – main	May 27/08
3. Dry Bean Narrow Row Regional (Saskatchewan)	Dr. A. Vandenberg, CDC ICDC	CSIDC – main CSIDC – off station	May 27/08 May 27/08
4. Irrigated Bean Variety Trial – Narrow Row (Alberta)	Dr. P. Balasubramanian, AAFC ICDC	CSIDC – main CSIDC – off station	May 27/08 May 27/08
5. Dry Bean Narrow Row Co-op A&B	Dr. A. Vandenberg, CDC	CSIDC – off station	May 27/08
6. Irrigated Pea Regional	Dr. T. Warkentin, CDC ICDC	CSIDC – main CSIDC – off station Pederson Weiterman	May 9/08 May 9/08 May 13/08 May 13/08
7. Pea Coop A&B	Dr. D. Bing, AAFC Dr. T. Warkentin, CDC	CSIDC – off station	May 9/08
8. Faba Bean Co-op	Dr. A. Vandenberg, CDC	CSIDC – main	May 9/08

CSIDC = Canada-Saskatchewan Irrigation Diversification Centre; ICDC = Irrigation Crop Diversification Corporation; SA = Saskatchewan Agriculture; 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 Demonstration

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Co-Investigator: Charlotte Ward AAg, Regional Forage Development Specialist

Co-operator:

- **Neil Haaland, Hanley, SK**

Project Objective

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

Demonstration Plan

NW 14-30-5 W3
The soils on this site are a loam to clay loam. Soil samples from the established pasture and the alfalfa stubble were taken on April 28th and sent to ALS Laboratories in Saskatoon for fertility analysis. Table 1 illustrates these results.

Table 1. Established pasture spring soil residual nutrients at the 0-30 cm (0-12 inch) depth

Nutrient	Residual lb./acre
NO_3-N	25
P	21
K	728
SO_4-S	32

Table 2. Alfalfa stubble spring soil residual nutrient at the 0-30 cm (0-12 inch) depth

Nutrient	Residual lb./acre
NO_3-N	32
P	15
K	768
SO_4-S	27

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

Project Methods and Observations

Grazing Management

The established pasture, of approximately 90 acres, and a seven acre dry land Crested wheatgrass corner was divided into six grazing paddocks. Grazing of cow/calf pairs and yearling heifers began on June 13th. Animals were rotated through each paddock and were removed from the pasture for 11 to 12 days in July and September to allow for adequate grazing recovery and re-growth. A total of 98 grazing days were achieved on the irrigated pasture. Table 3 summarizes the paddock rotations, animal units grazed and days grazing.

Table 3. Grazing data from June 13th to October 10th

Date	Field	Animal Units	Days	Acres
Jun-13	W Crested Wheatgrass	128	2	17
Jun-15	E Crested Wheatgrass	128	3	10
Jun-18	W Meadow Brome 1	128	5	18
Jun-23	W Meadow Brome 2	128	3	7
Jun-26	NE Meadow Brome	128	5	10
Jul-01	E Meadow Brome	128	5	35
Jul-06	Off		11	
Jul-17	W Crested Wheatgrass	43.5	6	17
Jul-23	E Crested Wheatgrass	43.5	9	10
Aug-01	W Meadow Brome 1&2	43.5	19	25
Aug-19	NE Meadow Brome	43.5	7	10
Aug-26	E Meadow Brome	43.5	10	35
Sep-05	Off		12	
Sep-17	NE Meadow Brome	132	10	10
Sep-26	E Meadow Brome	128	7	35
Oct-03	Crested Wheatgrass & Meadow Brome	128	7	52
Oct-10	Off			

Final Discussion

Poor pasture establishment and reduced grass productivity severely limited the ability of the grazing system to attain adequate numbers of yearling cattle or support sufficient gains. As such, grazing fees were charged on a cost per day basis. Resulting from this, the co-operator did not generate sufficient revenue to cover grazing operation production costs.

b) Corn Irrigation Scheduling Demonstration

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-Investigator: Nicole Beatty, Co-op Student

Co-operator:

- **Philip Tschetter, Estuary Hutterian Brethern**

Project Objective

To monitor soil water conditions and compare to predictions from the Alberta Irrigation Management (AIM) Model to actual water consumption.

Demonstration/Project Plan

Each field had tensiometers (30 cm, 60 cm, and 90 cm depths) and gypsum blocks (30 cm, 60 cm, and 90 cm depths) installed as well as a rain gauge to measure actual water applied. A weekly visit was conducted to read the equipment and collect soil for gravimetric analysis (30 cm, 60 cm, and 90 cm depths).

Demonstration Site

There were three sites with three different varieties all located near the Estuary Hutterite Colony. These sites were all under pivots with drop tubes right off the South Saskatchewan River with no water timing restrictions.

Murano Elite HTE CHU 2550 RR (2008)
NW1-23-28-W3, 40 acres, Silty Clay
Seeding Date: May 12
Seeding Rate: 34,000 seeds/acre
Fertilizer added: 140 lb. N, 50 lb. P, Manure
Herbicide Treatment: Glyphosate burn off, two applications in crop
Silaged: Sept 26
Yield: Left to Graze

DKC 27-44 CHU 2200 Monsanto (2007)
NE1-23-28-W3, 75 acres, Silty Clay over Silty Clay Loam
Seeding Date: May 12
Seeding Rate: 34,000 seeds/acre
Fertilizer added: 140 lb. N, 50 lb. P, Manure
Herbicide Treatment: Glyphosate burn off, two applications in crop
Silaged: Sept. 26
Yield: 19.7 tons/acre 65 per cent moisture

38B11 Pioneer CHU 2650 RR (2007)
NE1-23-28-W3, 75 acres, Silty Clay over Sandy Loam
Seeding Date: May 13
Seeding Rate: 34,000 seeds/acre
Fertilizer added: 140 lb. N, 50 lb. P, Manure
Herbicide Treatment: Glyphosate burn off, & two applications in crop
Silaged: Sept. 27
Yield: 20.6 tons/acre 65 per cent moisture

Project Methods and Observations

Data Collection

Just before the crop was taken for silage, cob samples were taken. Two different methods of estimating grain yields were evaluated. The first method is starting with a good cob and taking ten cobs in a row, measuring the distance from the first to the last, drying, shelling them, and measuring the grain weight. The second method was measuring 17' 5" (on a 30" row spacing that works out to 1/1000th of an acre) and taking every other cob, drying, shelling them and measuring the grain weight. On average the second method estimated 90 per cent of the first method. The results in Table 1 are an average of the two methods.

Table 1. Variety Comparison

	Average Kernels/cob	Cob Core Diameter (cm)	Est. Grain Yield (bu./acre)	Silage Yield (tons/acre)
DKC 27-44 (2200)	508.0	2.4	147.2	19.7
Murano (2550)	456.0	2.5	82.5	Left to Graze
38B11 (2650)	390.5	2.4	76.5	20.6

The weather station at Leader recorded 2,220 CHU received from May 15 to Sept. 26. This allowed the DKC 27-44 to mature, but not the Murano or the 38B11. Their average CHUs are about 2,327 and can expect 2,116 nine years out of ten. This year was cooler than average at this location, but didn't break any records.

Figure 1. Crop water use curve – DKC 27-44

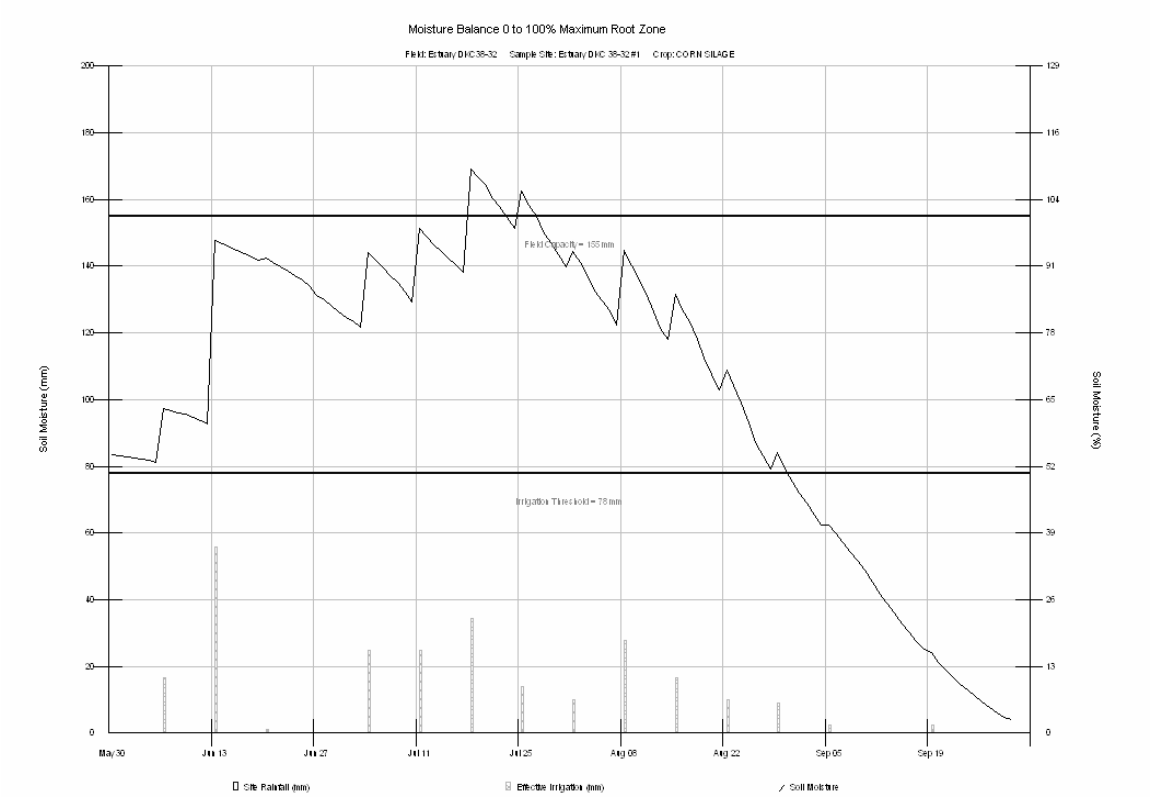


Figure 2. Crop water use Curve – Murano

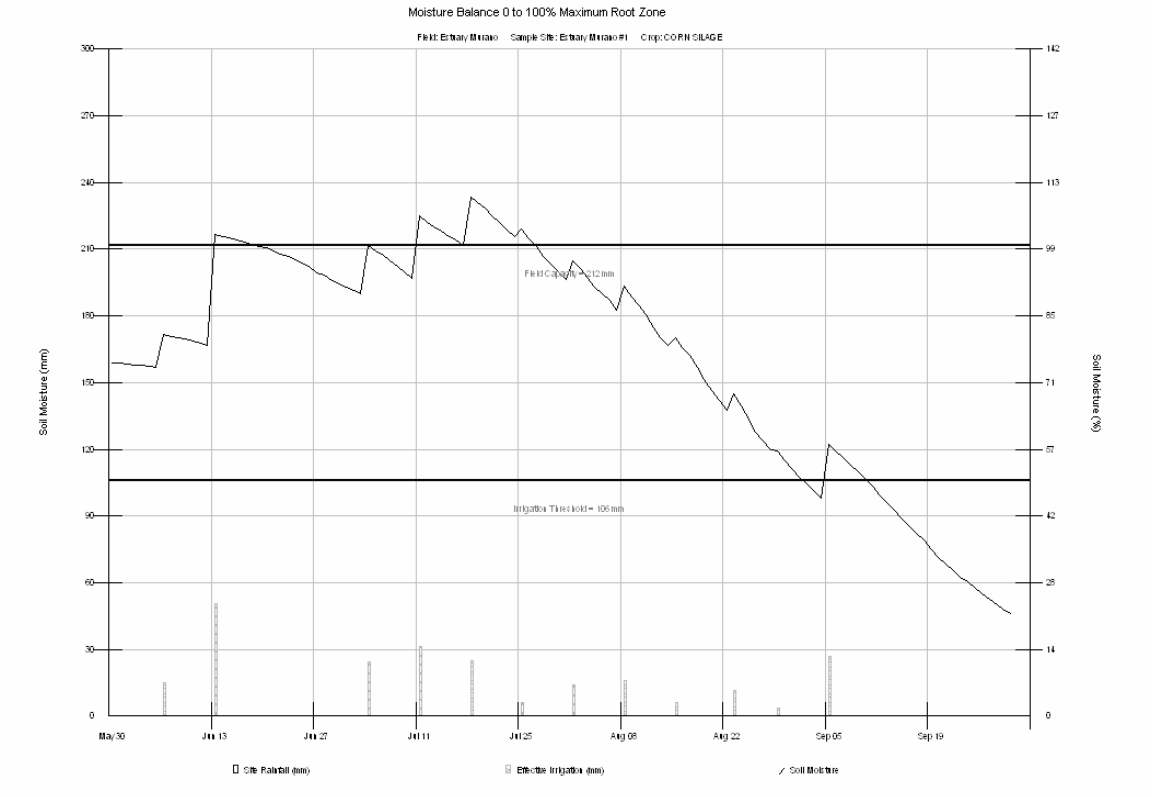


Figure 3. Crop water use Curve – 38B11

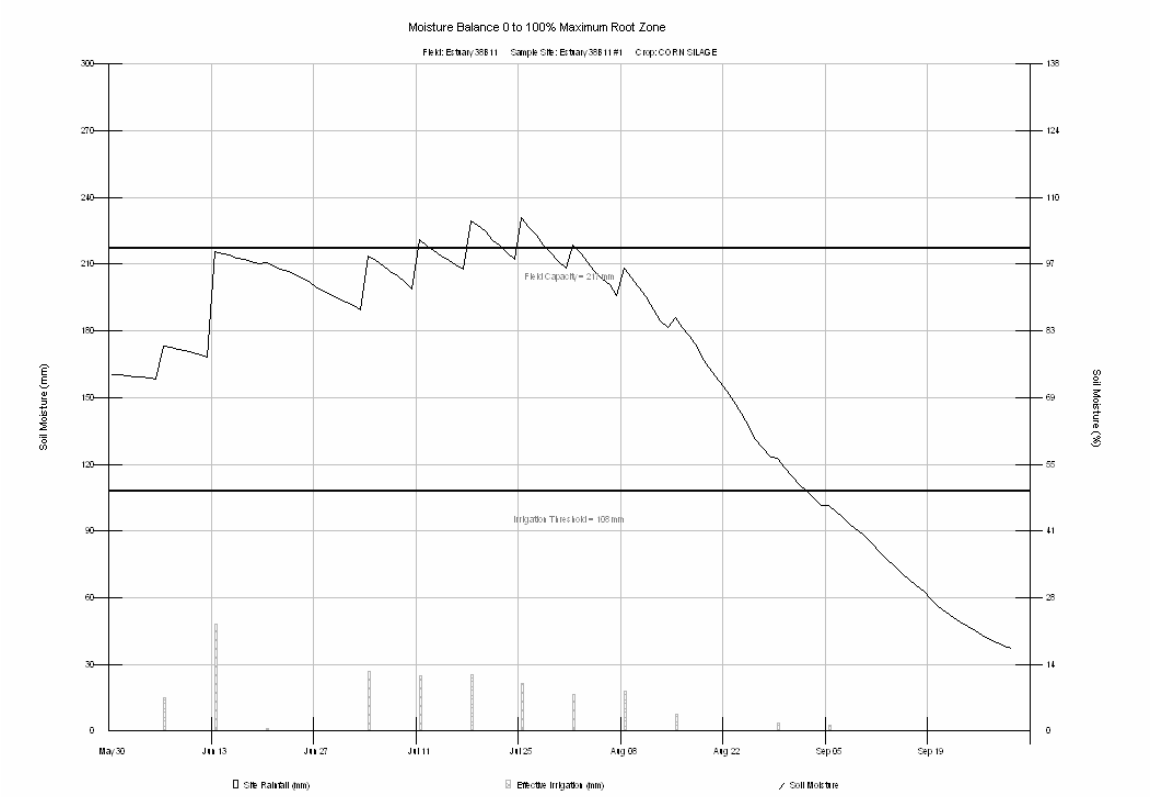


Table 2. Comparison of the water use between varieties

	Initial Soil Moisture (mm)	Total Moisture applied (mm)*	Final Soil Moisture (mm)	Total Crop Use (mm)	Modeled Crop Use (mm)
DKC 27-44	90	302	64	328	330
Murano	239	257	241	255	345
38B11	165	241	178	288	335

* This includes rainfall and applied effective irrigation.

Alberta Agriculture suggests that corn uses about 510 mm of moisture seasonally. The University of Montana table values for corn seasonal use vary from 197 mm if it stays between 10-15 C and up to 546 mm if it's between 32-37 C. The AIM model modeled between 330 and 345 mm using weather data from Medicine Hat. Taking into account the initial and final soil moistures and the amount added, these fields used between 255 and 328 mm of water. In this case, the pivots were turned off to aid the drydown of the corn for silage. They were probably turned off too soon and could have benefited from some later season moisture.

Final Discussion

The AIM model was not all that useful in predicting when to irrigate. It would be better if there were closer meteorological stations to download the data from. In this case, the closest weather station was Medicine Hat (about 150 km away). It is certainly useful in producing a graphical representation of the water use of a crop.

There were some differences in the water use between the three varieties. They fell within the range of the traditional recommendations although at the lower end which is consistent with a cooler year. The lower heat unit one (DKC 27-44) used more water which makes sense since it was closer to maturity and had used close to its seasonal water use when the water was turned off. The other two could have probably benefited from more water.

c) Osler Irrigated Forage Research Trial

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-Investigator: Nicole Beatty, Co-op Student

Co-operator:

- **Peter Fehr, Fairhaven Farms**

Project Objective

The purpose of this project was to demonstrate and obtain statistically valid yield information of the different alfalfa varieties and grass species available for irrigators under an intensive three-cut, dairy quality system. Some quality information was also obtained. 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.

Project Plan

This project was located in a dairy producer's field near Osler. It is a small plot trial with 14 varieties of alfalfa and 14 grass species replicated in four blocks in a randomized complete block design. It was harvested three times each year for five years.

Demonstration Site

This trial was located straight east of Osler at Fairhaven Farms (NW13-39-4-W3). The site is irrigated by a pivot with drop nozzles and accesses its water supply straight from the South Saskatchewan River. There are no timing restrictions on the water delivery. 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 previous fall. Soil samples were taken October 11, 2007 and sent to ALS Labs in Saskatoon for analysis. The recommendations that were sent back for the alfalfa were to add 5-15 lb./acre of N, up to 30 lb./acre of K_20 and 10-15 lb./acre of S. The grass recommendations were for 120-160 lb./acre of N, up to 30 lb./acre of P_2O_5, and up to 30 lb./acre of K_20 S.

Project Methods and Observations

Data Collection

This site was seeded in the spring of 2003, 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), three times

during 2007 (June 20, July 16, August 28) and three times during 2008 (June 24, July 30, September 29)

The weight of the each entire 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 of the entire plot. Height and maturity data were 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.

Technology Transfer

An Irrigated Forages Day was held June 25, 2008 together with Pioneer Hi-Bred. It was poorly attended due to the lateness of first cut. It included a tour of these plots as well as Pioneer Hi-Bred's corn demonstration plot nearby.

Alfalfa Results

Table 1. Alfalfa 2008 Yield Data (tons/acre 15% Moisture)

	Cut 1	Cut 2	Cut 3	Total	% of Beaver	
Stockwell	3.48	1.67	0.30	5.45	107%	a*
AC Longview	3.25	1.79	0.23	5.27	103%	ab
Beaver	3.35	1.59	0.15	5.10	100%	ab
Gala	3.05	1.70	0.30	5.05	99%	ab
Hornet	2.81	1.86	0.30	4.97	97%	ab
54V54	3.07	1.57	0.26	4.90	96%	ab
AC Grazeland	3.05	1.57	0.20	4.82	95%	ab
Geneva	2.62	1.75	0.38	4.76	93%	ab
PS8925MF	2.73	1.55	0.33	4.62	91%	ab
53Q60	2.73	1.64	0.22	4.59	90%	b
AC Nordica	3.03	1.45	0.10	4.57	90%	b
AmeriStand	2.88	1.47	0.16	4.51	88%	b
PS2065MF	2.41	1.71	0.33	4.46	87%	b
CV	18.12	12.18	33.32	12.28		
LSD	0.76	0.28	0.12	0.84		

***** *Values followed by the same letter are not significantly different.*

Table 2. Alfalfa Five Year Yield Summary (tons/acre 15% Moisture)

Variety	2004	2005	2006	2007	2008	% of Beaver	
AC Longview	5.33	3.93	5.58	5.22	5.28	106%	a*
54V54	5.34	4.01	5.56	5.23	4.90	105%	ab
AC Nordica	5.74	4.57	5.75	4.16	4.58	104%	ab
PS8925MF	5.46	3.59	5.90	5.13	4.62	104%	ab
Stockwell	5.14	3.68	5.55	4.51	5.45	102%	ab
Ameristand	5.38	3.67	5.72	5.02	4.51	102%	ab
Gala	5.13	3.96	5.49	4.62	5.05	102%	ab
Geneva	5.58	3.55	5.30	5.04	4.76	102%	ab
Hornet	5.27	3.89	5.50	4.45	4.97	101%	ab
AC Grazeland	4.90	3.90	5.49	4.70	4.82	100%	ab
Beaver	4.48	4.12	5.82	4.29	5.10	100%	ab
PS2065MF	5.29	3.97	5.32	4.72	4.46	100%	b
53Q60	5.21	3.54	5.73	4.63	4.59	100%	b
CV	8.30	6.20	N/S	10.57	12.28	5.38	
LSD	0.60	0.30	N/S	0.71	0.84	1.55	

**Values followed by the same letter are not significantly different.*

Table 3. Plant Counts after 5 years with three cuts each year

Variety	Plant Count**	
AC Nordica	18.75	a*
Beaver	18.25	ab
Gala	18.00	ab
AC Grazeland	16.75	abc
AC Longview	16.50	abc
AmeriStand	14.75	bcd
54V54	14.75	bcd
Geneva	14.00	cd
Hornet	14.00	cd
Stockwell	14.00	cd
PS2065MF	13.50	cd
PS8925MF	12.75	d
53Q60	12.75	d
CV	16.69	
LSD	1.83	

** Values followed by the same letter are not significantly different.*
**This is the number of plants in a 20 foot length on a 12 inch row spacing.*

Alfalfa Variety Descriptions

Beaver, an old variety that has been used as a standard for many years, was included in the trial as a check. Beaver is quite winter-hardy, although winterkill was noticed in some of the plots. Still, it had the third highest number of plants remaining at the end of the trial.

AC Longview was the top yielder. AC Longview and **Hornet** are two former FarmPure Seeds varieties. The FarmPure Seeds varieties were purchased by Pickseed. AC Longview comes from Lethbridge, AB, while Hornet was bred in

Wisconsin. In the United States, Hornet is sold as Magnum V. Hornet is supposed to have slightly slower regrowth and AC Longview is very winter-hardy. Of the two, AC Longview yielded higher, but not significantly over five years.

54V54 and **53Q60** are two of the Pioneer Hi-Bred varieties. 54V54 has 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. Of the two 54V54 yielded higher, but not significantly over five years. 54V54 and 53Q60 are no longer being sold by Pioneer Hi-Bred. The replacement varieties are 54V45 and 53Q30 respectively.

AC Nordica came in third place overall, down from first place in the first couple years. It has done very well in the past and this is the second year it dropped out of first place. It typically has a very large first cut and smaller second and third cuts compared to other varieties. It has a branched tap root, and is very winter-hardy. It had the most plants remaining at the end of the trial. AC Nordica was a Viterra variety and is now a Proven Seed variety along with **Geneva** and **Gala**. Geneva and Gala are both multi-foliate tap rooted varieties. Both do quite well. Gala is supposed to be a bit more winter-hardy, with a fall dormancy rating of two compared to Geneva's rating of four. This showed up in the plant counts at the end of the trial with Gala having significantly more plants remaining. 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. Of the three fall dormancy two varieties, AC Nordica did the best, but not significantly.

PS8925MF and **PS2065MF** are two Pickseed (PS) multi-foliate (MF) varieties. Both are quickly regrowing varieties. PS8925MF has a slightly higher fall dormancy rating (3.7 vs. three), so over time winterkill could be expected to lower the yield potential. **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.

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.

Grass Results

Table 3. Grass 2008 Yield Data (tons/acre 15% Moisture)

	Cut 1	Cut 2	Total	% of Bravo	
AC Parkland crested wheat grass	5.27	1.58	6.86	114%	a**
AC Goliath crested wheat grass	4.71	1.78	6.49	108%	ab
Garrison creeping foxtail	4.46	1.92	6.38	106%	ab
Bravo smooth brome	4.22	1.79	6.01	100%	ab
AC Knowles hybrid brome	4.65	1.24	5.89	98%	abcd
Joliette timothy	4.44	1.14	5.58	93%	abcd
Paddock meadow brome	4.02	1.56	5.58	93%	abcd
Chief intermediate wheat grass	3.97	0.94	4.92	82%	abcd
Arctic orchard grass	2.46	1.77	4.23	70%	bcd
Aurora timothy	2.31	1.16	3.47	58%	cde
Kay orchard grass	1.40	1.21	2.62	44%	def
Revenue slender wheat grass	0.02	1.03	1.05	17%	efg
Courtney tall fescue	0.08	0.40	0.48	8%	fg
Authur dahurian wild rye	0.01	0.00	0.01	0%	g
CV	47.46*	47.21*	40.17*		
LSD	1.65	0.84	2.11		

** These are separate grass species and perhaps should not be lumped together for the statistics as there are very different growth habits among them. Also after five years some of the aggressive species have partially invaded some the less invasive species.*

*** Values followed by the same letter are not significantly different.*

Table 4. Grass Five Year Yield Summary (tons/acre 15% Moisture)

Variety	2004	2005	2006	2007	2008	% of Bravo	
AC Parkland CWG	6.48	4.74	6.95	4.17	6.86	108%	a**
Paddock MB	6.03	5.64	7.12	4.65	5.58	107%	a
AC Goliath CWG	8.01	5.42	6.41	2.48	6.49	106%	a
AC Knowles HB	7.22	4.83	6.02	3.42	5.90	101%	ab
Bravo SB	5.83	4.86	6.36	4.01	6.01	100%	ab
Garrison Cfox	5.33	4.69	6.87	3.76	6.38	100%	ab
Chief IntWG	6.39	4.84	5.88	3.83	4.92	96%	ab
Joliette Timothy	4.97	4.30	4.50	3.61	5.58	85%	bc
Arctic Orchard G	3.65	4.56	4.94	3.10	4.23	76%	cd
Aurora Timothy	4.57	4.38	4.64	2.10	3.47	71%	cde
Revenue SlWG	7.21	3.88	4.19	1.26	1.05	65%	de
Kay Orchard G	0.72	3.92	4.78	3.52	2.62	57%	e
Authur Dah WR	5.78	3.58	3.92	1.54	0.01	55%	ef
Courtney Tfes	0.64	2.88	4.75	2.25	0.48	41%	f
CV	23.59	14.54*	12.30*	29.70*	40.17*	13.85*	
LSD	1.80	0.90	2.67	1.32	2.11	9.77	

**These are separate grass species and perhaps should not be lumped together for the statistics as there are very different growth habits among them. Also after*

five years some of the aggressive species have partially invaded some the less invasive species and the CV has increased.
*** Values followed by the same letter are not significantly different.*

Grass Variety Descriptions

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.

AC Parkland crested wheat grass is the diploid crested wheat grass in this trial. Crested wheat grass is known for its early growth in the spring and very long life span. It also responds nicely to both water and fertility and over the five years in this intensive system, it holds the top yielding spot. It is very drought tolerant, but not very tolerant of standing water. Generally the quality is fairly good early, but drops off considerably once the plant has matured. This variety of crested wheat grass was bred to have lower fibre levels and is more palatable over the whole year. Certified seed is now available. **AC Goliath crested wheat grass** is the tetraploid crested wheat grass and has a larger head and seed than AC Parkland.

Paddock meadow brome was the second highest yielding grass over the five years. Meadow brome grass has predominantly basal growth with the leaves growing close to the ground. **Bravo 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. In this case the haldrup that was used to harvest these plots was able to get very close to the ground and harvest the basal leaves. On the five year total, AC Knowles yielded less than the meadow brome and more than the smooth brome, but not significantly.

Garrison creeping foxtail has excellent flood tolerance. It is also 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. It is one of the grasses responsible for a high coefficient of variation in these plots.

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

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**.

Orchard grass is a highly palatable bunchgrass with excellent re-growth and mid-season production. Generally, the orchard grasses have marginal winter-hardiness. **Arctic orchard grass** 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.

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. The yield has dropped off in the last couple of years.

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 also has finished its life span and the yield has been low the last couple years.

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 contain endophytic fungi which can cause animal health problems. There are also palatability issues with its coarse texture and feel.

Final Discussion

Among the alfalfa varieties there is not a whole lot of difference between the top yielding varieties in an aggressive three-cut dairy quality system. In order, the highest yielding variety was AC Longview (Pickseed), then 54V54 (Pioneer Hi-Bred, the current replacement is 54V45), then AC Nordica (Proven Seed/Viterra), then PS8925MF (Pickseed) and Stockwell (Seed-Link). These five varieties represent the best varieties of these seed companies and are not statistically

different. So variety decisions could be based more on availability and seed price. There may also be situations which require more specific traits like lower bloat potential for grazing (AC Grazeland) or high traffic areas (Ameristand).

Among the grass species, the crested wheat grasses and the brome grasses yielded the highest in this fertile aggressive harvesting system. This is not that surprising as the majority of the grass mixes in hay fields in Saskatchewan include these two species. Garrison creeping foxtail is aggressively creeping and will creep into any of these species in this type of environment.

There is also some quality information available for each of these alfalfa and grass varieties.

There is a need for continued variety evaluation under intensively irrigated systems like this one as new varieties are developed. The dairy industry requires the very high quality alfalfa that comes from three cuts. Most of the current alfalfa variety information comes from dryland single-cut systems.

d) Waldeck Forage Demonstration Site

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-Investigator: Nicole Beatty, Co-op Student

Co-operators:

- **Producer – Lane Wilms**
- **Industry – Vern Turchyrn, Proven Seed**
- **Kevin Dunse, Pickseed**
- **Peter Novak, Brett Young Seeds**

Project Objective

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

Demonstration/Project Plan

To collect yield and forage quality data from a forage demonstration of ten 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+Z, and Spredor 4 are Proven Seed Varieties. HybriForce-400 and Magnum 3801+Z are Brett Young varieties. Starbuck is a Pickseed variety and AC Longview is a FarmPure variety. The plots were 12.2 m wide (40', 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, sprayed out and broken up. This site is irrigated by flood irrigation. The Waldeck Irrigation Project received two full irrigations (May 17 and August 1) in 2008.

Project Methods and Observations

Quarter meter swards were taken on July 3 to measure maturity and height. First cut was delayed due to rain and taken on July 18. Bales were counted, weighed, and samples were taken for quality analysis on July 29. A second cut was taken on October 6. Bales were counted, weighed and samples were taken for quality analysis on October 16.

Table 1. Quarter Meter Swards from First Cut

	MSC*	Height (cm)	Est. Yield (tons/acre)
Convoy	3.2	64	3.7
Equinox	2.5	63	2.9
Geneva	2.4	67	3.2
HybriForce-400	2.6	61	3.2
Gala	3.2	67	3.2
Magnum 3801 Wet	2.7	72	3.1
Starbuck	2.6	67	3.4
AC Longview	3.0	67	4.3
Ameristand 201+Z	2.7	65	3.6
Spredor 4	3.1	70	3.6

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

Table 2. Quality results from First Cut

	% CP	% NDF	% ADF	RFV
Convoy	16.8	49.3	37.9	112
Equinox	17.8	45.6	36.8	123
Geneva	17.2	47.5	36.1	119
HybriForce-400	17.2	47.9	34.1	121
Gala	17.7	45.5	33.8	128
Magnum 3801 Wet	17.4	45.9	36.3	123
Starbuck	17.1	49.0	36.8	114
AC Longview	17.7	49.2	37.8	112
Ameristand 201+Z	16.7	50.0	38.5	110
Spredor 4	18.1	45.9	35.3	124

Table 3. Quality results from Second Cut

	% CP	% NDF	% ADF	RFV
Convoy	21.9	38.8	27.9	161
Equinox	22.2	40.3	29	153
Geneva	21.9	42.4	29.5	145
HybriForce-400	21.4	41.6	27.8	150
Gala	22.8	37.8	24.7	172
Magnum 3801 Wet	22.0	39.4	26.4	161
Starbuck	22.1	40.2	27.0	157
AC Longview	21.7	42.2	30.8	143
Ameristand 201+Z	22.2	40.6	27.4	155
Spredor 4	21.4	42.6	29.9	143

Table 4. Yield Results (tons/acre)

	1st Cut	2nd Cut	Total
Convoy	1.93	1.76	3.69
Magnum 3801 Wet	1.85	1.43	3.28
Equinox	2.03	1.16	3.18
Geneva	1.85	1.31	3.17
Ameristand 201+Z	1.84	1.20	3.03
Spredor 4	1.79	1.16	2.95
Starbuck	1.77	1.14	2.91
Gala	1.82	0.96	2.78
AC Longview	1.73	1.01	2.74
HybriForce-400	1.01	0.92	1.94

Variety Descriptions

Convoy and **Equinox** are two new Proven Seed (Viterra) varieties. At the time of seeding this plot both varieties were being evaluated for future potential and the decision was made to bring Equinox forward but not Convoy. Of all the plots Proven Seed established across the province, this is the only one in which Convoy beat Equinox, which happened again this year. Part of the reason could be in that Convoy has a larger second cut, but a bit smaller first cut than Equinox. Both of these are a step up from the older Geneva and Gala.

Magnum 3801 Wet and **HybriForce-400** are both Brett-Young varieties. The Magnum 3801-Wet is targeted at a dairy market with a higher quality. It did have a high quality, but also the second highest yield in this demo. Magnum 3801 Wet has what is called a branched tap root and is supposed to tolerate flooding better than a straight tap root, hence the 'Wet'. The HybriFoce-400 is marketed as the first alfalfa hybrid. It yielded the lowest in this demo.

Geneva and **Gala** are also two Proven Seed varieties that have been around for a while. Usually Geneva beats Gala for yield, but Gala beats Geneva for quality, both which happened again here.

Ameristand 201+Z and **Spredor 4** are two more Proven Seed varieties. Both have some unique characteristics. The Ameristand 201+Z has a sunken crown that tolerates trampling and heavy traffic better than other varieties. Spredor 4 is the only creeping rooted variety in this demo and definitely one of the highest yielding creeping roots. Both of these could be considered for pastures.

AC Longview was a FarmPure variety, although with the sale of FarmPure to Pickseed, it now joins **Starbuck** as a Pickseed variety. AC Longview has been around for a few years and has done well in the past, while Starbuck is newer. AC Longview also has a branched tap root similar to Magnum 3801 Wet. Starbuck is a step up from AC Longview.

Final Discussion

Since this project is a demonstration with only two years of results and not replicated, the results should be considered accordingly. The Crop Varieties for Irrigation Guide should be used for variety recommendations. From the varieties in this plot, the top three should be Starbuck, Spredor 4 and AC Longview based on multi-year data. Some of the newer varieties in this plot do not have enough data to be included in the multi-year data yet.

e) Consul Forage Demonstration Site

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-Investigator: Nicole Beatty, Co-op Student

Co-operators:

- **Producer – Scott Sanderson**
- **Industry – Proven Seed, Pickseed, Brett Young Seeds**
- **Northstar, Pioneer Hi-Bred**

Project Objective

To demonstrate 17 of the latest recommended alfalfa varieties on a field scale to irrigation farmers in the Consul area of Saskatchewan. Also included are a new Crested Wheat Grass and two plots without phosphorus.

Demonstration/Project Plan

The project was established in 2007. The alfalfa varieties grown in the demonstration are planted side by side on 42' x 1000' border dyke strips together with Fairway crested wheatgrass with one exception. There is one plot seeded to Beaver and Goliath crested wheatgrass, adjacent to a plot with Beaver and Fairway. There are also two plots of Beaver and Fairway not fertilized with phosphorus adjacent to two plots of Beaver and Fairway that are. The plan is to collect data for two seasons, 2008 and 2009, and an extension event may be considered thereafter if the results prove to be useful.

The co-operator will cut and bale each strip individually and bales will be weighed. This project is neither intended nor designed to be a trial where statistical data can be collected and used for recommendations. Rather it is designed to show the various varieties grown side by side to allow producers to see each variety, on a field scale, and to enable ICDC to host a field day to discuss forage production, varieties and management under irrigation.

Demonstration Site

This demonstration is located south west of Swift Current in the Consul Irrigation District (SW14-04-27-W3). It is on Scott Sanderson's plot. This field scale demonstration was established in the spring of 2007 with 17 varieties from five different seed companies seeded at 15 lb./acre. The varieties include 54V46, 53Q30, 53V52, Equinox, Hybriforce 400, Spreador 4, Ameristand, AC Longview, Algonquin, Rangelander, Tophand, Runner, Rhino, Starbuck, AC Grazeland, 2065MF, 3006 and Goliath. Also include is new Crested Wheat Grass (AC Goliath) and two plots without phosphorus. The plots are on 12.8 m x 304.8 m (42' x 1000') border dyke strips. 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 loam. Soil samples were taken and sent to ALS Labs in

Saskatoon for analysis. The previous crop was barley. This site is irrigated by flood irrigation. It was established in 2007 right after a flood and in 2008 the Consul Irrigation Project did not receive irrigation.

Project Methods and Observations

Quarter meter swards were taken on July 3 to measure maturity and height. The first cut was taken on July 14. Bales were counted, weighed, and samples were taken for quality analysis on August 5. A second cut was not taken.

Table 1. Yield and Maturity Results

	MSC*	Est. Yield (tons/acre)	Height (cm)	Bale Yield (tons/acre)
EQUINOX	3.7	2.8	65	1.4
53Q30	3.5	3.0	64	1.1
ALGONQUIN	2.6	2.8	54	1.0
54V46	3.2	3.0	64	0.9
AC LONGVIEW	2.8	3.0	60	0.8
HYBRIFORCE 400	3.3	3.1	60	0.8
RHINO	2.5	2.5	54	0.7
RANGELANDER	1.8	2.3	50	0.7
53V52	3.6	3.7	68	0.7
SPREADOR 4	2.9	2.6	63	0.7
AMERISTAND	3.2	3.8	66	0.6
RUNNER	2.2	2.3	53	0.6
TOPHAND	1.8	2.1	56	0.6
BEAVER/GOLIATH	1.7	2.7	51	0.4
2065 MF	2.5	2.9	49	0.4
3006	1.9	2.9	49	0.4
STARBUCK	2.1	2.4	52	0.4
AC GRAZELAND	2.5	2.5	53	0.4

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

Variety Descriptions

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

Pioneer varieties

54V46 is a replacement for 54V54 which has done well under irrigation in the past. 54V46 yields 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 negative impact of traffic on the stand. 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.

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.

AC Longview was developed by Agriculture and Agri-Food Canada (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 and more suited to pasture situations.

Table 2. Results from fertility strips

	MSC	Est. Yield (tons/acre)	Height (cm)	Bale Yield (tons/acre)
Phos	2.9	2.8	54.3	0.5
no Phos	3.4	3.3	59.7	0.8

The entire field was fertilized with 300 lb. of 11-52-0 incorporated prior to seeding last year with the exception of two strips of Beaver and Fairway CWG, one at either end. These were adjacent to two strips of Beaver and Fairway CWG that were included in the fertilization. Each of the numbers in Table 2 is an average of two.

Final Discussion

This is a demonstration and not replicated and not all of the results were as expected. Equinox is a good variety and yielded the highest here. 53Q30 should have yielded less than 54V46, but didn't. Algonquin is an older variety that should have been out yielded by some of the newer varieties but didn't. The phosphorus trials showed the opposite of what was expected. In conclusion, this trial was not irrigated this year, had a lot of weeds, took only one cut and produced unexpected results. It did, however, survive the drought and didn't have to be reseeded. Perhaps with a flood next year the results will come more in line with what was expected. As this is only the first year of data taken, perhaps it is too early to see meaningful differences.

f) Miry Creek Alfalfa Phosphorus Demonstration

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-Investigator: Nicole Beatty, Co-op Student

Co-operators:

- **Greg Oldhaver**
- **Olynick Agro, Alpine Plant Foods**

Project Objective

With a sudden increase in the price of phosphorus, there was an interest expressed in whether alternative phosphorus fertilizers could replace traditional forms. Alpine Plant Foods has marketed a liquid phosphorus product as a seed placed starter fertilizer- up effect. Some have reported benefits from a foliar application. Although plants do not absorb many nutrients through the leaf area, the phosphorus should not be tied up in the soil. Alpine was promoting this as a more efficient way of applying fertilizer. The purpose of this trial is to compare the foliar application to traditional 11-52-0 application as well as to Avail coated 11-52-0. The Avail coating is a polymer coating that prevents the particle from breaking down until moisture is present. It is a slow release fertilizer.

Demonstration/Project Plan

A demonstration site was located at Greg Oldhaver's plot (Plot 10) on the Miry Creek Irrigation District. The fertilizer was applied between first and second cut. There were a total of six treatments which included a check (no fertilizer), 50 lb. of 11-52-0, 50 lb. of 11-52-0 treated with Avail, and three rates of the Alpine liquid phosphorus (1X, 2X 3X). Olynick Agro donated the Avail coated 11-52-0 and Alpine Plant Foods offered a discount to Greg Oldhaver for spraying the remainder of the field. Each plot was baled separately. The bales were weighed and samples were taken for quality analysis. This is the first year of a three year project.

Demonstration Site

The Miry Creek Irrigation District is located east of Cabri on the west side of the South Saskatchewan River. It is a sprinkler converted flood project. Two cuts of an alfalfa/grass mix were harvested. The demonstration site was located at the Greg Oldhaver's plot. This plot was seeded in 2003 with AC Longview and orchard grass. First cut yielded about 1.5 tons/acre in 2008. Soil tests showed 17 lb. of N, 12 lb. of P, 633 lb. of K per acre in the soil. ALS Labs recommended adding 110-120 lb. of 11-52-0 for a 3.5 tons/acre yield goal.

Project Methods and Observations

The treatments were applied on July 7 and 8. The single rate of the Alpine Liquid P product was 3 gallons per acre of product with an additional seven gallons of water for a total volume applied at 10 gallons per acre. The product has an analysis of 7-22-4, which works out to 8.5 lb. of actual P per acre for the single rate and 25 lb. of actual P per acre for the triple rate, which is similar to the 11-52-0 and Avail treatments. This is approximately half of the recommended rate from the soil test. Second cut was done on August 23, and baled on August 30 with one small rain on it. The bales were weighed, sampled and hauled on October 1.

Data Collection

As the fertility treatments were only applied after first cut, results were only taken for second cut.

Table 1. Yield in tons/acre for second cut

	Yield (tons/acre)
Check (0 lb. P)	1.49
Avail coated 11-52-0 (25 lb. P)	1.62
Uncoated 11-52-0 (25 lb. P)	1.74
1X Alpine (9 lb. P)	1.57
2X Alpine (17 lb. P)	1.56
3X Alpine (25 lb. P)	1.60

Table 2. Hay quality of second cut

	Check	Avail coated 11-52-0	Uncoated 11-52-0	1X Alpine	2X Alpine	3X Alpine*
CP	18.20	15.60	16.59	15.59	16.79	12.93
ADF	31.20	35.90	33.58	33.69	36.20	45.84
NDF	46.75	50.21	48.62	50.04	46.99	59.08
RFV	129	113	120	116	120	84
Ca	1.58	1.26	1.31	1.32	1.33	0.82
P	**0.19**	**0.19**	**0.19**	**0.17**	**0.16**	**0.13**
Mg	0.34	0.31	0.34	0.29	0.30	0.24
K	1.99	2.04	2.03	2.00	2.05	2.13
Na	0.08	0.08	0.08	0.09	0.08	0.10

* The hay probe broke during the sampling of the last plot, so this sample is less representative than the other samples.

Final Discussion

Sometimes a response in the hay quality from phosphorus fertilization can be seen, although in this case, it wasn't noticed. There was no correlation between phosphorus levels in the hay and those of the fertility treatments.

There was, however, a yield response compared to the check. This is a demonstration and some caution would be warranted, but the check was about 0.11 tons/acre lower than the other treatments. The uncoated 11-52-0 yielded higher than the Avail coated 11-52-0, which makes sense as the Avail coating takes time to break down in the soil. It is a slow release product so not as much of it would be available to the plant as compared to uncoated 11-52-0. The 3X rate of Alpine liquid phosphorus was similar in yield to the uncoated 11-52-0 and it had a comparable amount of actual P applied. It also yielded higher than the 2x rate and the 1x rate. This is only the first year of three so these differences may change in the next couple years. Initial observations would suggest that normal 11-52-0 is still the best choice in applying phosphorus fertilizer to forage stands.

g) CSIDC/ICDC Alfalfa Management Trial

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Co-Investigators: Korvin Olfert PAg, Provincial Irrigation Agrologist
Barry Vestre, Canada-Saskatchewan Irrigation Diversification Centre (CSIDC)
Charlotte Ward AAg, Regional Forage Development Specialist

Industry Co-operators:

- **Neil Mcleod, Northstar Seed Ltd.**
- **Ellis Clayton, Pioneer Hi-Bred**
- **Peter Novak, Proven Seeds**
- **Art Klassen, Brett Young**
- **Kevin Dunse, Pickseed**
- **Nicole Tanner, Farm Pure Seeds***

***Since the establishment of this trial, Farm Pure Seeds has been bought by Pickseed. Pickseed now has two varieties established in this trial.

Project Objective

The objective of this research project is to compare the yield performance of seven alfalfa varieties under an intensive three-cut management system.

Research Plan

A randomized, replicated field scale plot design consisting of seven alfalfa varieties replicated three times will be managed to harvest on a three-cut system. Cut timing will be based on the calendar dates of June 15, August 1, and October 1. The fertility plan will entail annual applications of phosphorus, as P_20_5, and potassium, as K_20, at a rate of 75 lb./acre actual product per nutrient. Spring stand assessments, measured as plants/m^2, will be performed annually to determine variety survivability and performance. Irrigation requirements will be scheduled weekly, under the recommendations of an irrigation agrologist. Harvest protocol requires plots to be cut and weighed with a forage harvester. Stage of maturity and forage quality analysis will be measured at the time of cutting.

Demonstration Site

The project site is located at CSIDC, which provides land and staff to perform the field operations necessary to conduct this research trial. Soil sampling was performed in the fall of 2007 for soil fertility analysis (Table 1).

Table 1. Fall soil residual nutrients

Nutrient	Residual 60 cm (24") lb./acre actual
NO_3-N	137
P	31
K	391
SO_4-S	>182

Trial Methods and Observations

Variety Selection

Variety selection was targeted at providing a fair market representation of current alfalfa varieties that were specific to intensive management under irrigation conditions.

AC Blue J is a public variety that serves as the irrigated check for the trial.

Pioneer
53Q30 is a high performance variety exhibiting good forage quality and winter hardiness.

Proven Seed
Equinox variety is suited for an intensive management system with rapid re-growth, high yield and winter hardiness characteristics.

Northstar
Stealth SF is a multifolate variety with high overall feed quality. This variety carries the unique Standfast™ trait, a feature that is claimed to promote a faster recovery rate following cutting.

Brett Young
Hybriforce 400 features improved establishment, winter hardiness and rapid re-growth.

Pickseed
2065 MF is a multifolate variety that exhibits rapid re-growth, excellent winter hardiness and is persistent in the stand. The multifolate leaf expression provides for improved forage quality.

AC Longview has excellent re-growth capability, good stand longevity and winter hardiness.

Establishment and Crop Management

The trial was established on June 4 using a John Deere 750 drill. Plots are 4.57 meters (15 feet) wide and 114.3 meters (375 feet) long. The seeding rate was calculated to be 12.6 lb./acre for each variety.

Data Collection

Data collection and analysis will begin in 2009.

3. New Crops Demos

a) Agroforestry Irrigation Scheduling Demonstration

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-Investigators: Garth Weiterman PAg, Senior Provincial Irrigation Agrologist
Kelly Farden PAg, Provincial Irrigation Agrologist
Ed Loewen, Provincial Irrigation Technician
Stacy Prevost, Provincial Irrigation Technician

Co-operators:

- **Saskatchewan Forest Centre**
- **Bill King, Project Manager**

Project Objectives

Assist with evaluating water use by a number of tree crops on both effluent and fresh water irrigation systems.

Project Plan/Approach

Use a range of irrigation scheduling equipment to evaluate water use, rooting depth, and tree growth rate compared with the dryland check. Compare growth of trees receiving effluent and fresh water.

Demonstration Site Project Overview – Outlook Agroforestry Demonstration

The water use demonstration was done at a recently established irrigated woodlot pilot project, organized by the Saskatchewan Forest Centre (SFC). Saskatchewan Agriculture staff were involved with the irrigation system design and promotion of the pilot project. The IDB Environmental Unit has been involved in monitoring moisture use over the 2008 growing season. There has been demand for information about irrigation design and water use of trees. There have also been inquiries about effluent irrigation of trees by municipalities. Since this technology and information is not established for Saskatchewan, this water use demonstration is intended to provide agrologists with data in this area.

A description of the SFC Effluent Agroforestry Demonstration, along with other information on tree plantations, is available from their website at www.saskforestcentre.ca. It is a unique project in Saskatchewan.

The tree species planted in 2007 were hybrid poplar, willow, green ash, Manitoba maple, balsam fir, red pine, lodgepole pine, and white spruce. In May 2008, black walnut, Siberian pine, bur oak and Siberian Larch were planted.

Irrigation and Soil Moisture Monitoring

The tree species planted in 2007 were evaluated in each irrigation block with both micro-sprinklers and trickle emitters. The trees planted in 2008 had a more cost-effective trickle material installed with built-in emitters. In 2008, the fresh water block and the effluent block were irrigated through the growing season.

The irrigation was managed by Bill King. Saskatchewan Agriculture Irrigation Development Branch staff monitored soil moisture levels under the hybrid poplar and willows throughout the growing season using tensiometers, Watermark™ sensors, and Time Domain Reflectometry (TDR). Water uptake of the various tree species varied widely because of their different growth rates. Willow and poplar used much more water than the slower-growing pines. Since all of the tree species were watered the same amount when the irrigation system was running, some species were overwatered and some were underwatered. Willows used more water than the poplars this year, with soil moisture levels consistently lower under the willows. Water use data for hybrid poplars and willows will be used to incorporate these species into the AIM model.

Between May 24 and September 19 the plots were irrigated with either fresh canal water or effluent. The micro-sprinkler plot was irrigated for more hours and received more irrigation than the trickle irrigated plots because microsprinklers wet a much larger area than the current rooting zone of the trees. Therefore, at this stage of development of the trees, with the possible exception of hybrid poplar and willow, a portion of the water applied is wasted with the micro-sprinklers.

Table 1. Summary of irrigation on the Outlook Agroforestry Demonstration

	# of Irrigation Applications	Total Irrigation Applied	Irrigation and Rainfall May – September
Effluent			
Trickle	12	91 mm (3.6 inches)	233 mm (9.2 inches)
Micro-sprinkler	14	203 mm (8.0 inches)	345 (13.6 inches)
Fresh Water			
Trickle	11	86 mm (3.4 inches)	228 mm (8.9 inches)
Micro-sprinkler	10	203 mm (8.0 inches)	345 mm (13.6 inches)
Dryland	n/a	n/a	142 mm (6.6 inches)

There is a visual increase in growth of most species in the irrigated plots versus the non-irrigated block, but no visual difference between the fresh water and effluent blocks. Data on growth amounts, either height or diameter, was not collected in 2008.

Summary

There will be many more questions and many answers generated from this demonstration site. The rated vs. actual output of the micro-sprinklers has been

a question. The actual amount that reaches the ground and the variability in that amount could be checked using low containers and measuring the amount of water applied in an hour of operation. The same thing could be done with the trickle emitters, except that the gauge would have to be under the emitter. This could be done for both the fresh water and effluent water blocks at the start and end of an irrigation period to account for changes in pressure due to filtration.

Over the next couple of years the potential water use of trees in Saskatchewan will be determined. Continued monitoring of water use is needed as the trees grow to their maximum water use in order to fully determine their irrigation requirement. When this is done, it will greatly help in designing practical, sustainable irrigation systems and effluent utilization projects using trees.

4. Fruit Crops

a) Commercialization of Strawberry Nursery Plant Production in Saskatchewan

Project Lead: Strawberry Crown Steering Committee
Sarah Sommerfeld PAg, Provincial Irrigation Agrologist
Gerry Gross PAg, Senior Provincial Irrigation Agrologist
Dr. Jazeem Wahab; Greg Larson, CSIDC
Dr. Karen Tanino, U of S
James Lokken; Dr. Gary Storey, Consultants

Year 3 of 3

Project Objective

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

Project Plan

The 2008 growing season was the final year for this project. As such, following completion of the project, a final report will be written with a summarization of project details, agronomics and economics. Dr. Jazeem Wahab has written and provided the following interim report that summarizes the 2008 growing season.

Project Partners:

Dr. Jazeem Wahab, Greg Larson (Canada-Saskatchewan Irrigation Diversification Centre (CSIDC); Dr. Karen Tanino, Dr. Gary Storey, James Lokken, University of Saskatchewan (U of S); John Linsley, PAg., Gerry Gross, PAg., Sarah Sommerfeld, PAg., Saskatchewan Ministry of Agriculture/ICDC;, Connie Achtymichuk, PAg., Forrest Scharf, PAg., Grant Holzgang, PAg.; Saskatchewan Ministry of Agriculture; Dr. Mikio Chiba, Neil Wagner, Peacock Industries; Dr. Craig Chandler, University of Florida

Funding Agencies:

- Advancing Canadian Agriculture and Agri-Food (ACAAF) program
- Irrigation Crop Diversification Corporation (ICDC)

The current project was initiated in 2006, designed to commercialize strawberry crown production in Saskatchewan by capitalizing on the advantage of 'Northern Vigour' similar to seed potato. This project targets Florida as a lucrative potential market as Florida imports approximately 150 to 180 million crowns per year

mainly from Ontario, Nova Scotia, and Quebec. The Florida commercial strawberry fruit growers want to diversify their crown sources to minimize risk from crown-borne diseases.

Early U of S and CSIDC studies demonstrated that Saskatchewan crowns were more vigorous and produced higher fruit yields than other Canadian sources in research plots and commercial fields in Florida.

The 2008 project was designed to multiply 'White Tag' and 'Registered' classes of strawberry cultivars and supply high quality crowns to commercial strawberry growers in Florida. Crown production is being conducted at CSIDC and field evaluation is carried out with leading commercial strawberry growers and at the University in Florida. Following is the summary of events and progress of the project:

2007 Fall Planting at CSIDC:

Fall planting is an option to increase crown numbers by extending the growing season provided strawberry plants can be established in the fall and minimize winter kill.

Camarosa and Carmine strawberries were planted August 1st, 2007 under the Solar Pivot. Half the crowns were planted into MOSS (Mustard Organic Soil Stabilizer) treated soil and the other half into bare soil. The following over-wintering systems were evaluated:

- Snow fence + straw
- Snow fence only
- Straw only
- Bare land

The mother plants produced runners during the latter part of the growing season. The crop suffered severe winter kill, as such, the trial had to be abandoned. Further work is needed to minimize winter kill.

2008 Spring Planting:

The following quantities of Locally Grown, Registered and White Tag plants were multiplied at CSIDC for export in the fall of 2008:

Local Plants:	2007 CSIDC crop stored over winter - 1,700 Common Camarosa, 600 Common Treasure
Registered Plants:	10,000 Festival, 3,000 Treasure, 3,000 Camarosa from Lassen Canyon, and 1,000 Carmine from Pacific West
White Tag:	1,000 Treasure, 1,000 Camarosa from Lassen Canyon, and 1,200 Carmine from Pacific West

- Approximately one hectare block planted.
- Site with sandy soil was chosen to facilitate ease of crown harvest and post-harvest handling.

- Crop was raised under irrigation utilizing optimum management practices.
- Small amounts of irrigation (6 mm - 12 mm) were applied frequently to maintain favourable surface moisture to facilitate runner establishment and promote rooting.
- The crop was inspected regularly to assess disease incidence and to estimate runner and crown production.
- Precautionary measures taken to produce disease-free vigorous crowns for export to Florida.

Field Observations:

- Relatively cool spring caused poor establishment and reduced early crop vigour.
- Sand blasting during the spring caused considerable foliar damage.
- Hailstorm combined with 18 mm of rain on August 21 negatively affected crop growth, runnering and crown establishment.
- Registered plants generally grew more vigorously than the Local or White Tag plants.
- Registered Camarosa was less vigorous, showed poor growth and runnering compared to the other Registered cultivars. Later identified as Anthracnose (Colletotrichum infection, a serious strawberry disease).

Crown Production, Marketing, and Economics:

- Delaying harvesting increased marketable crown numbers
- During the final harvest (October 18th, 2008) the total number of crowns ranged between 14 and 39 for the various cultivars, and marketable crowns ranged between 10 and 20.
- Projected 2008 fall crown exports to Florida was 35,000-50,000 for Festival; 11,000-15,000 for Treasure; 12,00-3,000 for Carmine, and 5,000-7,500 for Camarosa.
- Target price - US $140.00 to $144.00 per 1000 crowns.
- At a selling price $140.00/1000 crowns, it is necessary to average >12 marketable crowns per mother with a trimming efficiency of approximately 2000 crowns per worker per day (at $8.00/hr) for profitability.
- Strawberry crown production in Saskatchewan is economically feasible.

Disease Status:

- Vascular wilt and root rot (Anthracnose) was identified in August
- Detailed inspections were made. Group consisted of professionals, pathologists from U of S (Dr. Jill Thompson, Dr. Sabine Banizza) and Saskatchewan Ministry of Agriculture (Grant Holzgang)
- Confirmed the disease was caused by Colletotrichum.
- Isolates being taken to characterize the species through molecular analysis. C. Acutatum, C. Gleosporoides, or C. Fragaria are important diseases of strawberry.
- Decision was taken to destroy the entire field and not to send any to Florida to ensure quality for future exports.

- Intended crown importers were notified about disease incidence and the decision not to export. - Growers were pleased about action taken. Will be in contact for future interaction.
- Four to five year rotation required to eradicate the disease.

Future:

- Developing our own nursery plants beginning through tissue culture is an option to control disease incidence and produce high-quality crowns for export.

b) Sour Cherry Mulch Demonstration

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-operators:

- **Bruce Hill**
- **Canadian Cherry Producers Inc.**

Project Objective

A cherry mulch and weed suppression demonstration will fill a knowledge gap for sour cherries, a new fruit crop for the prairies. It could assist orchardists to reduce weeding costs, minimize moisture loss and minimize soil and root disturbance. It will also allow the evaluation of mulch options that are compatible with organic production.

Demonstration/Project Plan

In mid-May 2008, a mulch demonstration was laid out in a row of Juliet sour cherries. These had been planted in fall of 2007. The project was discussed with Saskatchewan Ministry of Agriculture's Provincial Fruit Specialist Forrest Scharf and the producer co-operator Bruce Hill. By starting with an established site, it was hoped that results would be obtained more rapidly.

The co-operator wanted to try out two different mulch treatments – flax shives and wood post shavings. These were compared with his current establishment practice, which is not using mulch. The co-operator had used plastic mulch in much of his orchard and had found it difficult to work with. Cultivation beside the mulch gradually ripped it out, leaving torn plastic all over the orchard. This mulch also was not compatible with organic production.

Demonstration Site

The demonstration site is located at SW 02-28-25-W3 near Imperial on a silty clay to silty clay loam soil. The site has been developed from a pasture into a sour cherry orchard. The row in which the mulch demonstration was established was planted with Juliet sour cherries, developed at the University of Saskatchewan.
T-tape was run underground and the cherry clone planting material was planted in the fall of 2007. The water source is a nearby large slough.

Project Methods

Flax shives, a fiber processing byproduct, were purchased from Biolin in Saskatoon for evaluation as a mulch. The material was applied to sections of 10 trees at three different points along a row. The cost of the material worked out to be about $2 per tree. This was compared with a wood post shavings material previously purchased by the co-operator, which was applied in the same way as the shives. Comparable mulch material is available from landscaping companies

for a cost of about $4 per tree. However, wood processing waste materials cost is highly variable depending on location. Both mulches were applied about 25 cm (3 inches) deep, leaving an open area directly around each new tree. These were compared with sections of row left bare of mulch.

Project Results

The co-operators mowed between the rows of cherries and used in-row mechanical tillage where no mulch was in place. No hand weeding was done in order to better assess the effect of mulch on weeds. Because of the lack of mechanical tillage around the cherry trees where mulch was in place, there were a lot of weeds in those row sections. The flax shive mulch had some volunteer flax and other volunteer crops. The wood mulch had predominantly annual weed species.

Survival of the cherry stock in this section of the orchard was very poor. The co-operators determined that the planting stock was of poor quality. More than half of the cherry planting in that row did not survive the 2007-2008 winter.

Conclusion

The co-operators found it easier to maintain the sections of row with no mulch because they could use their Weed Badger in-row cultivator to cultivate around the young trees. Cultivation would incorporate and rapidly break down the mulch, making the time and expense of its application a waste. Hand weeding of the width of the mulched area would be an onerous job, even if the amount of weeds emerging was reduced. However, with a mower attachment for the Weed Badger, it may be possible to keep the mulch in place while avoiding most hand weeding of the plot. Mowing might also disturb the mulch and disperse it, making the mulch ineffective. These attachments are available from Weed Badger. The practicality of weed management with a mulch product will have to be better established before the added cost can be justified.

5. Vegetable Crops

a) Trickle Irrigation Workshop

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-Investigator: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Project Objectives

To provide a trickle irrigation workshop for the purpose of improving knowledge of this specialized type of irrigation among irrigation professionals and irrigation producers.

Event Description

ICDC and the Saskatchewan Ministry of Agriculture's Irrigation Development Branch (IDB) hosted a Trickle Irrigation Workshop in Outlook on June 26 and 27. This intensive learning event was taught by Ted van der Gulik, P.Eng, a senior engineer with the Resource Management Branch of the British Columbia Ministry of Agriculture and Lands. He is also the primary developer of the course and its materials, including the B.C. Trickle Irrigation Manual. The last time this course was presented in Saskatchewan was 1999.

The workshop started with a short presentation on the irrigation development process by Provincial Irrigation Agrologist Kelly Farden, P.Ag, Irrigation Development Branch. Farden placed particular emphasis on developing small acreage projects and trickle irrigation. Participants were asked to purchase the B.C. Trickle Irrigation Manual, an integral part of the course material for this workshop. Ted demonstrated how to work through the Trickle Irrigation Manual to make design decisions, matching irrigation systems to the needs of the crop in a particular environment. He discussed considerations in choosing the various materials, including tubing, emitters, and filtration. Calculators and pencils were at work through the morning and into the afternoon.

In the afternoon on June 26, there was a tour of Saskatchewan Forest Centre's Effluent Agroforestry Demonstration adjacent to the Outlook municipal lagoons. This site allowed participants to see the different types of trickle materials and infrastructure in use on the demonstration. The tour also visited the JWD Market Garden, which utilizes trickle irrigation for its fruit and vegetable production, and the Canada-Saskatchewan Irrigation Diversification Centre, with a trickle-irrigated organically-managed vegetable demonstration. At JWD Market Garden, Bill and Jean King demonstrated some of the techniques and tools they use for assembling a trickle system.

On day two of the workshop, participants learned how to utilize worksheets and tables to work through real issues regarding filtration, clogging, water quality and system maintenance.

About 40 people participated in this two-day workshop on trickle irrigation. The Saskatchewan Vegetable Growers Association made the Trickle Workshop part of their annual summer field event. There was also good representation from people involved in agroforestry and small fruit production. Some people had already installed trickle irrigation systems and had many questions about how to improve the operation of their system. A number of the participants from the vegetable industry are currently irrigating with small sprinkler systems and were very interested in learning more about trickle irrigation. Advantages and disadvantages of conversion to a trickle system were discussed for various situations.

Summary

The course provided participants with very practical information that enabled them to purchase, install and operate a trickle irrigation system designed for their particular needs.

b) Soil Sampling of the ADF Organic Vegetable Project at CSIDC

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Co-Investigator: Kelly Farden PAg, Provincial Irrigation Agrologist

Project Objective

To establish and benchmark the soil fertility levels of the organically managed and conventional production areas of the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC). Analysis and documentation of the soil nutrient levels was to provide relevant background data to the ADF project "Organic/Pesticide-free Higher Value Vegetable Crops: Sustainable Production, Maintain Quality and Extend Shelf-life" lead by Dr. Jazeem Wahab, Horticulture Agronomist at CSIDC.

Project Methods and Observations

Soil sampling was completed on May 8. Eight plots were sampled. Samples collected at the 0-15, 15-30 and 30-60 centimeter (0-6, 6-12 and 12-24 inch) depths were analyzed for texture, macronutrients, micronutrients and organic matter. Samples collected at the 90, 120, 150 and 180 centimeter (36, 48, 60 and 72 inch) depths were analyzed for texture and nitrate content.

Results

The organic vegetable plot that received the application (unknown amount) of hog manure compost in the spring of 2007 had substantially higher phosphorous (P) levels in the 0-15 cm (0-6 inch) depth than those of the other seven plots. The organic vegetable plot had 582 lb. P/acre while the other seven plots had an average of 94 lb. P/acre. The organic vegetable plot also had elevated levels of iron, zinc, and manganese when compared with the other plots.

The nitrate (NO_3) sampling revealed a great deal of variation between depths and across the different plots. However, all plots were found to have consistently high levels of NO_3 throughout the soil profile (Figure 1). The average levels of NO_3-N were found to be 66 lb. N/acre at 0-30 centimetres (0-12 inch), 52 lb. N/acre at 30-60 centimetres (12-24 inch), 141 lb. N/acre at 60-90 centimetres (24-36 inch), 92 lb. N/acre at 90-120 centimetres (36-48 inch), 102 lb. N/acre at 120-150 centimetres (48-60 inch), and 77 lb. N/acre at 150-180 centimetres (60-72 inch).

Normal levels of residual nitrogen for irrigated land are between 30 and 50 lb./acre at the 0-30 centimetre depth. The nitrogen levels at the first foot are only slightly above normal. However, the large amounts of nitrogen at greater depths indicate that there is a substantial amount of nitrogen that is not being utilized by the crops and the nitrogen is being leached down below the active rooting zone

of most crops. To reduce the risk for groundwater contamination it may be necessary to grow a deep-rooted, high-nitrogen using crop such as alfalfa on these plots in the near future.

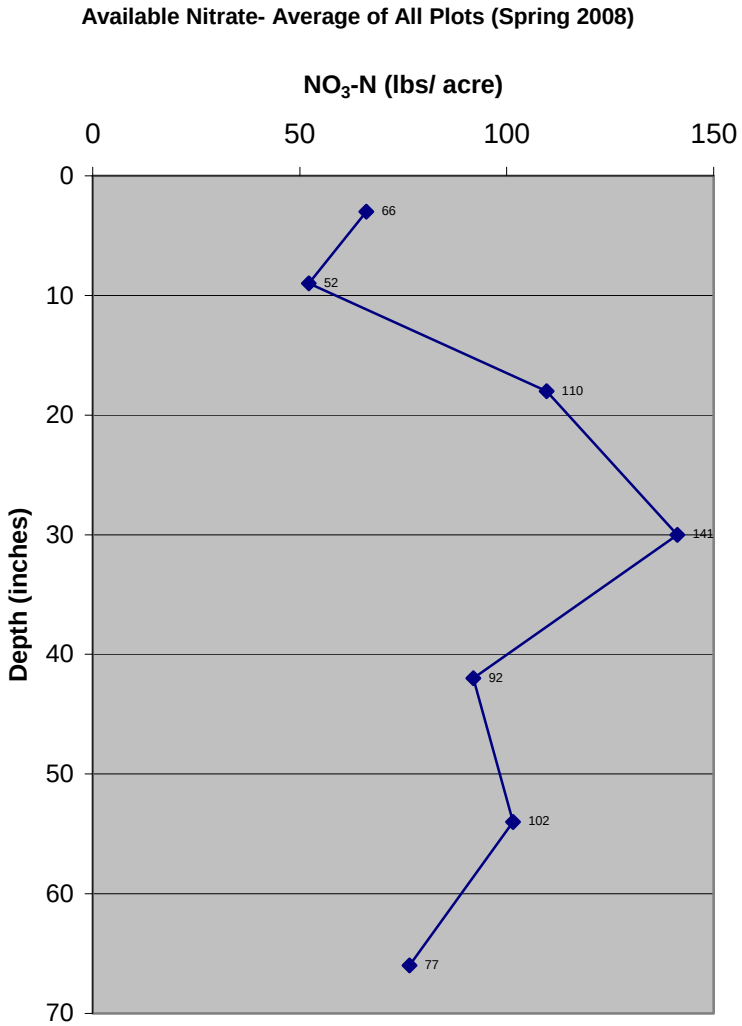


Figure 1. Average available nitrate levels of eight plots throughout the soil profile.

6. Agronomic Trials

a) Dry Bean Fertility Demonstration

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-operator:

- **Gordon Kent**

Project Objective

Closely monitor bean field for water use, production practices, and agronomic issues. Evaluate maturity, disease development and yield in an area with extra N fertility compared with the regular rate.

Demonstration/Project Plan

Three fertility comparison strip(s) were laid out by the co-operator prior to seeding the field to AC Polaris. In a separate area, a new variety Resolute was planted as a field-scale trial. Watermark ^{TM} sensors and rain gauges were used to monitor soil moisture and amounts of irrigation and rainfall. Recommendations were provided to the co-operator regarding irrigation applications. Disease development was monitored and pod development was assessed in fertility and variety strips. Yield was determined from the fertility strips as well as the new variety area.

Demonstration Site

The demonstration site is located in the Riverhurst Irrigation District, a district that operates with pressurized pipelines and a Lake Diefenbaker water source. This loam textured soil has been irrigated and kept in a pulse, oilseed, and cereal rotation for many years. It is slightly rolling and non-saline.

Table 1. Demonstration site characteristics

Land Location	SE-15-22-07-W3
Soil Type	Loam, Fox Valley association
Previous Crop	Durum
Irrigation System	800 gpm (6.6 gpm per acre)

Project Methods and Observations

Crop Management

Three fertility strips were monitored for differences in maturity, disease levels, and yield. Nitrogen was applied pre-seeding at 30 lb./acre, 60 lb./acre and 90 lb./acre. The remainder of the field was fertilized at 60 lb/acre. Two planter widths of the new great northern variety Resolute were planted in a separate area of the field. The remainder of the field was seeded with AC Polaris. The

fertility and variety comparison areas were managed using typical wide-row bean production practices.

AC Polaris and Resolute are both relatively new dry bean varieties from the great northern market class. They were both developed in the AAFC dry bean breeding program in Lethbridge. Viterra owns these varieties and contracts irrigated production in Saskatchewan. Resolute is more upright in growth habit, earlier maturing, and more resistant to diseases than AC Polaris. It is suitable for narrow-row production, but can be grown on wide rows. It has also been 20 per cent lower yielding in small-plot, wide-row variety trials than AC Polaris.

Post-emergence herbicides and fungicides were applied with a row-crop sprayer, which effectively reduces the amount of chemical applied by half, while maintaining the efficacy of the full rate. The field was cultivated twice and sprayed with Lance fungicide.

Table 2. Agronomic management of Kent demonstration site

Nutrients			
Soil Residual	20 lb./acre N	24 lb./acre P	1060 lb./acre K
Applied	30, 60, 90 lb./acre N	25 lb./acre P	
Variety	AC Polaris Great Northern / Resolute Great Northern		
Seeding	Row crop planter, 30 inch row spacing, 100,000 plants/acre		
Inoculation/Seed Trt	Self-stick peat-based inoculant, Streptomycin		
Herbicide	Edge 18 lb/acre spring applied Basagran 0.91 L/acre applied June 27		
Fungicide / Insecticide	Lance applied at 156 g./acre, row-crop sprayer, July 27		
Available Moisture			
Irrigation	180 mm (7 inches)		
Total Available	370 mm (14 inches)		

Table 3. Harvest results for variety evaluation

Variety	**Fertility**	**Seeds per plant**	**Yield lb./acre**
Polaris	30 lb./acre N	108	2750
	60 lb./acre N	107	2670
	90 lb./acre N	91	2710
Resolute	60 lb./acre	60	2630

On Sept. 2, the number of seeds per plant was determined by counting the number of full size pods per plant for ten plants and determining the average number of seeds per pod. Immature pods were not included in the pod count because they would generally abort. The 90 lb./acre treatment had more immature pods than the other treatments.

Fertility

There was no positive yield response to the 90 lb./acre nitrogen fertilizer rate. In fact, there were indications prior to harvest (pod counts) and during harvest (combining speed) that there was more plant material produced in this strip but not more yield. This strip tended to be later maturing and had more pods that developed too late in the season to fill. There was also no yield increase with the 60 lb./acre fertility strip compared with the lowest rate (30 lb./acre).

Variety Performance

At the Kent demonstration site, Resolute yielded a very respectable 2,630 lb/acre, compared with 2,670 lb/acre for Polaris at the same fertility rate. It also had much less White Mould evident than Polaris in this demonstration. The longer-season Polaris had to abandon many of its fully formed pods, which is a waste of resources for the plant. While Polaris escaped frost this fall due to an unseasonably favourable month of September, it could have suffered major frost damage this fall. AC Polaris has out-yielded Resolute by over 20 per cent in CSIDC's wide-row variety trials.

Final Discussion

In this demonstration, there was no noticeable positive response to added nitrogen above the 30 lb./acre rate. This gave the crop a total of 50 lb./acre of available N including soil reserves. Typically, soil plus fertilizer N rates of 90 lb./acre are desirable for high bean yields. Nitrogen fixation appears to have supplied a portion of this crop's requirement. Beans can fix nitrogen, but not generally as reliably as other pulse crops. This demonstration confirmed to this co-operator that a change to higher N application rates is not warranted in his situation. Other producers may find a different result, depending on field history, variety selection, and crop management.

The bean variety Resolute performed very well in this field-scale evaluation. A shorter season bean like Resolute was at an advantage this year because the crop was delayed by about two weeks. Given the added consideration that Resolute is resistant to several diseases, including White Mould, it should be considered for wider evaluation for production in Saskatchewan.

b) Dry Bean Variety Demonstration

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-operator:

- **Frank Hamel**

Project Objective

Closely monitor a bean field for water use, production practices, and agronomic issues. Evaluate maturity, disease development and yield in a field planted with two pinto bean varieties.

Demonstration/Project Plan

Winchester pinto beans were seeded on 66 acres under a quarter section pivot. This pinto variety was developed in the United States and is commonly grown on irrigation acres in Saskatchewan because of a relatively good plant structure, acceptable yield, and some disease resistance characteristics. The other 67 acres under this pivot were planted to the new White Mountain variety marketed through KEG Agro and Walker Seeds. The field was monitored for differences between the two bean varieties throughout the growing season. Total yields were measured from the each half of the field.

Demonstration Site

The demonstration site was located in the South Saskatchewan River Irrigation District.

Table 1. Hamel demonstration site characteristics

Land Location	SE-22-30-07-W3
Soil Type	Fine Sandy Loam
Previous Crop	Potatoes
Irrigation System	133 acre low pressure centre pivot with drop nozzles

Project Methods and Observations

Crop Management

The bean crop was managed as a row-crop, with agronomic management very similar to most of the wide-row dry bean fields around Lake Diefenbaker.

Table 2. Agronomic management of Hamel demonstration site

Nutrients	N	P	K
Soil Residual	45 lb./acre	36 lb./acre	430 lb./acre
Applied	70 lb./acre	25 lb./acre	
Variety	Winchester and White Mountain pinto beans		
Seeding	May 29, 22-inch Row Crop Planter, 100,000 plants/acre		
Herbicide	Edge, Basagran, Assure		
Fungicide	Lance		
Available Moisture			
Irrigation	103 mm (4.1 inches)		
Total Available	270 mm (10.6 inches)		
Harvest	Undercut and windrowed with Pickett One-Step Sept 14; Combined with Pickett machine: White Mountain Sept 30, Winchester Oct 2.		

Irrigation

Soil moisture was monitored throughout the year with a soil probe. Rainfall and irrigation amounts were recorded and confirmed through district water use records. Crop water use was reported to the co-operator through the irrigation season. Soil moisture conditions were sometimes below the 60 per cent available moisture threshold for irrigation scheduling.

Variety Comparison

Maturity for Winchester and the White Mountain variety were similar, with Winchester about two days behind by the end of the season. Bacterial disease levels were similar between the two varieties. More white mould was observed in the Winchester variety than in the White Mountain, which seemed to be due to the thicker crop canopy in the Winchester variety. The White Mountain variety had a good upright plant structure and the rows did not close completely, which tends to reduce disease pressure.

On August 28, pod counts and seed numbers per pod were determined for each variety (Table 3). The plants were well progressed into pod filling but had at least a week before the start of leaf drop. The indication at this point in the season was that Winchester would have a higher yield than the White Mountain variety.

Harvest

The field was harvested using a Pickett combine, which reduced damage to the beans to negligible levels. Quality of the sample was very good. The two varieties were combined on different days, but with the same machine. Harvest losses were determined to be higher for Winchester than for the White Mountain variety. This was determined by collecting samples of beans after harvest from the width of the double windrow.

Table 3. Harvest results for variety evaluation

Bean Variety	Winchester	White Mountain
Yield Components – Estimate Aug 28		
Pods per Plant	12.9	9.6
Seeds per Pod	5.6	4.4
Seeds per Plant	73	42
Cleaned Yield	2740 lb./acre	2875 lb./acre
Estimated Harvest Loss	14%	3%

Final Discussion

The White Mountain variety performed well this year compared with the more commonly grown Winchester. Harvested yields were comparable between the two varieties, although when differences in harvest losses were taken into account, Winchester yielded slightly higher (five per cent) than the White Mountain variety. The quality of both varieties was very good, but the White Mountain variety 1533 was lighter in colour at harvest. This variety has a slow-darkening trait that places it at a premium in the market. The question has been whether this premium is offset by a lower yield expectation. This year, the variety performed well.

c) Irrigated Canola Fertility and Management Demonstrations

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Producer Co-operators:

- **Roger Pederson, Outlook, SK**
- **Kelvin Bagshaw, Birsay, SK**

Project Overview

Irrigated canola crops in southern Alberta are reported to yield an average of 65 bu./acre in the 2006 and 2007 growing seasons. Nutrient uptake guidelines indicate that a canola crop, yielding 35 bu./acre, will take up 100 to 123 pounds nitrogen per acre. For every bushel of canola produced, the plant requires 3.5 pounds nitrogen. A target yield of 60 bu/acre would require 210 lb./acre total nitrogen. The objective of this demonstration is to determine if applying high rates of nitrogen fertilizer will produce an economically justified yield advantage.

Demonstration Plan

The project demonstration plan was to co-operate with two producers growing a hybrid canola variety. Within each field, an area received fertilizer applications to achieve a total soil nitrogen content of 210 lb./acre or greater. The irrigation agrologist monitored crop development, crop inputs, disease and insect pressures, rainfall and irrigation applications. Irrigation scheduling equipment was installed in each field to monitor soil moisture content and assist the agrologist in providing scheduling recommendations to the producer. Yield results from the field and high nitrogen areas were compared and a cost/yield benefit was calculated to determine if increased nitrogen fertility provided a productivity and economic advantage.

i) Irrigated Canola Fertility and Management Demonstration – Pederson Site

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Producer Co-operator: Roger Pederson, Outlook, SK

Project Objective

To document the management practices, crop inputs and crop development of an irrigated canola crop with a comparison to an in-field, high-nitrogen fertility area.

Demonstration Site

SE 20-28-7 W3
The field is located in the South Saskatchewan River Irrigation District, south of Broderick, SK and is irrigated by a high pressure impact sprinkler pivot. Soil texture throughout the field ranges from a very fine sandy loam to a silty clay loam over a silty clay. Previous crop in 2007 was seed potatoes.

Project Methods and Observations

Establishment and Crop Management

Spring soil samples were collected on May 6th and sent to ALS Laboratories in Saskatoon for analysis. Based on the levels of residual soil nutrients, an additional 93 lb./acre actual nitrogen was required for the high-nitrogen fertility area to meet project requirements. Table 1 refers to the soil residual and applied nutrient levels of the field and test area.

Pioneer variety 45H21 was seeded on May 21st at a seeding rate of 4.25 lb./acre. RoundUp Weathermax was sprayed at 0.5 L/acre to control in crop weeds. No fungicide applications occurred.

Table 1. Spring soil residual and applied nutrients – Pederson site

Nutrient	Residual	Spring Applied	
	60 cm (24")	Field	Test Area
	lb./acre actual		
NO_3-N	117	0	92
P	52	10	10
K	1380	10	10
SO_4-S	163	0	0

Irrigation Scheduling

Tensiometers and Watermark™ sensors were installed in one location of the field at 15, 45 and 76 centimeter depths (6, 18, 30 inches). A rain gauge was placed at the site to measure irrigation applications. Soil was sampled at 30 centimeter (12 inch) increments, to the 1.2 meter (48 inch) depth, to determine spring soil moisture content by gravimetric analysis. Table 2 shows spring soil moisture levels.

Irrigation scheduling recommendations were provided to the co-operator weekly, calculated from the equipment readings, available soil moisture and crop water use. Table 3 provides a summary of the rainfall, irrigation and crop consumptive use data as documented by the Alberta Irrigation Management Model.

Table 2. Spring soil moisture – May 23rd

Texture	Depth		Available Moisture		
	cm	inches	%	mm	inches
Clay loam	0-30	0-12	31	17	0.67
Silty clay loam	30-60	12-24	40	22	0.87
Silty clay	60-90	24-36	56	35	1.3
Silty clay	90-120	36-48	106	67	2.6

Table 3. Moisture data collected from May 23rd to September 2nd

Rainfall (mm)	169
Gross Irrigation (mm)	219
Total (mm)	**388**
Crop Consumptive Use (mm)	301

Yield Measurement

The field was swathed on September 2nd and harvested September 29th. Areas from the field and high nitrogen fertility area were harvested and weighed, using a weigh wagon, separately. Yield data is presented in Table 4.

Table 4. Pederson yield data – September 29th

Treatment	Area Acres	Weight Pounds	Yield bu./acre
High Nitrogen Area	0.370	932	50.4
Field	0.629	1395	44.3

ii) Irrigated Canola Fertility and Management Demonstration – Bagshaw Site

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Producer Co-operator: Kelvin Bagshaw, Birsay, SK

Project Objective

To document the management practices, crop inputs and crop development of an irrigated canola crop with a comparison to an in-field, high-nitrogen fertility area.

Demonstration Site

NE 31-24-7 W3
The demonstration field is located within the Luck Lake Irrigation District, which supplies irrigators' water by pressurized pipelines. A high pressure impact sprinkler pivot is operated on this site. Previous crop in 2007 was field peas, yielding 50 bu./acre. Soil textures of this field are a loam to fine sandy clay loam over a clay loam.

Project Methods and Observations

Establishment and Crop Management

A fall soil test indicated residual soil nitrogen levels to be 49 lb./acre in the top 30 centimeters (12 inches). To meet the project objective, the high nitrogen test area required an additional 160 pounds actual nitrogen. Table 1 summarizes the fertility plan. Pioneer variety 45H26 was seeded on May 3rd at a seeding rate of 4.9 lb/acre. Two applications of Roundup Weathermax, at 0.33 L/acre, were performed on May 18th and June 2nd. An aerial application of Proline fungicide occurred on July 7th.

Establishment of this field was poor and resulted in varied crop development stages throughout the season. The field suffered significant stem damage from a hail storm on June 26th. This resulted in the field being severely affected by disease pressures of blackleg and other secondary infections.

Table 1. Fall soil residual and spring applied nutrients – Bagshaw site

Nutrient	Residual	Spring Applied		
	30 cm (12")	Seeding	Broadcast	
			Field	Test Area
	lb./acre actual			
NO_3-N	49	10	130	180
P	43	25	10	10
K	>1080	0	0	0
$S0_4$-S	>86	5	0	0

Irrigation Scheduling

The demonstration site was equipped with tensiometers and Watermark™ sensors, installed at 15, 45, 76 centimeter depths (6, 18, 30 inches). Spring soil moisture was measured by gravimetric analysis (Table 2). Irrigation scheduling field reports were recommended to the co-operator weekly, based on equipment readings, crop water use and available soil moisture. Table 3 summarizes rainfall, irrigation and crop consumptive use data as recorded in the Alberta Irrigation Management Model.

Table 2. Spring soil moisture – May 23rd

Texture	Depth		Available Moisture		
	cm	inches	%	mm	inches
Sandy clay loam	0-30	0-12	54	27	1.0
Sandy clay loam	30-60	12-24	67	34	1.3
Sandy clay loam	60-90	24-36	58	29	1.1
Sandy clay loam	90-120	36-48	52	26	1.0

Table 3. Moisture data collected from May 23rd to August 27th

Rainfall (mm)	146
Gross Irrigation (mm)	241
Total (mm)	**387**
Crop Consumptive Use (mm)	319

Yield Measurement

The field was swathed on August 27th and harvested on September 18th. Yield was measured from the field and high nitrogen test area (Table 4). This site was affected by adverse growing conditions including variable crop establishment, cool spring temperatures, hail damage and disease incidence, all of which negatively affected the yield potential.

Table 4. Bagshaw yield data – September 18th

Treatment	Area Acres	Weight Pounds	Yield bu./acre
High Nitrogen Area	0.718	1934	53.9
Field	0.718	1830	50.9

Final Discussion

The yield advantage from increased nitrogen applications, 3 bu./acre and 6.1 bu./acre, is marginal based on results from this demonstration project. Production benefits were measured against the economic costs and benefits to determine if the high nitrogen rate was cost effective (Table 5).

Table 5. Economic comparison of high nitrogen fertility rates related directly to the difference in nitrogen applications.

Site	N Difference Pounds	N cost* $	Yield gain bu./acre	Yield gain** $/acre	Net $** $/acre
Pederson	92	51.52	6.1	73.20	21.68
Bagshaw	50	28.00	3.0	36.00	8.00

*Based on nitrogen price of $.56/lb. (ICDC Irrigation Economics and Agronomics, January 2008)
**Based on canola market price of $12/bu. (ICDC Irrigation Economics and Agronomics, January 2008)

Extension

An irrigated canola field event was held on the afternoon of July 10th at CSIDC. Discussion topics focused on irrigation scheduling, disease and pest management and the CSIDC/ICDC canola variety trials. The event offered producers the opportunity to ask questions of Ministry of Agriculture disease, insect and irrigation specialists.

7. Other Activities

a) Gopher Field Day

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-Investigator: Nicole Beatty, Co-op Student

Co-operator:

- **Andy Perrault**

Project Objective

To showcase and evaluate the different methods of control for the Richardson's Ground Squirrel.

Demonstration/Project Plan

ICDC held a Gopher Information Day on the Ponteix Irrigation District June 16 with about 100 producers attending. It included three speakers. Scott Hartley, Saskatchewan Ministry of Agriculture's Insect and Pest Management Specialist described the life cycle and biology of the Richardson's Ground Squirrel. Cameron Wilk from the Ministry's Inspection and Regulatory Management Branch spoke on the availability of different control products. Dr. Gilbert Proulx from Alpha Wildlife Research and Management Ltd gave a description of the research project he has initiated near Mankota. The day finished off with live demonstrations of five different methods of control.

Speakers

Scott Hartley

Cameron Wilk

Dr. Gilbert Proulx

Demonstration Site

SW33-09-12-W3
This field day was held near Andy Perrault's farm on one of his plots at the edge of the Ponteix Irrigation District.

Demonstrations

Varmit Getter

This product uses a mixture of propane and oxygen which is injected into the burrow. The gas mixture is set off causing a concussion blast that travels down the burrow.

Benefits
- remotely detonated
- no poison, humane
- kills in the burrow
- collapses the burrow*

Concerns
- a couple minutes at each hole

Costs about $2000, plus propane and oxygen
Call Evan Dewar (403) 835-8648 to order

Rodenator

This product is similar to the Varmit Getter in that it uses propane and oxygen to cause a concussion blast.

Benefits
- remotely detonated
- no poison, humane
- kills in the burrow
- collapses the burrow*

Concerns
- a couple minutes at each hole

Costs about $2000, plus propane and oxygen
Call Bob Dierdall (403) 620-4038 to order

*Although both the Varmit Getter and Rodenator collapse the hole it is probably not complete enough to plug a hole through an irrigation canal.

RoCon

This product uses expanding mustard foam to asphyxiate the gophers. The mustard is an irritant that causes them to breathe in the foam and they die by drowning.

Benefits
- no poison
- humane, kills quickly
- kills in the burrow

Concerns
- a couple minutes at each hole

Costs about $1600 plus $20-25 per jug of foam which does 50-75 holes
Call Earl Greenhough (780) 721-9894 to order.

The Gophinator

The Gophinator

This product injects anhydrous ammonia into the burrow to control gophers. It's heavier than air and sinks into the burrow.

Benefits
- anhydrous ammonia is a fertilizer
- humane, kills quickly
- kills in the burrow

Concerns
- a couple minutes at each hole
- you need a source of anhydrous ammonia
- you need a license to apply it (it's corrosive)

Costs about $4000 plus the ammonia
Call Gary or Norm Maze (306) 398-2637 to order.

Lee's Trap Works

This is an upgraded, easier to set, easier to move trap compared to the old types.

Benefits
- easy to set and move
- humane, kills quickly
- confirmed kills
- no poison

Concerns
- you need to reset it after each kill
- you might lose it

Costs about $16.50
Call Leroy Schwartz (306) 778-2083 to order.

Poisons

There are three types of poisons – Fumigants, Acute and Anti-coagulants.

Fumigants

The most common fumigant is aluminum phosphide or **Phostoxin**. It comes as a small white pellet similar to a moth ball that is placed into the burrow. When the pellet gets wet it releases a phosphine gas that displaces oxygen in the bloodstream. Warm conditions enhance its release. The hole should also be closed. You need to have a valid pesticide applicators license to purchase and apply it. Symptoms of human poisoning include a pressing sensation in the chest, nausea, and unconsciousness. If gas is inhaled, remove to fresh air and keep warm. If swallowed, induce vomiting.

Acute Rodenticides

The two most common acute rodenticides are **Strychnine** and **Zinc Phosphide**. Both only require a single feeding to kill. There are several formulations of each. The wet formulations of strychnine are supposed to work better than the dry ready to use formulations although neither the wet or dry are very palatable to the gophers. Take care to use clean whole grain for mixing the wet formulation.

Some people report adding salt or a licorice flavoring helps with the acceptance of the bait. Most wet formulations already have some of this included.

Strychnine enters the bloodstream and affects the nervous system. It results in continuous uncontrolled reflex action causing muscles to contract and contra muscles to tear. It does not prevent pain and can cause secondary poisoning. For this reason strychnine is not to be used in bait stations or applied above the ground. When it is applied the hole is to be closed after application. Human symptoms of light poisoning include anxiety, fear, restlessness, muscle spasms, rigid arms or legs, and dark urine. Higher levels of exposure lead to respiratory failure and brain death within 15-30 minutes of exposure. If ingested, do not induce vomiting. If exposed on the skin, wash with soap and water.

The wet formulation was available in Saskatchewan from certain rural municipalities in 2008 on an emergency basis. This is likely to occur again in 2009.

Zinc Phosphide is not water soluble but will produce phosphine gas in the presence of moisture. However it is much more rapid in a dilute acid such as stomach acid. It is readily absorbed into the blood stream and displaces oxygen. It is less toxic than strychnine and can take up to 30 hours. Early symptoms in humans include nausea, vomiting (with garlic smelling vomitus), abdominal pain, chest tightness, excitedness and feeling cold. Victims recover if they survive the first three days. One beneficial feature is that rodents cannot vomit.

Anticoagulants

Chlorophacinone and diphacinone are the two active ingredients for **Rozol** and **Ramik Green** respectively. These are the two most common anticoagulant rodenticides. These are multiple dose rodenticides and rely on a cumulative toxic effect. It is a blood thinner and prevents coagulation of the blood when wounded. When gophers fight and inflict wounds on each other they bleed to death or rats bleed internally when they squeeze through small openings. The delay in mortality has a safety advantage as it provides time to administer an antidote (Vitamin K). Fresh green vegetation, particularly alfalfa, has small amounts of Vitamin K. So these poisons work best in early spring before the vegetation starts growing. Both the Rozol and Ramik Green products have good palatability and are allowed in above-ground bait stations.

b) Irrigation Disease Ratings for Grain Crop Varieties

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Co-Investigators: Myriam Fernandez, Agriculture and Agri-Food Canada (AAFC) Cereal Pathologist, Swift Current
Terry Hogg, CSIDC

Project Objectives

- Update the disease resistance ratings for new varieties of wheat crops under irrigated conditions.
- Gain experience in diagnosing and assessing severity of diseases in wheat crops.

Project Plan and Results

Fusarium head blight (FHB) and leaf spots (mainly Tan Spot and Septoria Leaf Spots) reduce quality and yield of wheat on dryland and irrigation in Saskatchewan. Data on variety responses to these diseases is incomplete. Dr. Myriam Fernandez provided instructions and advice on how to rate the varieties for FHB and provided a leaf disease scale to use for rating fungal leaf spots. Ratings of leaf and head diseases were taken in CSIDC's wheat variety trials. The two locations of the ICDC Wheat Variety Trial with the most disease pressure were evaluated for relative amounts of leaf disease and FHB. The Pederson and Knapik sites of the trial had both leaf diseases and FHB present, and there were noticeable differences among the responses in the trials.

Technology Transfer

The data collected at these two sites will be used in the Varieties of Grain Crops publication, produced by Saskatchewan Agriculture. Dryland locations of the wheat variety trials often do not have enough disease development to distinguish between resistant and susceptible responses of varieties. This new information will be available and useful to dryland farmers across the province. It will be especially useful to irrigation farmers in making decisions to manage diseases in their irrigated cereals. It also gives irrigation agrologists the information they need to make variety recommendations to irrigation farmers.

c) Dry Bean Plot Tour at CSIDC

Project Lead: Lana Shaw PAg, Provincial Irrigation Agrologist

Project Objective

Irrigation bean producers and industry were introduced to the new dry bean breeder Dr. Parthiba Balasubramanian from Agriculture and Agri-Food Canada (AAFC) in Lethbridge. A field tour was organized to review progress on new varieties suited to irrigated production in Saskatchewan.

Project Plan and Results

ICDC hosted a visit by Dr. Parthiba Balasubramanian to come to Outlook and lead a plot tour of their new material. The dry bean program at AAFC Lethbridge has been generating dry bean varieties of a number of different market classes which are very well suited to irrigated production in Saskatchewan. Their breeding plots are located in Alberta under irrigation. AC Polaris, AC Redbond and Resolute were generated from this program and have been grown commercially with good success. AC Island is the most promising pinto variety to be released. Viterra supports the bean breeding program and has first choice of the varieties registered from that program. Viterra's Alberta bean business unit contracts bean acres in the irrigated areas of Alberta and Saskatchewan for processing at its Alberta plants.

Dry bean growers and bean industry representatives were present for the tour held on July 24. There were many questions about yield, diseases, varietal resistance to those diseases, and other factors in developing new dry bean varieties. Terry Hogg, who manages and overseees the maintenance of the trials for the breeders, also provided insight into the varieties and their performance.

d) South West Fruit and Vegetable Initiative

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Co-Investigators: Lana Shaw PAg, Provincial Irrigation Agrologist
Korvin Olfert PAg, Provincial Irrigation Agrologist

Producer Co-operators:

- **Linda and Maurice Metke, Treasure Valley Market, Cadillac, SK**
- **Marty and Marie Bohnet, Cypress Hills Winery, Maple Creek, SK**

Project Objective

- To explore opportunities to diversify into high value irrigation crops, such as fruit and vegetables, in the south west.
- Build relationships with south west irrigators who are utilizing good quality irrigation water and/or high efficient irrigation systems to produce ultra value crops.

Demonstration/Project Plan

Assist two sites in the South West (Treasure Valley Markets at Cadillac and the Cypress Hills Winery at Maple Creek) with irrigation scheduling by installing tensiometers. Agrologists will network with existing producers in the area to identify opportunities and constraints for expansion of acres into ultra value crops. ICDC staff will identify the needs for extension events or demonstration projects that could occur in the future.

Demonstration Site

Treasure Valley Market
SW 30-10-13 W3
The Metke Farm was established in 1912 and with the installation of a 75 acre foot, rain fed, stock watering dam in the early 1930s. Treasure Valley Markets has grown to about 33 acres and grows vegetables such as potatoes, corn, peas and lettuce and also less traditional vegetables like asparagus. Fruit production dominates, however, with the production of saskatoons, strawberries, raspberries and chokecherries. The soil texture is a clay loam over clay with cobble rock.

Cypress Hills Winery
NW 32-9-29 W3
The winery was built in 2006.The Bohnet's currently have two vineyards on site totaling approximately 4.5 acres of grapes in production. The winery irrigation water source is spring delivery from Downie Lake into a dugout. The soil texture is silty clay over a clay loam.

Project Methods and Observations

Data Collection

Tensiometers were installed in four locations at the Cypress Hills Winery on June 5. Within the north vineyard two scheduling sites were chosen to account for a slight change in topography. In the south vineyard, there were scheduling sites installed in an old planting and a new planting of grapes. Tensiometers were installed at depths of 30 and 60cm (12 and 24 inches) for each scheduling site. The tensiometers were monitored and maintained several times throughout the irrigation season.

Tensiometers were installed at four locations at Treasure Valley Market on June 5th. The sites were located in the strawberries, saskatoons, raspberries and cabbage. Each location had two depths of 30 and 60 cm (12 and 24 inches). The tensiometers were monitored and maintained several times throughout the irrigation season.

Technology Transfer

An evening field tour was held at Treasure Valley Market on July 8. The focus of the event was to provide attendees with technical information specific to fruit and vegetable production and irrigation scheduling. Ministry of Agriculture Provincial Vegetable Specialist Connie Achtymichuck, PAg and Provincial Fruit Specialist Forrest Scharf, PAg spoke to topics of their areas of specialization. David Larson, PAg. Soil and Nutrient Management Specialist at the Agriculture Knowledge Centre discussed soil fertility needs of market gardens. Irrigation agrologists Sarah Sommerfeld, PAg and Korvin Olfert, PAg spoke on irrigation scheduling and irrigation water quality. The event was well received with approximately 100 people in attendance.

Final Discussion

The South West Fruit and Vegetable Initiative implemented by ICDC in 2008 was meant to improve our understanding of vegetable and fruit production in the south west and to raise awareness of the opportunities for utilizing irrigation water to produce high value crops among current and potential irrigators. The contacts developed through the project included Treasure Valley Market at Cadillac, Cypress Hills Winery at Maple Creek and a number of Hutterite colonies.

Treasure Valley Market is a mature market garden that is and can continue to be a source of information for gardeners in the South West.

Cypress Hills Winery owners were open to working with ICDC and were open to learning more about irrigation of wine grapes, a very specialized field of irrigation. There is much to be learned by staff about irrigation of grapes. The question to be answered is should this become an ongoing priority for ICDC? Is there potential in the south west for an expansion of commercial wine production or is this a tourism issue? This has not been answered.

Contacts with several Hutterite colonies enabled staff to identify a need for ongoing information on fruits and vegetables by the colonies. However, the need is more general and is more related to agronomy and marketing then it is to irrigation management. There would be value in having provincial specialists hold a horticulture information meeting or field day specifically targeted to the colonies in the south west. Potential to expand horticultural production in the south west appears to be limited at this time but may expand if the “grow local” idea develops.

e) South West Survey

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-operators:

- **Each of the 13 irrigation districts in the southwest**

Project Objective

A survey was completed in 1999 of all the irrigation districts in southwestern Saskatchewan to determine the priorities that ICDC should be working on. This was repeated during the winter of 2007/2008. The two main objectives were to determine the crop distribution over the acreage and to determine the priorities that ICDC should focus on in the future.

Project Plan

An irrigation agrologist went to each of the 13 irrigation district annual meetings in the south west. A map of each project was brought along where the patrons could point out their plots and what they were growing. A copy of the results of the survey from 1999 was brought along. For each of the items in the survey the patrons had a chance to say if ICDC should continue to do those things or not. There was opportunity for new ideas for research and demonstration projects to be brought forward.

Observations

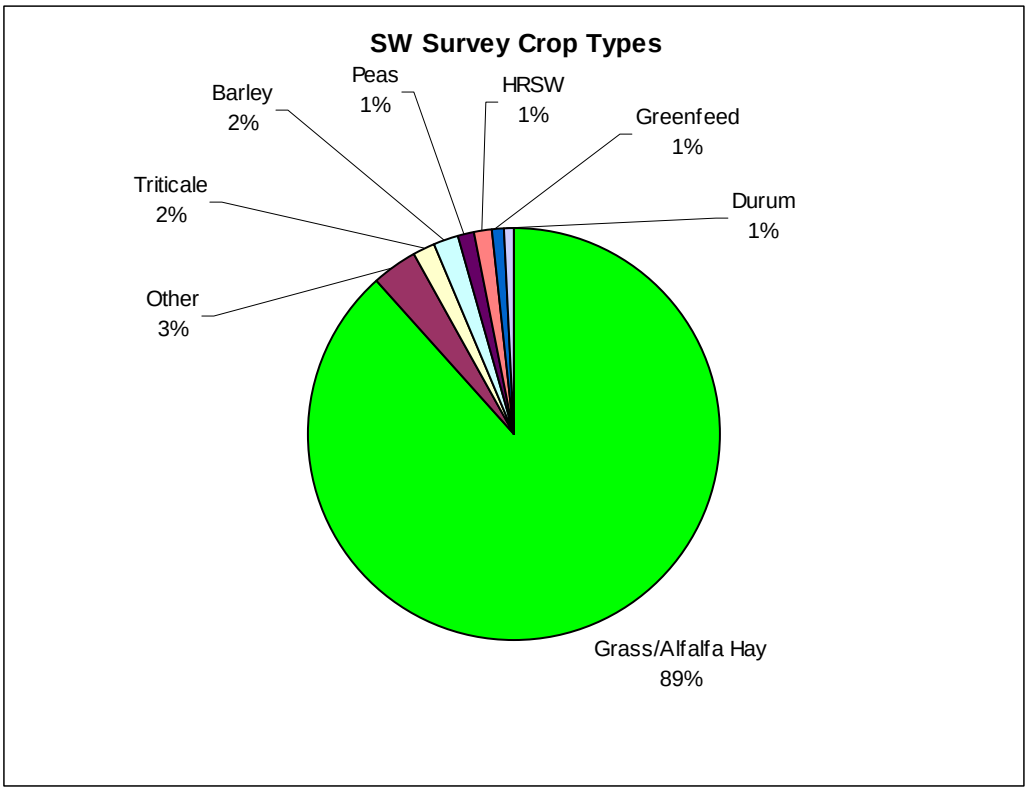
Data Collection

An ICDC representative attended each of the following meetings

Chesterfield ID (685 acres, flood), Feb. 5
Consul-Nashlyn ID (3,485 acres, flood), March 28
Eastend (2,878 acres, flood), Feb. 7
Herbert ID (1,667 acres, pivots), March 27
Lodge Creek ID (970 acres, flood), April 1st
Maple Creek (2,039 acres, flood & pivots), Feb. 8
Middle Creek ID (1,087 acres, flood), March 13
Miry Creek ID (1,551 acres, sprinkler), April 2
North Waldeck ID (1,639 acres, flood), April 23
Ponteix ID (1,495 acres, flood & pivots), April 8
Rush Lake ID (3,394 acres, flood), April 7
Val Marie (6,600 acres, flood), May 2
Vidora ID (2,436 acres, flood), March 13

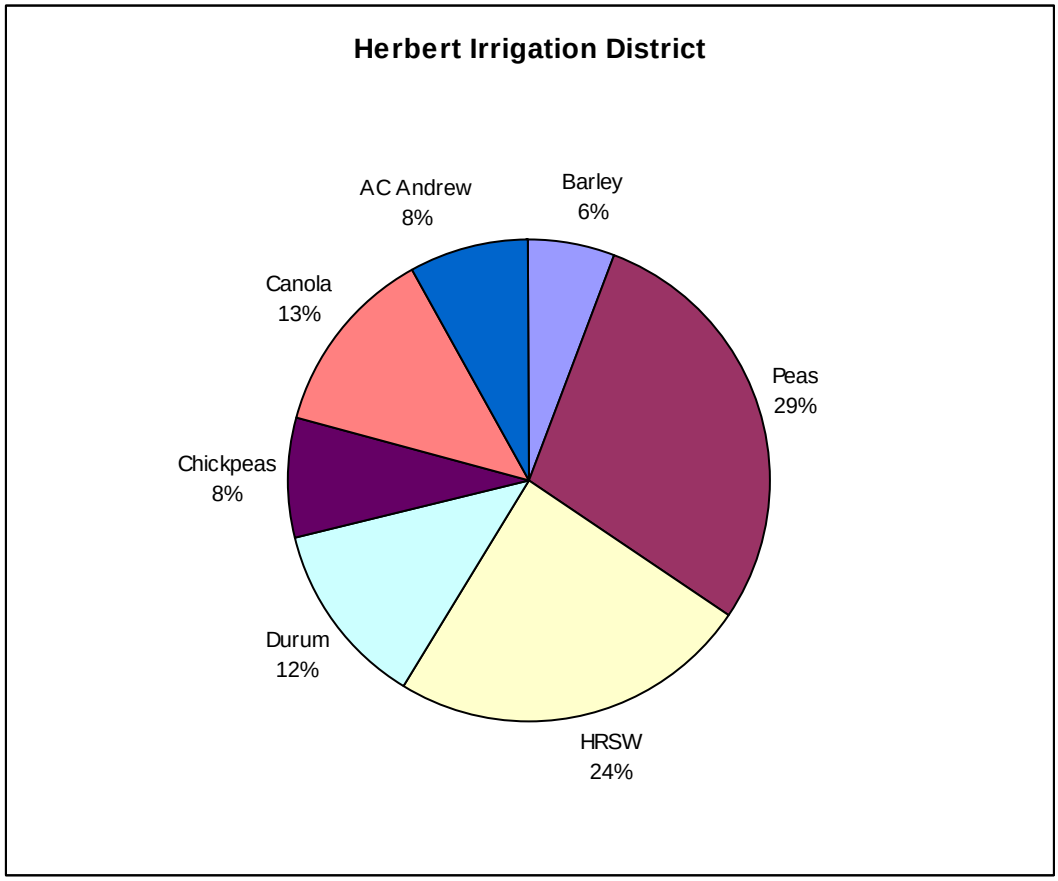
Objective 1
To determine the crop distribution

Figure 1. Crop distribution of the irrigation projects in the south west



The majority (89 per cent) of the acres grow a grass alfalfa mix for hay. Most of the remaining acres (seven per cent) are cereals. Generally one could consider this rotation as growing a grass/alfalfa hay stand for eight to nine years and then rotate into an annual crop before reseeding the hay. This would be true for most of the projects with one notable exception. The Herbert Irrigation District is composed of all pivots with one set of wheel moves. The crop distribution is similar to that of the Lake Diefenbaker Development Area.

Figure 2. Crop distribution of the Herbert Irrigation District.



Objective 2
To determine the priorities for ICDC future projects

The top 15 topics from the 1999 survey that ICDC should continue to pursue are:

- Alfalfa Reseeding Techniques
- Dandelion Control in Alfalfa
- Pocket Gopher/Gopher Control
- Forage Production Centers tied to Livestock Feeding
- Forage Mixes for Grazing
- Zero Tillage/Direct Seeding
- Alfalfa Fertilizer Economics
- Deer Damage on Alfalfa and Irrigation Ditches
- Salinity Control
- Grass Seed Varieties for Irrigation
- Willow Control in Ditches
- Banding Liquid Fertilizer to Rejuvenate Alfalfa
- Strengthen Links between Irrigated Crops and Livestock
- Moisture Content for Baling Hay and for Silage
- Saline Tolerant Forages

The top 10 topics from the 1999 survey that ICDC should no longer pursue as research and demonstration projects are:

- Soybean Varieties
- Irrigation Crop Clubs
- Sugar Beet Production
- Potato Test Plots
- Dry Beans in Rotation with Potatoes
- Chickpeas
- Hemp Irrigation
- Precision Farming
- Wheat Midge Crop Susceptibility
- Chemigation Registration

New Suggestions:

- Gopher Control (4x)
- Effective Fertilizer Application on Alfalfa (2x)
- Install Hawks Nests for Non-Toxic Gopher Control
- Better Canada/USA Agreement for Low Volume Releases
- Aeration on Older Grass/Alfalfa Stands
- Methods of Rotating Out of Hay and into Cereal/Oilseed and Back

Final Discussion

Most of the irrigation in the south west projects grow grass/alfalfa hay. The research priorities for ICDC are consistent with this cropping rotation. The research priorities for ICDC are generally consistent with this production.

8. Scheduling Projects

a) Irrigation Scheduling and Crop Development Projects

Project Lead: Sarah Sommerfeld PAg, Provincial Irrigation Agrologist

Producer Co-operators:
- **Barry and Elayna Vestre, Outlook, SK**
- **Scott Anderson, True North Seed Potato Company, Outlook, SK**

Project Objective

- Monitor soil water conditions, crop water use and crop development to assist producers to schedule irrigation operations.
- To utilize the Alberta Irrigation Management Model to forecast an irrigation requirement.

Project Plan

Each field site was equipped with tensiometers, Watermark™ sensors and irrigation and rainfall gauges. Weekly visits to each site required reading of the equipment and determining soil moisture by feel. Based on these results, calculation of the available soil water and daily crop water use, an irrigation scheduling recommendation was provided to the co-operator.

Irrigation and rainfall amounts and updated climate data was inputted into the Alberta Irrigation Management Model (AIMM) and the program provided a scheduling recommendation that was used to cross reference the field report.

Demonstration Sites

True North Seed Potato
SW 35-29-8 W3
Crop: Dark Red Norland Potato
Soil Texture: Fine sandy loam in top 60 centimeters (24 inches) over loamy sand to sand

Barry and Elayna Vestre
SE 17-28-7 W3
Crop: Pioneer 53V52 Alfalfa
Establishment Year: 2006
Soil Texture: Fine sandy loam to a loam over clay loam

Barry and Elayna Vestre
SE 17-28-7 W3
Crop: Pioneer 39B90 RR Corn 2250 CHU
Soil Texture: Loam to clay loam over clay loam

Project Methods and Observations

Data Collection

Spring Soil Moisture
Spring soil moisture was determined for each site by gravimetric analysis to the depth of 1.2 meters (48 inches). Tables 1 through 3 present the spring soil moisture data for the potato, corn and alfalfa sites respectively.

Table 1. Spring soil moisture – True North potato site – May 28th

Texture	Depth		Available Moisture		
	cm	inches	%	mm	inches
Sandy loam	0-30	0-12	51	21	0.8
Sandy loam	30-60	12-24	78	33	1.3
Loamy sand	60-90	24-36	0	0	0
Loamy sand	90-120	36-48	0	0	0

Table 2. Spring soil moisture – Vestre corn site – May 27th

Texture	Depth		Available Moisture		
	cm	inches	%	mm	inches
Loam	0-30	0-12	75	38	1.5
Clay loam	30-60	12-24	96	54	2.1
Clay loam	60-90	24-36	77	42	1.7
Clay loam	90-120	36-48	69	37	1.5

Table 3. Spring soil moisture – Vestre alfalfa site – May 23rd

Texture	Depth		Available Moisture		
	cm	inches	%	mm	inches
Sandy loam	0-30	0-12	0	0	0
Loam	30-60	12-24	34	17	0.7
Clay loam	60-90	24-36	57	32	1.3
Clay loam	90-120	36-48	33	19	0.7

Moisture and Consumptive Use

Moisture data was collected and totaled from the irrigation and rainfall amounts recorded for each crop. The consumptive use information was calculated by the AIMM program through daily climate updates and accounts for crop development stage. Tables 4, 5 and 6 illustrate the accumulated rainfall and irrigation amounts in comparison to the crop consumptive use. The following data in Tables 4, 5 and 6 is collected from the Alberta Irrigation Management Model.

Table 4. True North Seed Potato site moisture data collected from May 28th to August 16th.

Rainfall (mm)	127
Gross Irrigation (mm)	228
Total (mm)	**355**
Crop Consumptive Use (mm)	244

Table 5. Vestre corn site moisture data collected from May 27th to September 30th.

Rainfall (mm)	164
Gross Irrigation (mm)	249
Total (mm)	**414**
Crop Consumptive Use (mm)	398

Table 6. Vestre alfalfa site moisture data collected from May 23rd to September 30th.

Rainfall (mm)	109
Gross Irrigation (mm)	292
Total (mm)	**401**
Crop Consumptive Use (mm)	365

Final Discussion

Based on Environment Canada data, the 2008 growing season began with a cool and dry May and June, followed by an average temperature July with slightly below amounts of rainfall and a warmer and wetter than normal August. Tables 7 and 8 summarize the normal climate data and the 2008 growing season monthly climate data, respectively.

Referring to the data presented in Tables 4 to 6 and Figures 1 to 3 (on the following page), the water use curves indicate that the potato and corn crop soil profiles were generally maintained within the field capacity and allowable depletion thresholds. The consumptive use of the alfalfa crop was less then the total rainfall and gross irrigation (refer to Table 5), but spring soil moisture was severely depleted (Table 2). This deficit resulted in the irrigator being unable to fill the soil profile and continue to meet crop demands. Irrigation operation limitations resulting from growing four different forage crops under one system may have contributed to the co-operators being unable to successfully replenish the soil profile and meet alfalfa water demands.

Table 7. Normal temperature and precipitation values for Outlook from 1971-2000.

	May	June	July	August	September
Daily Average Temperature (^{o}C)	11.8	16.4	18.6	17.9	12.2
Total Precipitation (mm)	44.3	63.7	57.1	38.3	27.6

Table 8. Recorded monthly temperature and precipitation values for Outlook in 2008.

	May	June	July	August	September
Mean Temperature (^{o}C)	11.19	15.12	18.3	18.6	12.2
Total Precipitation (mm)	5.8	44	43	43.8	5.4

Figure 1. Crop water use curve – True North Seed Potato site

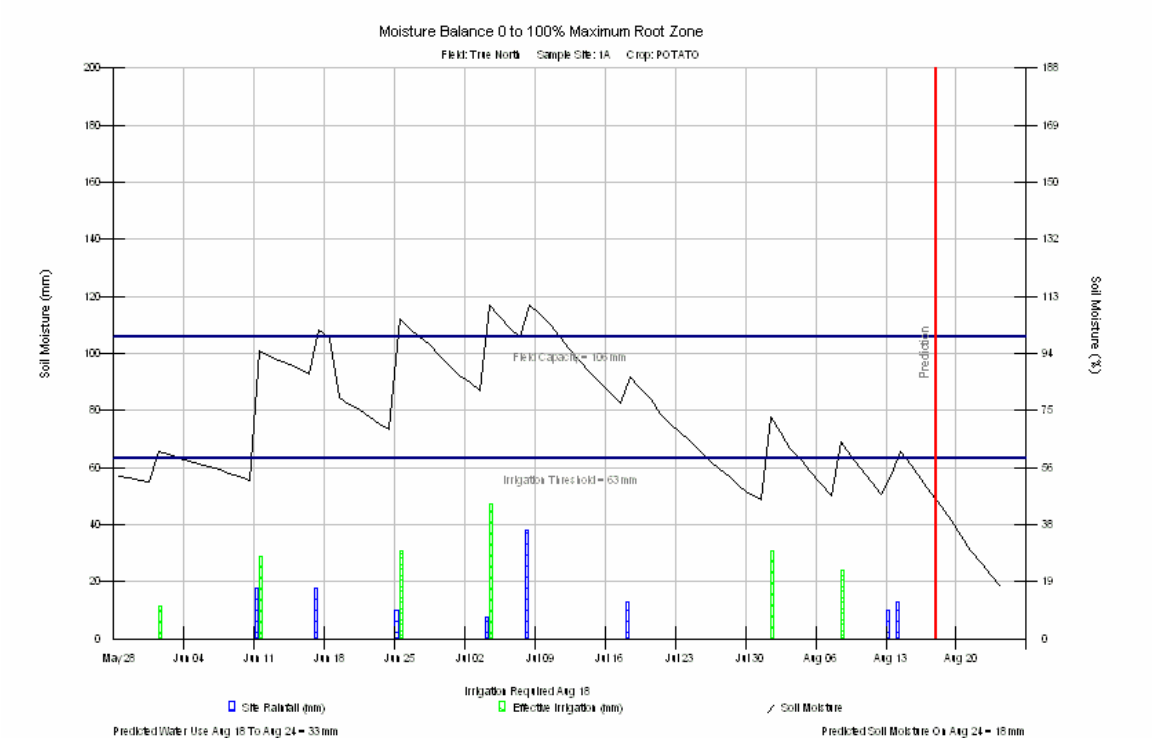


Figure 2. Crop water use curve – Vestre corn site

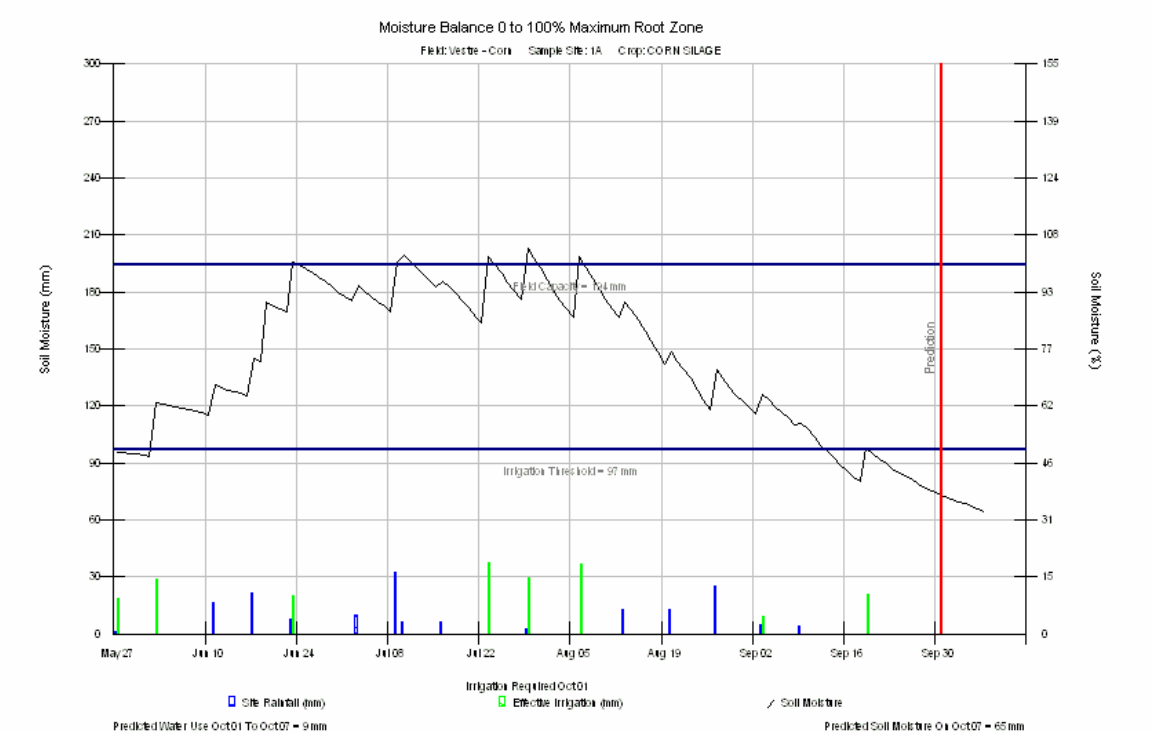
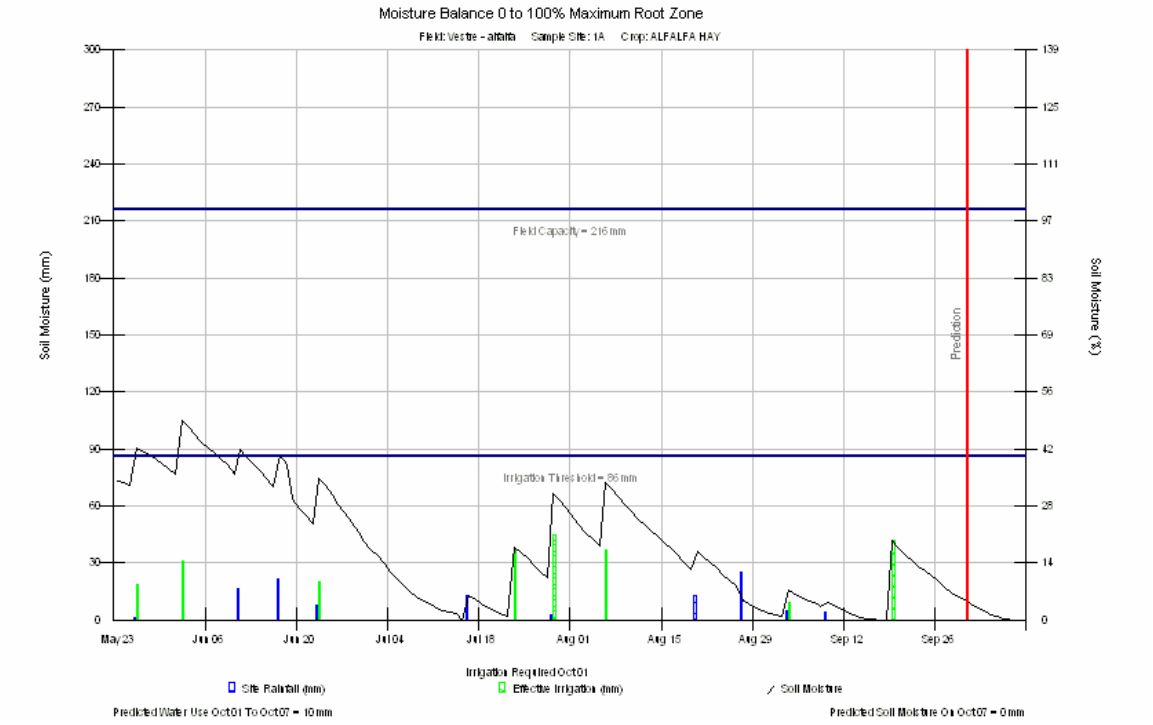


Figure 3. Crop water use curve – Vestre alfalfa site



Irrigation scheduling projects and extension will continue to be a significant focus of irrigation agrologists in the 2009 growing season.

b) Herbert Irrigation Scheduling Demonstration Site

Project Lead: Korvin Olfert PAg, Provincial Irrigation Agrologist

Co-Investigator: Nicole Beatty, Co-op Student

Co-operator:

- **Ron Mathies**

Project Objective

To monitor soil water conditions and compare to predictions from the Alberta Irrigation Management (AIM) Model to actual water consumption.

Demonstration/Project Plan

Each field had tensiometers (30 cm, 60 cm, and 90 cm depths) and gypsum blocks (30 cm, 60 cm, and 90 cm depths) installed as well as a rain gauge to measure actual water applied. A weekly visit was conducted to read the equipment and collect soil for gravimetric analysis (30 cm, 60 cm, and 90 cm depths).

Demonstration Site

There were three sites with three different crops all located on the Herbert Irrigation District. These sites were all under pivots with drop tubes with no water timing restrictions.

AC Barrie HRSW
SE11-17-10-W3, 150 acres, Clay Loam over a Silty Clay Loam
Previous Crop: Canola
Seeding Date: May 12
Seeding Rate: 1.5 bu./acre
Soil Test: 40 lbs N, >108 lbs P, >1080 lb. K, >86 lb. S
Fertilizer added: 140 lb. of 34-17-0
Herbicide Treatment: Glyphosate burn off, Horizon and Target
Swathed Sept 12, Combined Sept.19
Yield: 50 bu./acre

Golden Peas
NW14-17-10-W3, 130 acres, Clay Loam over a Silty Clay Loam
Previous Crop: AC Barrie
Seeding Date: Apr 23
Seeding Rate: 3 bu./acre
Soil Test: 61 lbs N, 48 lb. P, >1200 lb. K, >96 lb. S
Fertilizer added: only inoculants
Herbicide Treatment: Glyphosate burn off, Odyssey
Desiccated Aug 12, Combined Aug 31
Yield: 30 bu./acre

Canterra 1841 RR Hybrid Canola
SW14-17-10-W3, 120 acres, Silty Clay Loam over a Silty Loam
Previous Crop: Peas
Seeding Date: Apr 28
Seeding Rate: 5 lbs/acre
Soil Test: 83 lbs N, >108 lb. P, >1080 lb. K, >86 lb. S
Fertilizer added: 140 lb. of 34-17-0
Herbicide Treatment: Glyphosate burn off, & two applications in crop
The canola site was moved on July 4 due to low emergence. It was relocated to an area where emergence was better. A portion of the field was reseeded to AC Barrie HRSW.
Swathed Aug 23, Combined Sept 30
Yield: 55 bu./acre

Project Methods and Observations

Figure 1. Crop water use curve for AC Barrie HRSW

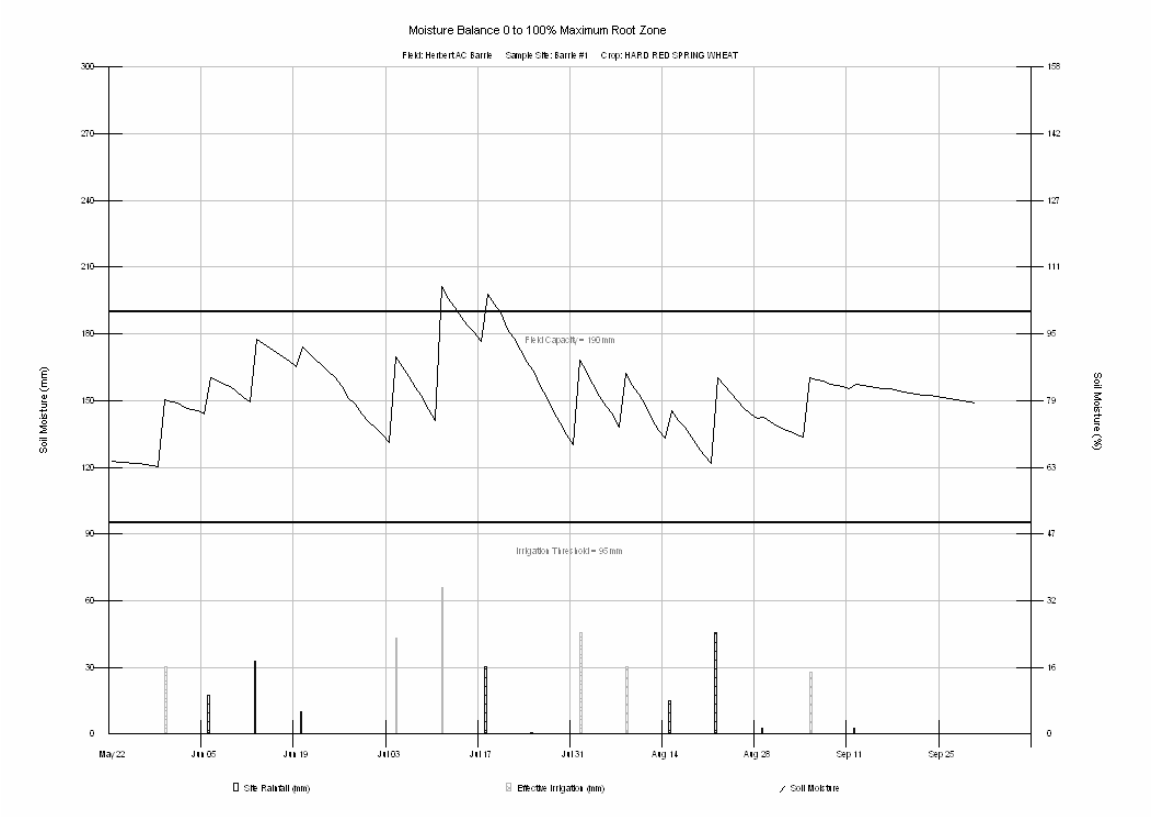


Figure 2. Crop water use curve for Golden Peas

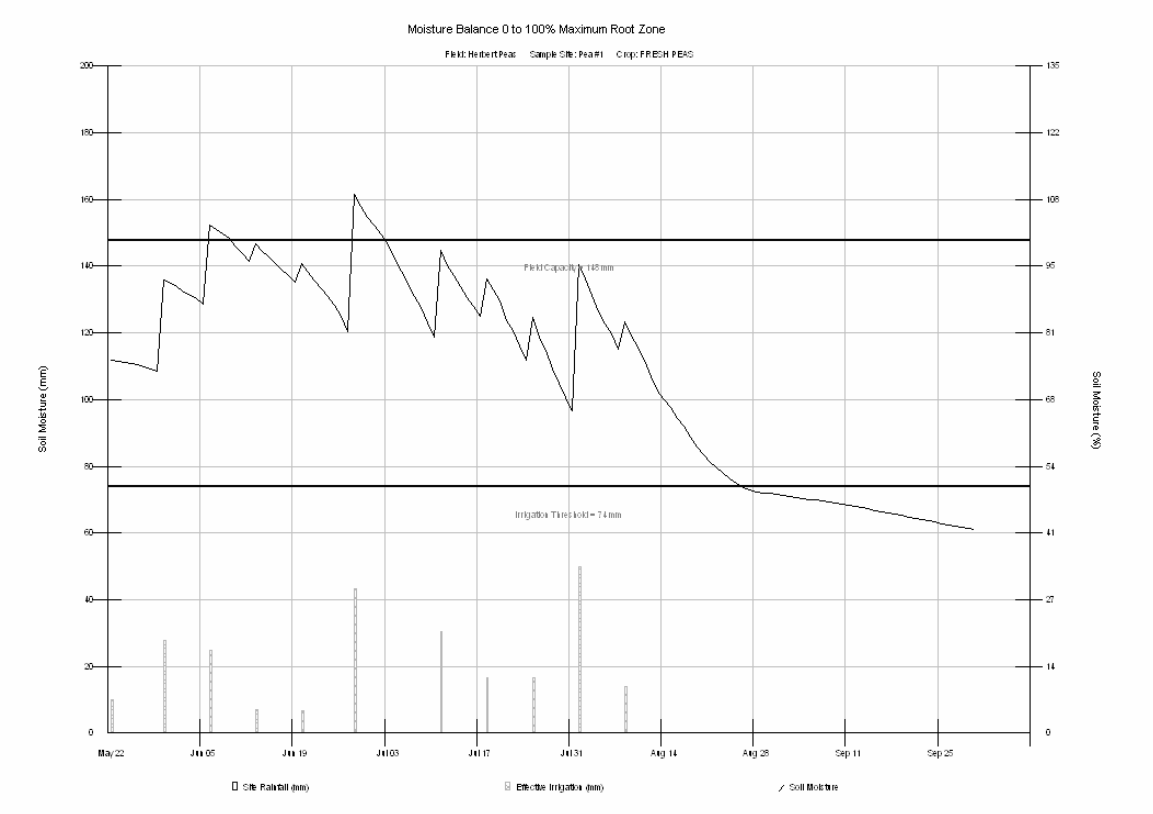


Figure 3. Crop water use curve for Canterra 1841 Hybrid Canola

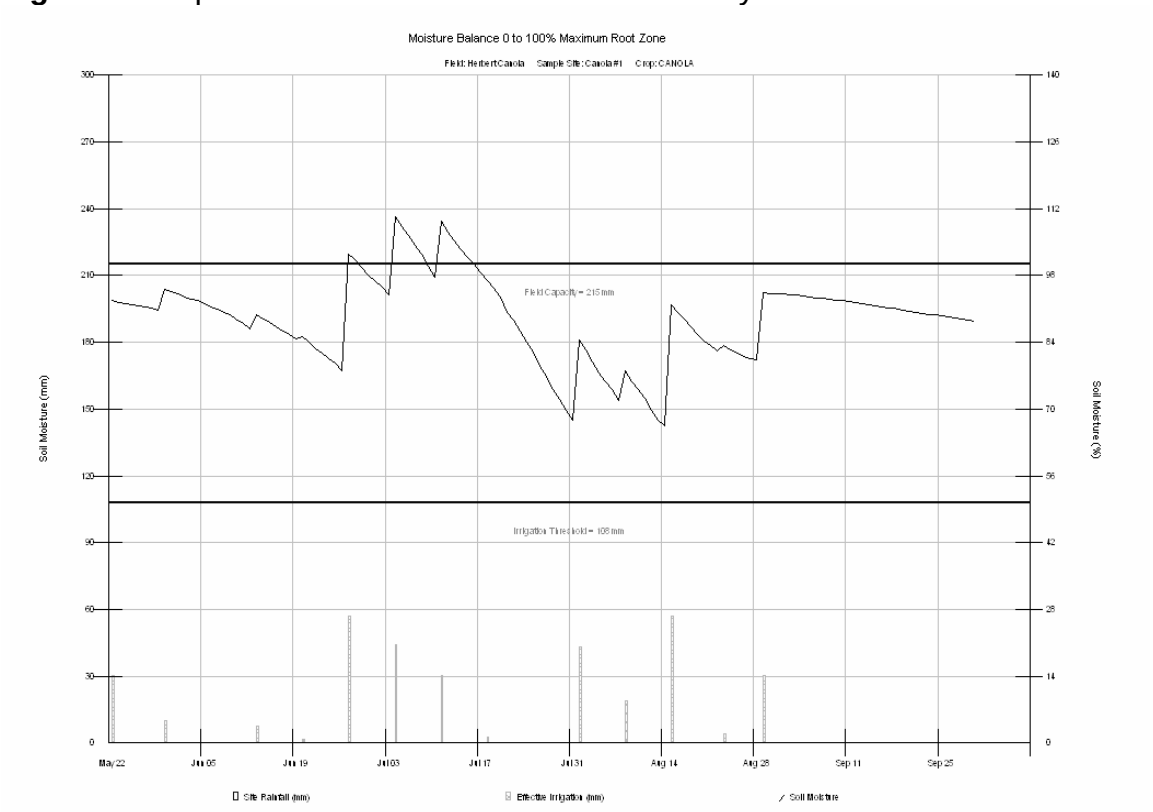


Table 1. Comparison of the water use between varieties

	Initial Soil Moisture (mm)	Total Moisture applied (mm)*	Final Soil Moisture (mm)	Total Crop Use (mm)	Modeled Crop Use (mm)
AC Barrie HRSW	175	427	175	427	343
Golden Peas	117	356	177	296	414
Canterra 1841 Canola	163	462	170	455	432

* This includes rainfall and applied effective irrigation.

Alberta Agriculture suggests that wheat uses about 460 mm of moisture seasonally. The AIM model modeled 343 mm of water use. Taking into account the initial and final soil moistures and the amount added, this field used 427 mm of water. However there were a couple times where the soil profile was over 100 per cent full so some of the water may have percolated through the root zone and been wasted.

Alberta Agriculture suggests that peas use about 400 mm of moisture seasonally. The AIM model modeled 414 mm. Taking into account the initial and final soil

moistures and the amount added, this field only used 296 mm of water. However, the yield was below what was expected. There was poor germination in the spring with this variety, and in fact, the cooperator reseeded a portion of this field to another variety.

Alberta Agriculture suggests that canola use about 430 mm of moisture seasonally. The AIM model modeled 432 mm. Taking into account the initial and final soil moistures and the amount added, this field used 455 mm of water. It was slightly higher, however there were again a couple of instances where the soil moisture was above 100 per cent so some of the water may have passed through the root zone.

Final Discussion

The AIM model was not all that useful in predicting when to irrigate. It would be more useful if there were more weather stations listed to download the data from. In this case, the closest weather station was Outlook (about 200 km away). However, weather data was obtained from SPARC at Swift Current for this year for modeling the moisture use in retrospect. It is certainly useful in producing a graphical representation of the water use of a crop and comes quite close to estimating the amount of moisture a crop will use.

c) 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-operators:

- **Barry Vestre and Jazeem Wahab, CSIDC Small Fruit Orchard**
- **Terry Hogg, CSIDC Regional Variety Plots**
- **Larry White PAg, Saskatchewan Forest Centre, Agri-Forestry site**

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 and to collect moisture use information on small fruits and fibre forest crops. This would provide data which would allow these new crops to be added to the Alberta Irrigation Management Model (AIMM).

Demonstration/Project Plan

Irrigated crops were monitored for moisture use utilizing tensiometers, Watermark^{TM} sensors, gypsum blocks, TDR probes, 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 as well as the fruit and agroforestry sites. One on-station and four off-station sites were monitored. Data collected and experience gained will be used to re-write and update irrigation scheduling information extended from the branch as well as collect information to be used in adding small fruit and fiber forest crops to the AIMM database.

Demonstration Sites

NW 16-31-07-W3M and SE 20-28-07-W3M - These co-operator fields adjacent to the regional trials were instrumented and data collected was compared to model predictions. The small fruit orchard at CSIDC and the agroforestry site adjacent to the Outlook lagoons, on SW 27-29-08-W3M, were instrumented and monitored.

Project Methods and Observations

Data Collection – consisted of installation of tensiometers, Watermark™ sensors, gypsum blocks, TDR probes 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 Ministry website.

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 two metres in km/day, precipitation in mm, RH (Relative Humidity) max per cent, RH min per cent, 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 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. The data collected from the small fruit and fibre forestry sites will be used in cooperation with Alberta Agriculture to add these crops to the database within the AIMM system. Data collection will occur for another two years to provide proper baseline data for these crops.

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 2008 growing year could be summarized as having a dry, cool spring followed by a June and July that were cooler than average but provided timely precipitation. August was slightly wetter and warmer than normal. See Tables 1 and 2. Total accumulated evapotranspiration (ET) was 350 mm for hybrid canola. Growing season rainfall on the site was 191 mm and this, with effective irrigation, matched consumptive use. The growing season maximum ET of seven mm occurred twice, on July 12 and 21.

Table 1. 1971 - 2000 long term weather data for Outlook Saskatchewan

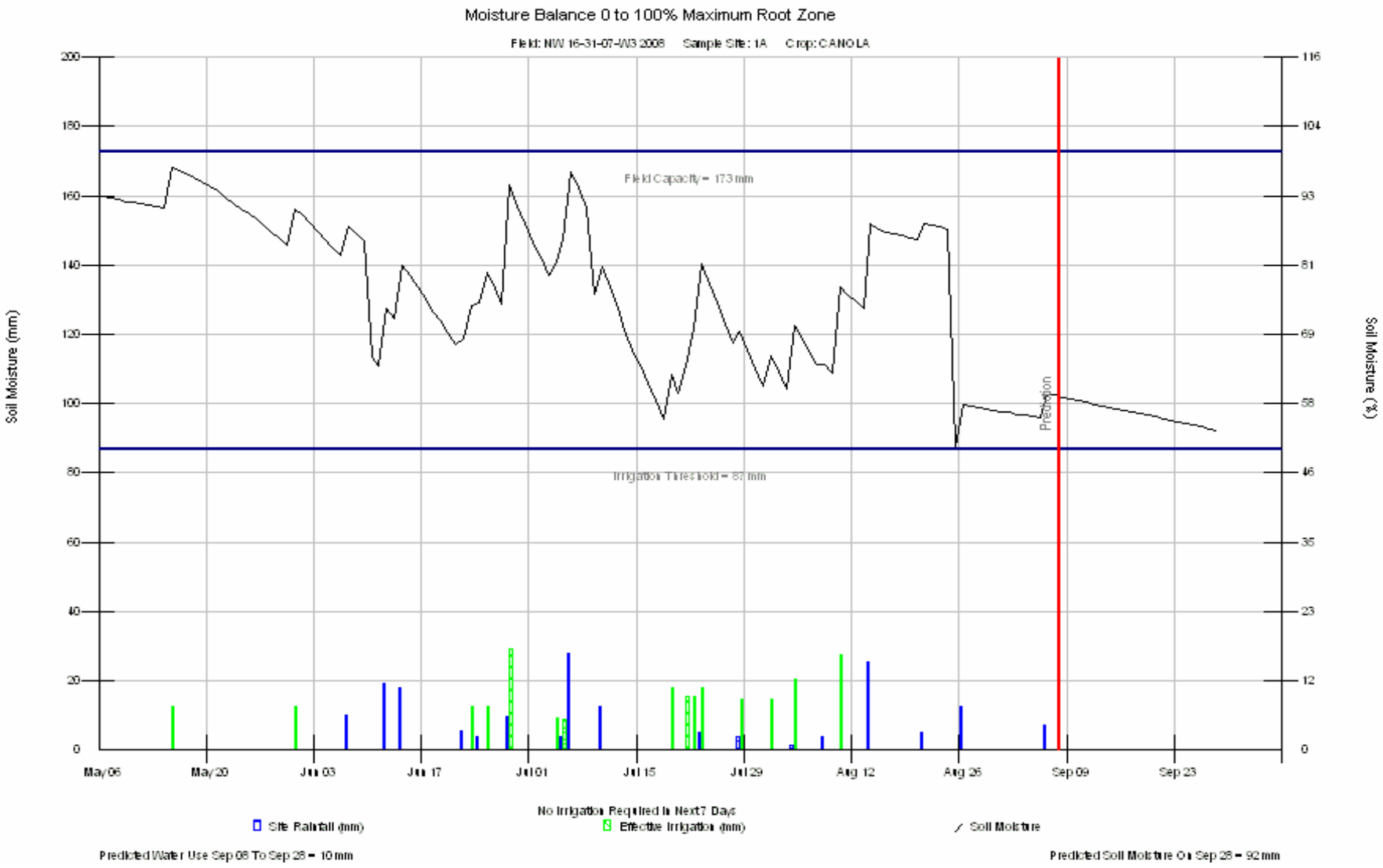
	May	**June**	**July**	**August**	**September**
Daily Average Temperature (^{o}C)	11.8	16.4	18.6	17.9	12.2
Total Precipitation (mm)	44.3	63.7	57.1	38.3	27.6

(from Environment Canada)

Table 2. 2008 growing season temperature and precipitation data

	May	**June**	**July**	**August**	**September**
Mean Temperature (^{o}C)	11.19	15.12	18.3	18.6	12.2
Total Precipitation (mm)	5.8	44	43	43.8	5.4

(from Environment Canada)


Moisture Balance 0 to 100% Maximum Root Zone
Field: NW 16-31-07-W3 2008 Sample Site: 1A Crop: CANOLA
Soil Moisture (mm)
Soil Moisture (%)
Field Capacity = 173 mm
Irrigation Threshold = 87 mm
Prediction
200
180
160
140
120
100
80
60
40
20
0
116
104
93
81
69
58
46
35
23
12
0
May 06
May 20
Jun 03
Jun 17
Jul 01
Jul 15
Jul 29
Aug 12
Aug 26
Sep 09
Sep 23
No Irrigation Required In Next 7 Days
Site Rainfall (mm)
Effective Irrigation (mm)
Soil Moisture
Predicted Water Use Sep 06 To Sep 28 = 10 mm
Predicted Soil Moisture On Sep 28 = 92 mm

The graph of seasonal water use shows that the site was kept above 50 per cent field capacity until the end of season. Irrigation and timely rainfall kept these medium textured soils well watered for the entire year.

ICDC will continue to collaborate with our counterparts in Alberta, and is actively working to see more Saskatchewan stations added for 2009. 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.

9. Technology Transfer

a) Ministry of Agriculture Agrologist Extension Events 2008

i) Field Days

- Gopher Field Day – Korvin Olfert PAg and Nicole Beatty – June 16th
- Irrigated Forages Day – Korvin Olfert PAg and Nicole Beatty – June 25th
- Trickle Irrigation Workshop – Lana Shaw PAg – June 26th and 27th
- Treasure Valley Markets Evening Field Tour – Sarah Sommerfeld PAg – July 8th
- Irrigated Canola Field Day – Sarah Sommerfeld PAg – July 10th
- CSIDC Irrigation Field Day and Tradeshow – July 17th
    - Tour Leaders – Gerry Gross PAg and John Linsley PAg
    - Tradeshow Organization – Sarah Sommerfeld PAg
- Dry Bean Plot Tour – Lana Shaw PAg – July 24th

ii) Presentations

- "Alfalfa Varieties" – Korvin Olfert PAg – Irrigated Forages Day – June 25th
- "Irrigation Scheduling" - Sarah Sommerfeld PAg - Treasure Valley Markets Evening Field Tour, Cadillac – July 8th
- "Irrigation Water Quality" – Korvin Olfert PAg – Treasure Valley Markets Evening Field Tour, Cadillac – July 8th
- "Irrigation Scheduling" – Sarah Sommerfeld PAg – Irrigated Canola Field Day, Outlook – July 10th
- "Irrigation Scheduling" – Garth Weiterman PAg – CSIDC Irrigation Field Day and Tradeshow – July 17th
- Cropping, Irrigation Methods and ICDC projects – Gerry Gross PAg – Minister's Tour, Outlook – July 17th
- CSIDC Presentation – Gerry Gross PAg and Brian Champion, Acting Manager, CSIDC – University of Saskatchewan – November 25th
- ICDC/SIPA Annual Conference – Swift Current – December 8-9th

iii) Booth Display

- Crop Production Week – Saskatoon – January 7-10th
- CSIDC Irrigation Field Day and Tradeshow – Outlook – July 17th
- ICDC/SIPA Annual Conference – Swift Current – December 8-9th

iv) Publications and Article Contributions

- "Irrigation Scheduling Manual" – Sarah Sommerfeld PAg
- "Irrigation Reports Available" – Sarah Sommerfeld PAg – February Agriview
- "Irrigation Scheduling" – Sarah Sommerfeld PAg – March Agriview
- "Irrigation Crop Varieties for 2008" – Gerry Gross PAg – March Agriview
- "Forages in Irrigated Cropping Rotations" – Sarah Sommerfeld PAg –May Saskatchewan Hay Report
- "Irrigation Field Days" – Lana Shaw PAg – June Agriview
- "Irrigation Research and Demonstration Program 2008" – Gerry Gross PAg – July/August Agriview
- "CSIDC Field Day: Valuing Our Water" – Sarah Sommerfeld PAg – July/August Agriview
- "Corn Irrigation Scheduling" – Korvin Olfert PAg – July/August Agriview
- "Trees – A New Irrigation Crop?" – Lana Shaw PAg – October Agriview
- "SIPA/ICDC Annual Conference Update" – Gerry Gross PAg – December/January Agriview

b) Ministry of Agriculture Agrologist Activities

Fusarium Head Blight Survey

Lana Shaw PAg
Sarah Sommerfeld PAg
Korvin Olfert PAg
Nicole Beatty
Ministry of Agriculture Provincial Specialists co-ordinate the annual Fusarium and Cereal Leaf Disease surveys. Ministry Irrigation Agrologists collect random samples from cereal crops across south and central Saskatchewan. Samples are submitted to the Crop Protection Lab in Regina for analysis and disease rating.

Canola Disease Survey

Sarah Sommerfeld PAg
The survey is co-ordinated by Ministry of Agriculture Provincial Specialists. Ministry Irrigation agrologist surveyed random fields throughout the Lake Diefenbaker area assessing 100 plants per field for canola disease incidence.

Saskatchewan Advisory Council on Forage Crops

Korvin Olfert PAg
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 PAg
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 advisory council and compiled into the Ministry's "Varieties of Grain Crops" publication. This publication provides producers with the ability to evaluate new grain crop varieties.

Soil Fertility Sub-Council

Garth Weiterman PAg
Kelly Farden PAg
Participation on the Soil Fertility Sub-Council 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 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

Gerry Gross PAg
Sarah Sommerfeld PAg
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 Water Quality and Food Safety Study

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

c) ICDC Website

Lana Shaw PAg

The joint ICDC SIPA website (www.irrigationsaskatchewan.com) is being redesigned and launched in December 2008. The new site will direct visitors to an ICDC subsection, a SIPA subsection or a link to an irrigation section of the Saskatchewan Ministry of Agriculture's website. The ICDC section includes ICDC reports, publications and events, as well as links to information relevant to irrigation crops.