# Canada-Saskatchewan Irrigation Diversification Centre

901 McKenzie St. S., Box 700
Outlook, Saskatchewan
S0L 2N0
Phone (306) 867-5400; Fax (306) 867-9656
e-mail: csidc@agr.gc.ca

## ANNUAL REVIEW
## April 1, 2006 to March 31, 2007

### TABLE OF CONTENTS



***This report and other CSIDC publications are available at our internet address:***
**http://www.agr.gc.ca/pfra/csidc/csidc.htm**

# Introduction

# Manager's Report

The Canada-Saskatchewan Irrigation Diversification Centre, CSIDC, is a Federal-Provincial-Industry partnership between Agriculture and Agri-Food Canada (AAFC), Saskatchewan Agriculture and Food (SAF), the Irrigation Crop Diversification Corporation (ICDC) and the Saskatchewan Irrigation Projects Association (SIPA). CSIDC is managed by the Executive Management Committee (EMC) with representation from each of the partners. This Manager's report is presented on behalf of the Executive Management Committee.

CSIDC is also part of a tri-provincial initiative: the Prairie Irrigation Crop Diversification Group (PICDG) which aims to assist the agriculture and agri-food industry across the Prairies in addressing issues, needs and opportunities in environmentally and economically sustainable irrigated crop diversification and value adding activities through joint efforts in applied research and demonstration, technology transfer and industry development.

CSIDC, located at Outlook, Saskatchewan, is a world-class irrigation facility on 340 acres, of which 310 acres are irrigated by pressurized mainline via centre pivots, linear-move and drip irrigation systems. A full line of research plot equipment, run by dedicated, experienced personnel deliver results through field days, publications, presentations and one-on-one interaction with irrigators.

This facility began in 1949 as a pre-development farm to demonstrate irrigation prior to the completion of the Gardiner Dam and Lake Diefenbaker in 1967. In 1986 the irrigation systems were upgraded and the Government of Saskatchewan became a partner with PFRA. In 1998 a new agreement was signed to include irrigators through ICDC and SIPA, both of which were established under *The Irrigation Act, 1996* in Saskatchewan.

Within this network irrigators should expect effective, relevant applied research, demonstration and education.

The CSIDC program focuses on **Best Management Practice Development** for sustainable diversified irrigated crop production and crop water management systems, under three activities: i) crop and variety development and evaluation (e.g. the annual publication of *Crop Varieties for Irrigation* which is distributed to all irrigators in Saskatchewan); ii) agronomic production practices for irrigated crops and production systems (e.g. strawberry crown commercialization involving production, export marketing and the development of a prospective grower group); iii) irrigation and other in-field water management practices, including subsurface drainage (e.g. National Agri-Environmental Health Analysis and Reporting Program and irrigating vegetables under the solar-powered mini pivot).

CSIDC is involved in **international irrigation work** in Egypt, Ethiopia and China. This activity, often through staff involvement with the Canadian International Development Agency, includes project management (e.g. National Water Quality and Availability Management, Egypt), training (e.g. Water Harvesting and Institutional Strengthening for Tigray, Ethiopia and China) and advisory work (e.g. China).

In addition to the project results described in this report, the Executive Management Committee was pleased to see 300 people attend the CSIDC **Field Day** on July 13th, listen to Saskatchewan's Minister of Agriculture and Food, the Honourable Mark Wartman, deliver a positive speech on irrigation and learn about the close connections between CSIDC's work and value-added processing. Associate Deputy Minister for AAFC, Ms. Christianne Ouimet, visited on July 19th. The Honourable Eric Cline, Saskatchewan's Minister of Industry and Resources, spoke on bio-fuels at the SIPA/ICDC Annual Irrigation Conference in Moose Jaw in December.

A new five-year **Memorandum of Understanding (MOU**) has been drafted and is being reviewed by the CSIDC partners before the existing ten-year MOU ends on December 31st, 2007. Along with a new MOU, an updated five year business plan is being prepared by the EMC which includes the updating of the CSIDC program goals and the development by the partners of an evaluation tool for projects.

Without doubt, the most disappointing part of 2006 was the **August 23rd hailstorm** which damaged the crops at CSIDC and destroyed a year's worth of data. This is the first time in living memory that such an event has occurred on this farm and it was a tough day for us all.

We would like to thank all the CSIDC partner staff who work hard to deliver projects and results. We would also like to acknowledge our clients, the irrigators, who drive our rural economy through their willingness to invest, employ and take risk: "Thank you".

The Executive Management Committee is pleased to present the 2006-07 CSIDC Annual Review.

## Executive Management Committee

Co-chair AAFC:
    Laurie Tollefson, Acting Director, International Partnerships

Co-chair Saskatchewan Agriculture and Food:
    John Babcock, Director, Irrigation Development Branch

Co-chair Industry, Irrigation Crop Diversification Corporation:
    Kevin Plummer, Director, ICDC

Representing Saskatchewan Irrigation Projects Association:
    Larry Lee, Director, SIPA

Representing PFRA:
    Larry Lenton, Technical Director, Prairies Central Region

Representing Agriculture and Agri-Food Canada:
    Dr. Paul McCaughey, Research Manager, Saskatoon Research Centre

Resources:
    John Linsley, SAF, Manager, Irrigation Development Branch
    Judy Clark & Debbie Greig, PFRA Administration

# Objectives

The mandate of CSIDC is to provide irrigation based applied research and demonstration activities with the following objectives:

1. To identify higher value cropping opportunities to help target the Centre's research and demonstration programs for maximum benefit;

2. To conduct, fund, and support irrigated research and demonstration to meet the needs of irrigation producers and industry in Saskatchewan;

3. To co-operate with other agencies to develop, test, and refine means of diversifying and intensifying irrigated crop production in a sustainable manner;

4. To demonstrate sustainable irrigated crop management practices at the Centre;

5. To extend and deliver information on sustainable irrigation management to producers and irrigation stakeholders;

6. To determine the impact of irrigation on the natural and physical resources; and

7. To promote a Western Canadian approach to irrigation sustainability by co-operating with similar institutions and with industry in support of increased crop diversification and value-added processing.

# Staff

## CSIDC

Laurie Tollefson
*Manager, Irrigation & Diversification, Apr 2006-Jan 2007*

Terry Hogg
*Irrigation Agronomist*

Gail Dyck
*Irrigation Agrologist*

Greg Larson
*Horticultural Crops Technician*

Barry Vestre
*Field Operations Supervisor*

Darryl Jacobson
*Irrigation Equipment Operator, Apr-Dec 2006*

John Harrington
*Information Technology, Dec 2006-Mar 2007*

Judy Clark
*Administrative Assistant*

Debbie Greig
*Receptionist*

John Linsley
*Manager, CSIDC, Feb-Mar 2007*

Jazeem Wahab
*Horticultural Crops Agronomist*

Jacques Millette
*Soil & Water Specialist, Apr-Dec 2006*

Don David
*Field Crops Technician*

Allen MacDonald
*Equipment Maintenance & Operator*

Richard Wagner
*General Labourer, Apr-Dec 2006*

Evan Derdall
*Irrigation Engineering, Jan-Mar 2007*

Marlene Martinson
*Administrative Services Coordinator*

## ICDC

John Linsley
*ICDC, Manager, Apr 2006-Jan 2007*

Korvin Olfert
*ICDC Agrologist, Swift Current*

Lana Shaw
*ICDC Agrologist, Outlook*

Les Bohrson (retired July 2006)
*ICDC Senior Agrologist, Swift Current*

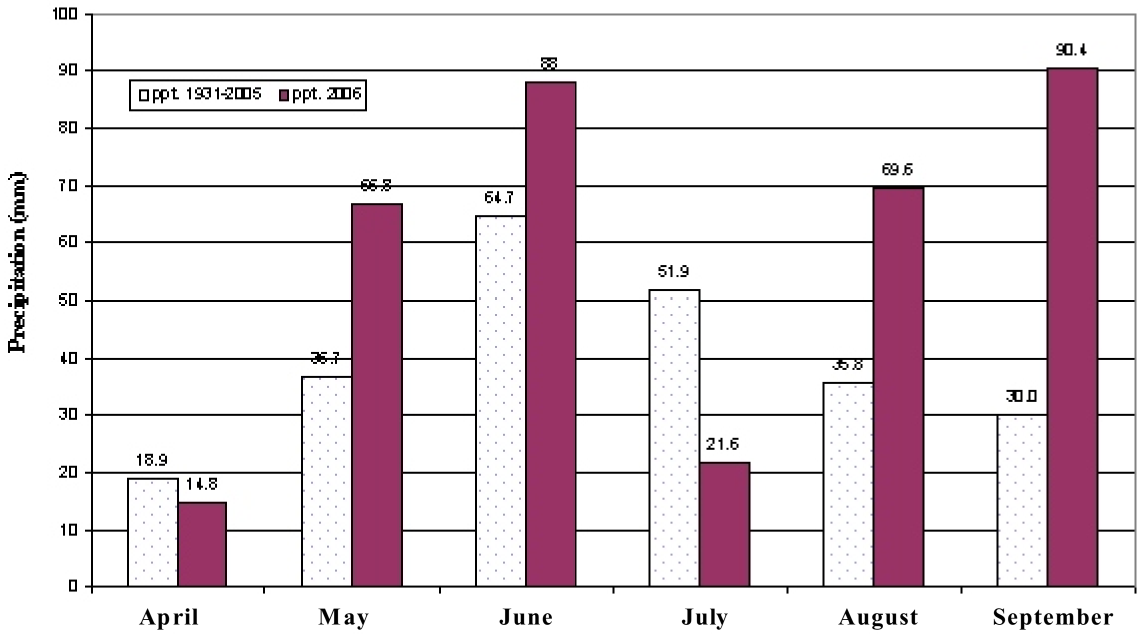
Gerry Gross
*ICDC Senior Agrologist, Outlook, Jan-Mar* 2007

## Summer Staff

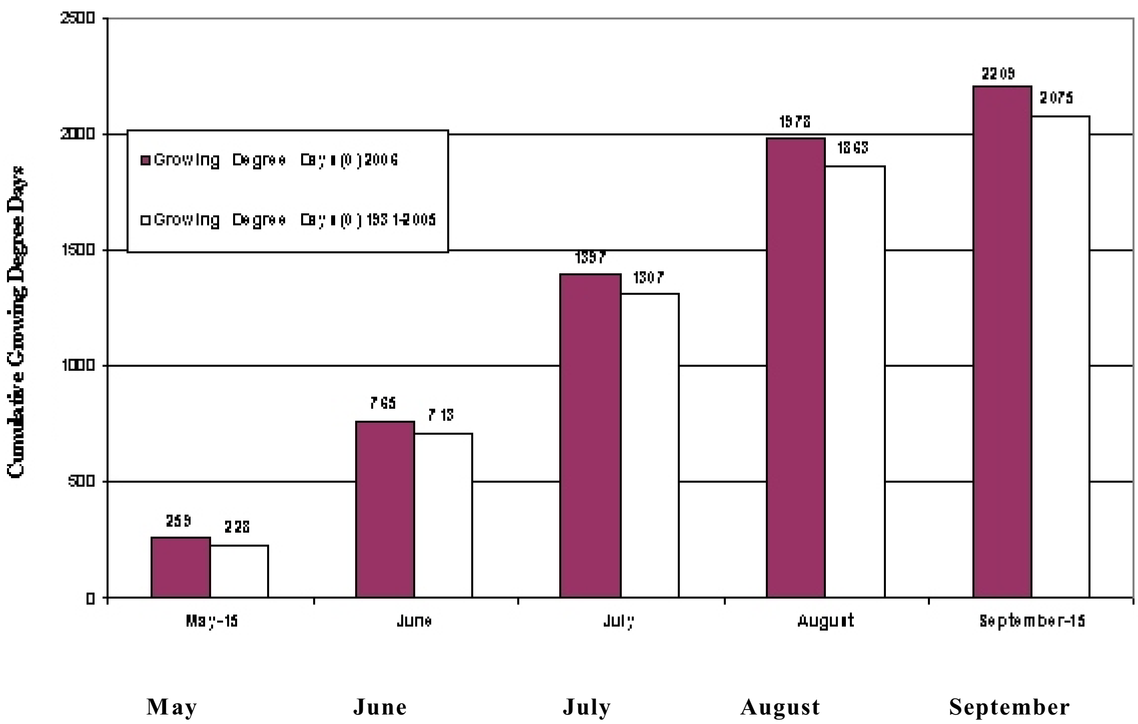
Skylar Feltis
Jenna Johnson
Graham Henricks
Justine Ehman
Jennifer Blumer
Tim Niskala

# 2006 Weather Summary

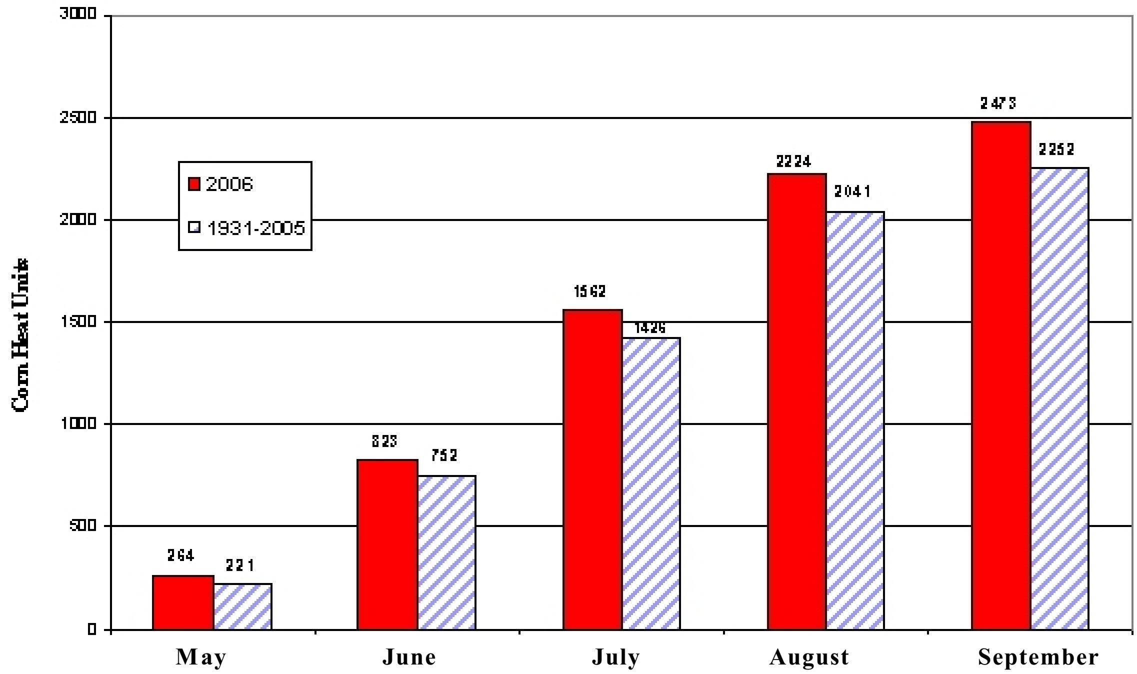
## Growing Season Precipitation



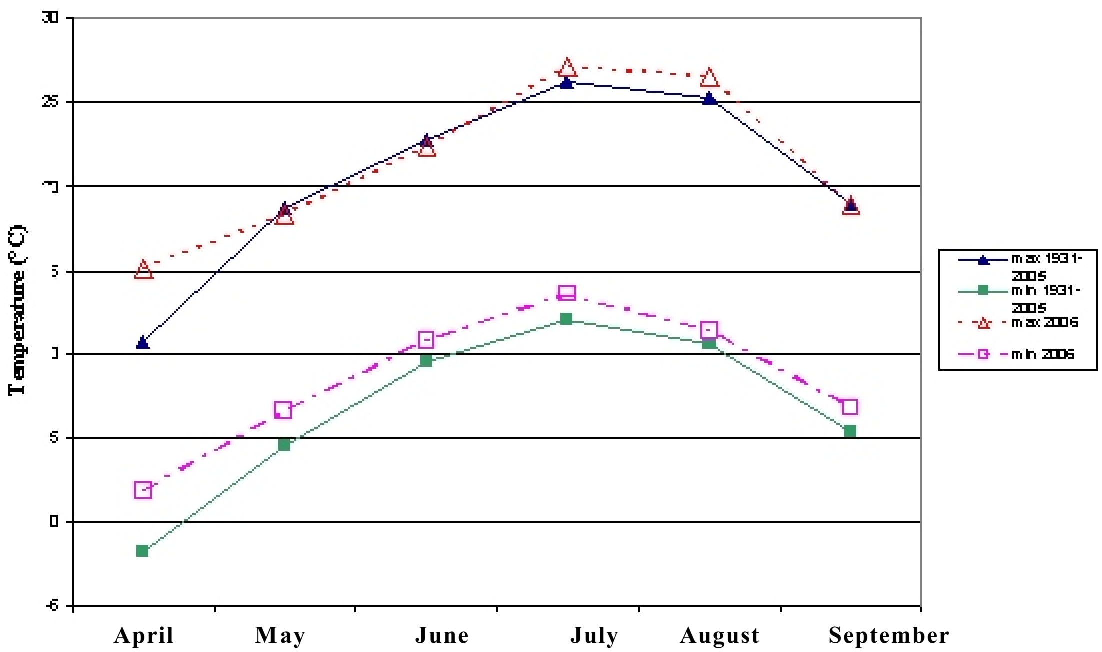

## Growing Degree Days (Base 0° C)



## Cumulative Corn Heat Units




## Growing Season Temperature



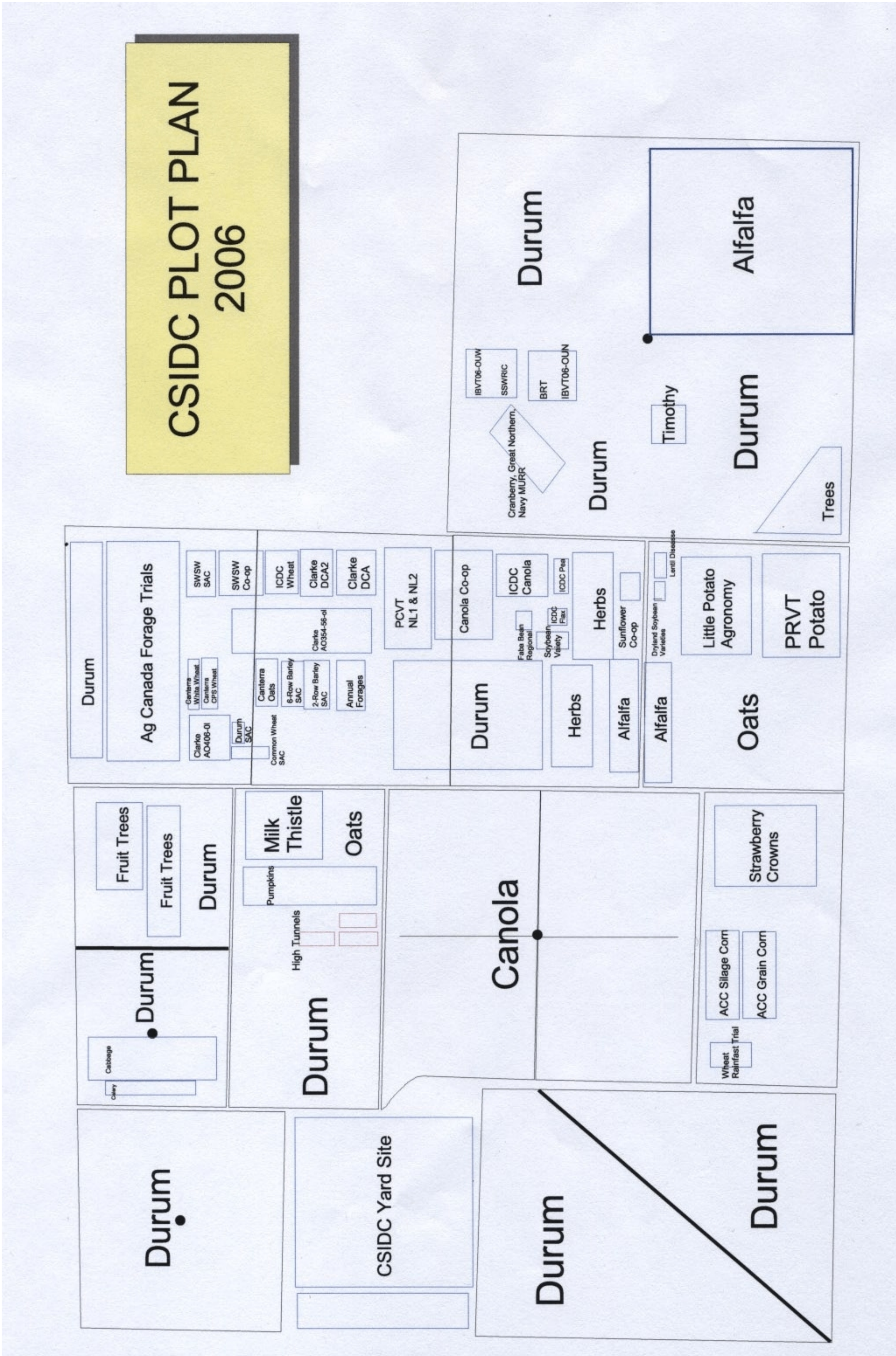
# 2006 Irrigation Summary

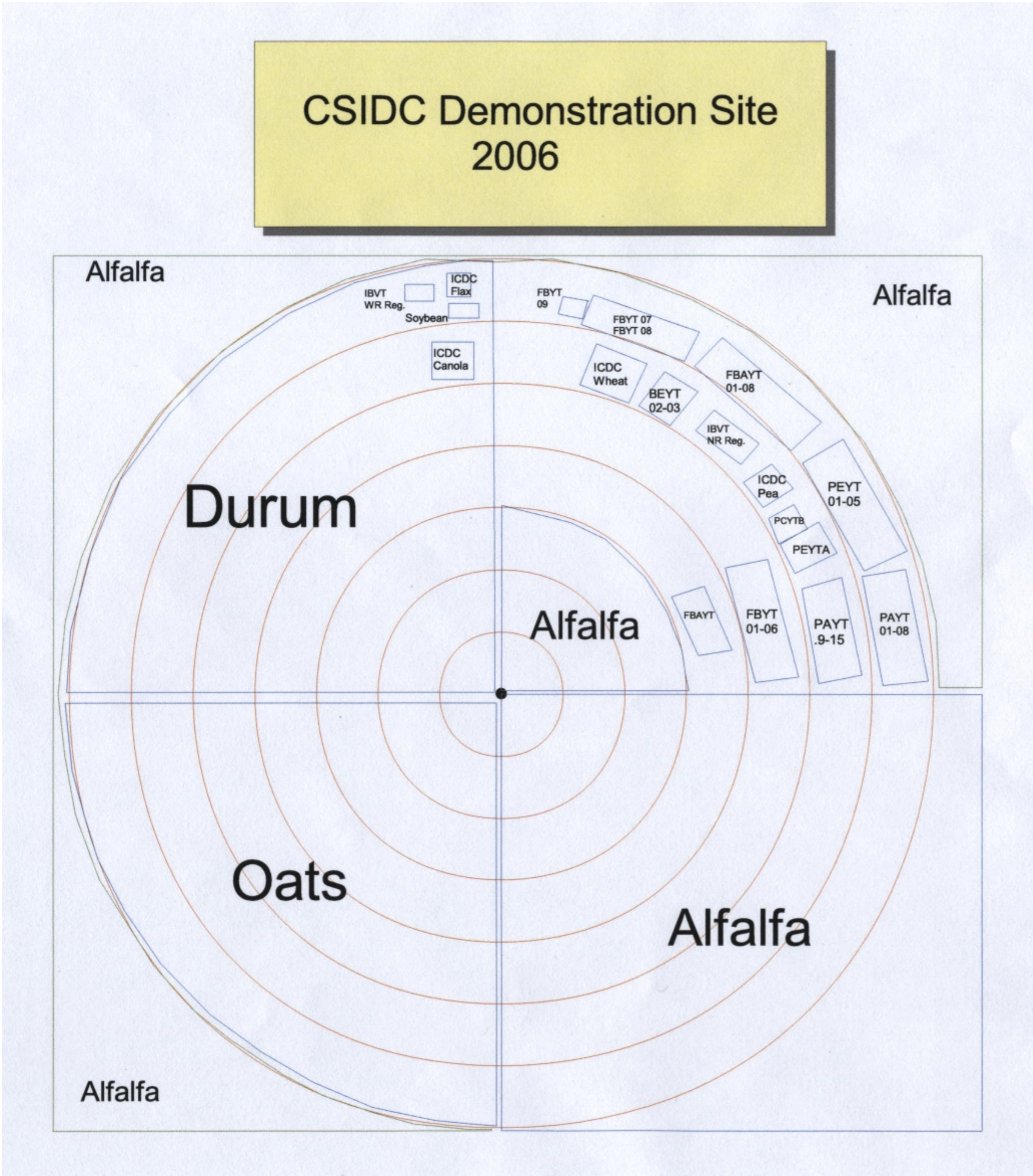
Table 1. Irrigation depth applied on fields 1 to 7 by crop, 2006 season, CSIDC, Outlook.

| Field | Crop | Irrigation Depth Applied (mm) | | | | | Total Irrigation (mm) |
|---|---|---|---|---|---|---|---|
| | | May | Jun | Jul | Aug | Sep | |
| 1 | Durum | 0 | 25 | 137.5 | 0 | 0 | 162.5 |
| 2B | Cole Crops- High Flow | 0 | 9 | 38 | 59 | 0 | 106 |
| 2B | Cole Crops- Low Flow | 0 | 12 | 75 | 77 | 0 | 164 |
| 2B | Celery | 0 | 12 | 75 | 67 | 0 | 154 |
| 2B | Durum | 0 | 12 | 75 | 24 | 0 | 111 |
| 3 | Durum | 0 | 0 | 100 | 0 | 0 | 100 |
| 3 | Pumpkins | 0 | 0 | 201 | 75 | 0 | 276 |
| 3 | High Tunnel 1- Cucumbers, Melons, Zucchini | 0 | 56 | 104 | 201 | 176 | 537 |
| 3 | High Tunnel 2- Peppers | 0 | 56 | 104 | 201 | 176 | 537 |
| 3 | High Tunnel 3- Melons | 0 | 56 | 104 | 201 | 176 | 537 |
| 4 | Canola | 0 | 0 | 100 | 25 | 0 | 125 |
| 5 | Canola | 0 | 0 | 115 | 25 | 0 | 140 |
| 6 | Corn | 0 | 25 | 155 | 75 | 0 | 255 |
| 6 | Strawberries | 55 | 80 | 128 | 40 | 24 | 327 |
| 6 | Wheat- North Block | 0 | 50 | 80 | 0 | 0 | 130 |
| 6 | Wheat- South Block | 0 | 33 | 80 | 0 | 0 | 113 |
| 7 | Oats | 0 | 60 | 170 | 0 | 0 | 230 |
| 7 | Potatoes | 0 | 60 | 210 | 80 | 0 | 350 |
| 7 | Lentils | 0 | 5 | 21 | 0 | 0 | 26 |

Table 2. Irrigation depth applied on fields 8 to 12 by crop, 2006 season, CSIDC, Outlook.

| Field | Crop | Irrigation Depth Applied (mm) | | | | | Total Irrigation (mm) |
|---|---|---|---|---|---|---|---|
| | | May | Jun | Jul | Aug | Sep | |
| 8 | Durum | 0 | 25 | 125 | 25 | 0 | 175 |
| 8 | Canola | 0 | 25 | 125 | 40 | 0 | 190 |
| 8 | Peas | 0 | 25 | 130 | 40 | 0 | 195 |
| 8 | Sunflowers | 0 | 60 | 175 | 40 | 0 | 275 |
| 8 | Herbs and Spices | 0 | 0 | 125 | 65 | 0 | 190 |
| 9 | Cereal Plots | 0 | 25 | 150 | 0 | 0 | 175 |
| 10 | Ag Canada Forages | 25 | 85 | 125 | 80 | 30 | 345 |
| 11 | Durum | 0 | 25 | 110 | 0 | 0 | 135 |
| 12 | Dry Beans | 0 | 23 | 130 | 30 | 0 | 183 |
| 12 | Durum | 0 | 15 | 45 | 65 | 0 | 125 |
| 12 | Alfalfa | 0 | 15 | 0 | 65 | 25 | 105 |
| 12 | Timothy | 0 | 15 | 100 | 65 | 0 | 180 |
| 12 | Durum | 0 | 15 | 100 | 65 | 0 | 180 |
| Demo | North West | 0 | 45 | 120 | 0 | 0 | 165 |
| Demo | North East | 0 | 15 | 120 | 0 | 0 | 165 |
| Demo | South East | 0 | 30 | 15 | 15 | 0 | 45 |
| Demo | South West | 0 | 30 | 105 | 0 | 0 | 135 |


CSIDC PLOT PLAN
2006
Durum
Alfalfa
Durum
Timothy
Durum
Trees
Cranberry, Great Northern, Navy MURR
BVT06-OUW
SSWRIC
BRT
IBVT06-OUN
Durum
Ag Canada Forage Trials
SWSW SAC
SWSW Co-op
ICDC Wheat
Clarke DCA2
Clarke DCA
PCVT NL1 & NL2
Canola Co-op
ICDC Canola
ICDC Pea
Herbs
Lentil Disease
Little Potato Agronomy
PRVT Potato
Clarke AO354-56-ol
Faba Bean Regional
Soybean Variety
ICDC Flax
Sunflower Co-op
Dryland Soybean Varieties
Canterra White Wheat
Canterra CPS Wheat
Canterra Oats
6-Row Barley SAC
2-Row Barley SAC
Annual Forages
Clarke AO406-0l
Durum SAC
Common Wheat SAC
Durum
Herbs
Alfalfa
Alfalfa
Oats
Fruit Trees
Fruit Trees
Durum
Milk Thistle
Oats
Pumpkins
High Tunnels
Canola
Strawberry Crowns
ACC Silage Corn
ACC Grain Corn
Wheat Rainfast Trial
Durum
Cabbage
Celery
Durum
Durum
CSIDC Yard Site
Durum
Durum


CSIDC Demonstration Site
2006
Alfalfa
Alfalfa
IBVT
WR Reg.
ICDC
Flax
Soybean
ICDC
Canola
FBYT
09
FBYT 07
FBYT 08
ICDC
Wheat
BEYT
02-03
FBAYT
01-08
IBVT
NR Reg.
ICDC
Pea
PEYT
01-05
PCYTB
PEYTA
Durum
Alfalfa
FBAYT
FBYT
01-06
PAYT
.9-15
PAYT
01-08
Oats
Alfalfa
Alfalfa

# Field & Forage Crops

# Field Crops



# Forage Crops

# Field Crops

*Lead: Terry Hogg, Co-lead: Don David, CSIDC*

# Crop Variety Trials

## Western Canada Irrigated Canola Co-operative Tests XNL1, XNL2, XNL3 and XNL4

*Funded by the Canola Council of Canada and Agriculture and Agri-Food Canada, PFRA*

The canola co-operative test was conducted on an irrigated site at CSIDC. The test was seeded on May 15. Plot size was 1.5 m x 6 m. Nitrogen was applied at 112 kg N/ha as 46-0-0 and phosphorus was applied at 56 kg $P_2O_5$/ha as 12-51-0. All fertilizer was side-banded at the time of seeding. In the XNL1, XNL2 and XNL3 trials 14 new lines and in the XNL4 trial 13 new lines were compared to the check varieties 46A65 and Q2 (Tables 3-6).

Most new lines had similar days to flower and maturity to the checks but varied in height compared to the checks. The majority of the new lines had a lodging rating either better than or equivalent to the check variety.

No yield data was obtained for the Canola Co-operative trials in 2006 due to a severe hail storm on August 23, 2006 prior to harvest.

## Prairie Canola Regional Variety Trial NL1 and NL2

*Funded by the Canola Council of Canada, Irrigation Crop Diversification Corporation and Agriculture and Agri-Food Canada, PFRA*

The PCVT canola regional trials were conducted on an irrigated site at CSIDC. The NL1 and NL2 trials were seeded on May 15. Plot size was 1.5 m x 6 m. Nitrogen was applied at 112 kg N/ha as 46-0-0 and phosphorus was applied at 56 kg $P_2O_5$/ha as 12-51-0. All fertilizer was side-banded at the time of seeding.

Most entries in both trials had similar days to flower and maturity compared to the check (Tables 7 and 8). In both trials plant height varied among the entries with two entries in the NL1 trial (45H25 and SW H5269RR) and two entries in the NL2 trial (Invigor 5030 and Invigor 5070) significantly taller than the check and one entry in the NL1 trial (SW G5246RR) significantly shorter than the check.

No yield data was obtained for the Canola PCVT trials in 2006 due to a severe hail storm on August 23, 2006 prior to harvest.

Table 3. Yield and agronomic data for the 2006 Irrigated Canola Cooperative trial XNL1.

| Entry | Flower (days) | Maturity (days) | Height (cm) | Lodging 1=erect; 9=flat |
|---|---|---|---|---|
| 46A65 | 46 | 88 | 120 | 2.5 |
| Q2 | 48 | 87 | 111 | 3.3 |
| 04RHY/268 | 44 | 85 | 116 | 2 |
| 05N166R | 46 | 87 | 119 | 4 |
| 05RHY/029 | 47 | 86 | 130 | 1.8 |
| 05RHY/308 | 45 | 85 | 121 | 1.8 |
| 1267_03 | 47 | 88 | 118 | 3.5 |
| A05-6NI | 46 | 85 | 114 | 3.5 |
| A05-7NI | 47 | 88 | 115 | 2 |
| MB41036 | 45 | 86 | 111 | 1.8 |
| MB52105 | 44 | 85 | 110 | 2.5 |
| MB52129 | 46 | 89 | 120 | 4.5 |
| PHS05-809 | 45 | 86 | 116 | 2.3 |
| PHS05-817 | 46 | 86 | 126 | 1.3 |
| SW J5311 RR | 47 | 88 | 123 | 2.3 |
| Z4446 | 44 | 85 | 118 | 2.3 |
| LSD (0.05) | 1 | 2 | 10 | 0.9 |
| CV (%) | 1.44 | 1.4 | 5.85 | 25.69 |

| Table 4. Yield and agronomic data for the 2006 Irrigated Canola Cooperative trial XNL2. | | | | |
|---|---|---|---|---|
| Entry | Flower (days) | Maturity (days) | Height (cm) | Lodging 1=erect; 9=flat |
| 46A65 | 46 | 87 | 118 | 4 |
| Q2 | 48 | 87 | 113 | 5.3 |
| 05H975 | 48 | 87 | 125 | 5.8 |
| 05RHY/918 | 45 | 86 | 122 | 3.5 |
| 05RHY/961 | 45 | 85 | 116 | 4.8 |
| 05RHY/966 | 46 | 85 | 119 | 3.8 |
| 22008 | 45 | 87 | 125 | 3.8 |
| A05-17NI | 45 | 85 | 125 | 3.3 |
| D3329 | 46 | 87 | 120 | 2.8 |
| H50014 | 45 | 87 | 119 | 4 |
| MB41106 | 47 | 86 | 116 | 5 |
| MB52141 | 45 | 86 | 119 | 4.8 |
| MB52152 | 46 | 88 | 111 | 6 |
| MB52162 | 45 | 87 | 117 | 4.5 |
| PHS05-816 | 47 | 87 | 141 | 1.3 |
| SW J5312 RR | 46 | 86 | 123 | 4.3 |
| LSD (0.05) | 1 | 1 | 8 | 1.2 |
| CV (%) | 1.37 | 1.2 | 4.54 | 20.23 |

Table 5. Yield and agronomic data for the 2006 Irrigated Canola Cooperative trial XNL3.

| Entry | Flower (days) | Maturity (days) | Height (cm) | Lodging 1=erect; 9=flat |
|---|---|---|---|---|
| 46A65 | 46 | 86 | 116 | 2.8 |
| Q2 | 49 | 89 | 117 | 4.8 |
| 04H277 | 48 | 87 | 116 | 2.8 |
| 04H339 | 46 | 86 | 116 | 2.8 |
| 04H416 | 49 | 89 | 131 | 2.5 |
| 04H730 | 48 | 88 | 123 | 2.8 |
| 05N172R | 46 | 86 | 116 | 3.8 |
| 05N207R | 49 | 89 | 129 | 4.5 |
| 05RHY/957 | 47 | 86 | 116 | 3.8 |
| 05RHY/959 | 45 | 85 | 116 | 4 |
| 3430_03 | 46 | 87 | 123 | 3 |
| H4322 | 46 | 87 | 119 | 2.5 |
| MB51105 | 44 | 85 | 107 | 5 |
| MB52136 | 45 | 85 | 113 | 5 |
| SW J5306 RR | 47 | 87 | 124 | 2.5 |
| SW J8001 RR | 49 | 88 | 120 | 3 |
| LSD (0.05) | 1 | 2 | 8 | 1.1 |
| CV (%) | 1.41 | 1.26 | 4.62 | 21.83 |

| Table 6. Yield and agronomic data for the 2006 Irrigated Canola Cooperative trial XNL4. | | | | |
|---|---|---|---|---|
| Entry | Flower (days) | Maturity (days) | Height (cm) | Lodging 1=erect; 9=flat |
| 46A65 | 46 | 87 | 118 | 2.8 |
| Q2 | 48 | 87 | 117 | 3 |
| Q2_Rep | 48 | 87 | 114 | 2.8 |
| 05N171R | 49 | 89 | 124 | 5.5 |
| 05N212R | 46 | 89 | 114 | 3.5 |
| DN040241 | 49 | 91 | 115 | 2.5 |
| DN040244 | 49 | 89 | 113 | 2.8 |
| DN040839 | 48 | 90 | 116 | 2.5 |
| DN040844 | 47 | 90 | 112 | 2 |
| DN040845 | 47 | 89 | 116 | 2.5 |
| DN040847 | 49 | 89 | 104 | 1.8 |
| DN040856 | 48 | 90 | 113 | 2 |
| H5025 | 46 | 88 | 123 | 1.8 |
| MB51116 | 48 | 90 | 121 | 3.3 |
| MB51125 | 49 | 89 | 114 | 3.5 |
| SW J5298 RR | 47 | 88 | 128 | 1.5 |
| LSD (0.05) | 1 | 2 | 6 | 1.2 |
| CV (%) | 2.16 | 1.49 | 3.61 | 31.65 |

Table 7. Yield and agronomic data for the 2006 PCVT Irrigated Canola Regional trial NL1.

| Entry | Flower (days) | Maturity (days) | Height (cm) | Lodging 1=erect; 9=flat |
|---|---|---|---|---|
| 46A65 | 46 | 89 | 121 | 4 |
| 03H631 | 46 | 89 | 116 | 4.5 |
| 04N201I | 46 | 89 | 114 | 5 |
| 45H21 | 45 | 88 | 119 | 5 |
| 45H25 | 45 | 87 | 136 | 2.5 |
| 45H26 | 45 | 88 | 122 | 5 |
| 45H72 | 46 | 88 | 121 | 4.5 |
| 45H73 | 46 | 89 | 129 | 3.8 |
| 71-45 RR | 46 | 85 | 109 | 7.3 |
| 997_03 | 46 | 89 | 116 | 5.8 |
| BCS301L | 46 | 87 | 118 | 4.5 |
| Invigor 5020 | 44 | 87 | 117 | 3.3 |
| PHS02-568 | 46 | 88 | 127 | 3.3 |
| SP Banner | 47 | 88 | 126 | 3.3 |
| SP Desirable | 46 | 86 | 121 | 3.3 |
| SW G5246RR | 47 | 87 | 112 | 6.5 |
| SW H5263 RR | 48 | 90 | 116 | 5.3 |
| SW H5269 RR | 46 | 90 | 136 | 5.3 |
| SW H5289 RR | 45 | 86 | 124 | 2.5 |
| SW5272 | 46 | 86 | 127 | 4.5 |
| SW5278 | 45 | 88 | 115 | 4.5 |
| LSD (0.05) | 1 | 2 | 8 | 1.1 |
| CV (%) | 1.3 | 1.48 | 4.5 | 18.05 |

| Table 8. Yield and agronomic data for the 2005 PCVT Irrigated Canola Regional trial NL2. | | | | |
|---|---|---|---|---|
| Entry | Flower (days) | Maturity (days) | Height (cm) | Lodging 1=erect; 9=flat |
| 46A65 | 46 | 89 | 120 | 3.3 |
| 03N322R | 46 | 89 | 121 | 3.5 |
| 1818 | 46 | 88 | 107 | 3.5 |
| 1841 | 48 | 88 | 127 | 2 |
| 292 CL | 46 | 87 | 116 | 3.8 |
| 34-65 | 45 | 87 | 113 | 3.3 |
| 45H21 | 45 | 85 | 119 | 3 |
| 45H24 | 46 | 87 | 127 | 2.3 |
| Invigor 5030 | 48 | 88 | 141 | 1.8 |
| Invigor 5070 | 48 | 88 | 132 | 2.3 |
| BC937-104 | 44 | 87 | 111 | 3.3 |
| CC504-03 | 47 | 88 | 119 | 3.8 |
| IMC209RR | 49 | 90 | 122 | 3.8 |
| Manor | 47 | 89 | 114 | 4.5 |
| Nex 828 CL | 50 | 91 | 128 | 2.3 |
| NO01-5815 | 47 | 87 | 116 | 2.5 |
| Reaper | 47 | 90 | 121 | 3.3 |
| SW-PF 02-3902 | 45 | 88 | 124 | 3.8 |
| SW-PG 02 1017 | 47 | 89 | 122 | 4.3 |
| v1030 | 47 | 87 | 126 | 5 |
| v1031 | 47 | 89 | 121 | 3.8 |
| LSD (0.05) | 1 | 2 | 9 | 1.4 |
| CV (%) | 1.4 | 1.59 | 5.24 | 29.31 |

## Irrigated Canola Regional Variety Trial

*Funded by the Irrigation Crop Diversification Corporation*

The irrigated canola regional trials were conducted at four locations in the Outlook area. Each site and soil type are as follows:

CSIDC (SW15-29-08-W3): Bradwell loam
CSIDC off-station (NW12-29-08-W3): Asquith sandy loam
Weiterman (SW16-31-07-W3): Asquith sandy loam - fine sandy loam
Pederson (SW29-28-07-W3): Elstow loam

Canola varieties were tested for their agronomic performance under irrigation. The CSIDC Off-station and Pederson sites were seeded on May 17 while the CSIDC and Weiterman sites were seeded on May 18. Plot size was 1.5 m x 4.0 m. All plots received 112 kg N/ha as 46-0-0 and 56 kg $P_2O_5$/ha as 12-51-0. All fertilizer was side-banded at the time of seeding. Yields were estimated by harvesting the entire plot.

The CSIDC, CSIDC-offstation and Pederson sites were lost just prior to harvest due to hail damage from a storm that passed through the area on August 23.

Irrigated canola height and lodging rating varied among the sites (Table 9). Most varieties were similar in height to the check. Lodging ratings indicated that some varieties have improved lodge rating compared to the check.

Yields were only obtained for the Weiterman site. The top yielding variety was 9590 while the lowest yielding variety was Red River 1826.

The results from these trials are used to update the irrigation variety database at CSIDC and provide information to irrigators on the best canola varieties suited to irrigation conditions.

## Irrigated Flax and Solin Regional Variety Trial

*Funded by the Irrigation Crop Diversification Corporation and the Saskatchewan Variety Performance Group (SAF)*

The irrigated flax and solin regional trials were conducted at four locations in the Outlook area. Each site and soil type are as follows:

CSIDC (SW15-29-08-W3): Bradwell very fine sandy loam
CSIDC off-station (NW12-29-08-W3): Asquith sandy loam
Weiterman (SW16-31-07-W3): Asquith sandy loam - very fine sandy loam
Pederson (SW29-28-07-W3): Elstow loam

Flax and solin varieties were tested for their agronomic performance under irrigation. The CSIDC Off-station and Pederson sites were seeded on May 17 while the CSIDC and Weiterman sites were seeded on May 18. Plot size was 1.5 m x 4.0 m. All plots received 112 kg N/ha as 46-0-0 and 56 kg $P_2O_5$/ha as 12-51-0. All fertilizer was side-banded at the time of seeding. Yields were estimated by harvesting the entire plot.

The CSIDC and CSIDC off-station sites were lost just prior to harvest due to hail damage from a storm that passed through the area on August 23.

Irrigated oilseed flax and solin height and lodging rating varied for the two sites that were not damaged by hail (Table 10). All varieties had good lodging tolerance at the Pederson site while several varieties at the Weiterman site had poor lodging rating, probably due to the higher amount of irrigation water aplied at the Weiterman site. All oilseed flax and solin varieties except Prairie Thunder and Prairie Blue had yield lower than the check variety CDC Bethune averaged over the two sites. Prairie Thunder not only had high yield but also had good lodging tolerance and was one of the earliest maturing varieties. The lowest yielding variety was CDC Gold solin.

The results from these trials are used to update the irrigation variety database at CSIDC and provide information to irrigators on the best oilseed flax and solin varieties suited to irrigation.

## Irrigated Sunflower Co-op LMTS & EMSS Variety Trial

*Funded by the Saskatchewan Sunflower Committee*

The Sunflower Co-op trial was conducted on an irrigated site at CSIDC. The test was seeded on May 16. The Late Maturing Tall Stature (LMTS) entries and the single Early Maturing Short Stature (EMSS) entry 63A21 were grown in a single trial with plant populations of 50,000 and 115,000 plants/ha, respectively. All varieties were seeded at a 60 cm row spacing with two rows/plot except for the EMSS entry 63A21 which was solid seeded at a 20 cm row spacing with six rows/plot. Plot size was 1.2 m x 6 m. Nitrogen was broadcast and soil incorporated at a rate of 112 kg N/ha urea (46-0-0) prior to seeding. Phosphorus was side banded at a rate of 56 kg $P_2O_5$/ha as 12-51-0 during the seeding operation.

The trial was severely damaged by a hail storm on August 23 that stripped the leaves from the plants and pitted the stems, however, the heads remained intact. Yields were estimated by harvesting the entire plot.

63M28 and 63A21 EMSS were the only entries that yielded significantly higher than the check, 63A70 (Table 11). The entry 63A21 yielded significantly lower when seeded on a wide row spacing (LMTS) as compared to solid seeding (EMSS). 63A21 and MSR 62 had height significantly less than the check while all other entries were similar to the check. 63A21 had seed weight significantly greater than the check while 63M02 had seed weight significantly lower than the check. All other entries had seed weight similar to the check. The entry 63A21 had a significantly lower seed weight when solid seeded (EMSS) compared to when seeded on a wide row spacing. Test weight varied from 34.7 to 41.9 kg/hl with the entries 63M02, MSR 62 and 63A21 EMSS significantly greater than the check. Test weight was higher for the variety 63A21 when solid seeded (EMSS) compared to when seeded on a wide row spacing. Two entries, XF3425 and 63A21, had significantly lower oil content than the check while three entries, 63M02, 63M28 and MSR 62 had significantly higher oil content than the check.

The results from this trial should be used with caution due to severe hail damage late in the 2006 growing season.

Table 9. Yield and agronomic data for the 2006 Irrigated Canola Regional Variety trial.

| Variety | CSIDC | | | CSIDC-offstation | | | Pederson | | | Weiterman | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maturity (days) | Height (cm) | Lodging rating[1] | Maturity (days) | Height (cm) | Lodging rating[1] | Maturity (days) | Height (cm) | Lodging rating[1] | Yield (kg/ha) | Maturity (days) | Height (cm) | Lodging rating[1] | Yield % of 46A65 |
| 46A65 (check) | 86 | 128 | 4.8 | 88 | 109 | 5 | 88 | 108 | 2.5 | 4897 | 89 | 104 | 5.8 | 100 |
| 1818 | 88 | 118 | 5.3 | 88 | 100 | 5.8 | 89 | 104 | 2 | 4388 | 88 | 103 | 6.3 | 90 |
| 1852H | 86 | 129 | 4.8 | 88 | 118 | 4.5 | 89 | 113 | 2.5 | 4611 | 89 | 111 | 6.8 | 94 |
| 292CL | 86 | 120 | 5.8 | 85 | 92 | 5.5 | 89 | 107 | 2.3 | 4739 | 89 | 111 | 6.8 | 97 |
| 45H21 | 86 | 123 | 5.3 | 88 | 108 | 5.8 | 88 | 111 | 2.5 | 4803 | 89 | 102 | 7 | 98 |
| 45H24 | 86 | 129 | 5 | 87 | 117 | 4 | 87 | 117 | 2.3 | 4796 | 89 | 111 | 6.8 | 98 |
| 45H25 | 87 | 131 | 5.8 | 89 | 115 | 3.5 | 86 | 117 | 1.5 | 4989 | 88 | 111 | 6 | 102 |
| 45H72 | 89 | 126 | 6.8 | 88 | 106 | 5 | 90 | 112 | 2.8 | 4379 | 89 | 109 | 6.5 | 89 |
| 45P70 | 87 | 123 | 5.8 | 87 | 107 | 4.8 | 90 | 119 | 2.5 | 4868 | 89 | 105 | 6 | 99 |
| 46P50 | 89 | 130 | 6 | 90 | 107 | 5 | 90 | 103 | 2.5 | 4333 | 91 | 105 | 6.8 | 88 |
| 5020 | 87 | 124 | 3.8 | 85 | 108 | 4 | 87 | 106 | 2 | 5286 | 89 | 107 | 5.8 | 108 |
| 5030 | 88 | 141 | 3 | 88 | 126 | 2 | 90 | 119 | 1.5 | 5376 | 90 | 119 | 5.5 | 110 |
| 5070 | 89 | 134 | 5 | 88 | 112 | 3.5 | 91 | 115 | 2 | 5241 | 90 | 109 | 6 | 107 |
| 9551 | 87 | 126 | 6.3 | 87 | 98 | 5.8 | 89 | 110 | 2.3 | 4302 | 90 | 99 | 7.3 | 88 |
| 9590 | 86 | 129 | 5.5 | 87 | 113 | 4.5 | 89 | 113 | 2 | 5471 | 89 | 100 | 6 | 112 |
| 71-85 RR | 89 | 122 | 6.3 | 88 | 107 | 5.8 | 89 | 116 | 2.3 | 4547 | 90 | 108 | 7.5 | 93 |
| 71-45 RR | 85 | 114 | 6.8 | 86 | 98 | 5.8 | 87 | 107 | 3.5 | 4521 | 89 | 97 | 7.3 | 92 |
| 71-25 RR | 86 | 126 | 3.3 | 87 | 111 | 3.8 | 86 | 105 | 1.8 | 4196 | 88 | 103 | 5.5 | 86 |
| 71-20 CL | 85 | 121 | 5.8 | 86 | 106 | 5.8 | 86 | 112 | 2.3 | 4154 | 88 | 100 | 7.3 | 85 |
| EXPT# 44 | 86 | 119 | 6 | 87 | 100 | 6 | 86 | 105 | 2 | 4467 | 89 | 94 | 6.8 | 91 |
| EXPT# 561 | 88 | 119 | 4.3 | 88 | 100 | 4 | 90 | 100 | 1.3 | 4223 | 89 | 98 | 5.3 | 86 |
| Prairie 717RR | 87 | 117 | 6.8 | 88 | 98 | 5.5 | 88 | 101 | 2.8 | 4315 | 88 | 98 | 6.5 | 88 |
| Prairie 719RR | 88 | 124 | 4 | 87 | 102 | 5 | 86 | 104 | 2 | 4693 | 89 | 103 | 5.8 | 96 |
| Red River 1826 | 86 | 117 | 6.3 | 88 | 104 | 5 | 91 | 108 | 2 | 3667 | 88 | 100 | 6.5 | 75 |
| Roper | 88 | 128 | 6 | 87 | 108 | 5 | 91 | 113 | 2.5 | 4463 | 90 | 102 | 6 | 91 |
| SP 621 RR | 87 | 127 | 6.5 | 86 | 112 | 4.5 | 87 | 108 | 2 | 4840 | 88 | 100 | 6.3 | 99 |
| SP Favourable RR | 87 | 127 | 6.5 | 88 | 111 | 3.8 | 90 | 113 | 1.8 | 5173 | 89 | 107 | 6.3 | 106 |
| SWPF02-3902 | 87 | 123 | 6.8 | 87 | 112 | 4.3 | 89 | 115 | 2.3 | 4131 | 89 | 101 | 7.3 | 84 |
| v1030 | 87 | 122 | 6 | 88 | 109 | 5.5 | 91 | 114 | 3.3 | 3713 | 90 | 108 | 7.8 | 76 |
| V1031 | 88 | 124 | 6 | 89 | 111 | 5.3 | 89 | 113 | 3.3 | 4407 | 90 | 106 | 6.5 | 90 |
| LSD (0.05) | 2 | 10 | 1.2 | 2 | 10 | 1.1 | 2 | 10 | 1 | 494 | 1 | 11 | 0.8 | - |
| CV (%) | 1.63 | 5.52 | 15.89 | 1.59 | 6.79 | 16.51 | 1.95 | 6.74 | 30.32 | 7.64 | 1.05 | 7.22 | 9.02 | - |

[1] lodging rating (1=erect, 9=flat)

Table 10. Yield and agronomic data for the 2006 Irrigated Flax Regional Variety trial.

| Variety | Pederson site | | | | Weiterman site | | | | Mean yield | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yield (kg/ha) | Height (cm) | Maturity (days) | Lodging rating[1] | Yield (kg/ha) | Height (cm) | Maturity (days) | Lodging rating[1] | kg/ha | % of CDC Bethune |
| **Flax (brown linseed)** | | | | | | | | | | |
| CDC Bethune (FP1026) | 2322 | 67 | 99 | 1 | 3005 | 77 | 99 | 3.3 | 2669 | 100 |
| CDC Mons (FP2044) | 2700 | 64 | 101 | 1 | 2353 | 71 | 102 | 3.7 | 2527 | 95 |
| CDC Sorrel (FP2141) | 2635 | 72 | 101 | 1.3 | 2074 | 84 | 102 | 7.3 | 2355 | 88 |
| Prairie Thunder (FP2137) | 2381 | 63 | 98 | 1 | 3187 | 65 | 94 | 3.3 | 2784 | 104 |
| Hanley (FP1094) | 2232 | 62 | 98 | 1 | 3064 | 68 | 97 | 2.3 | 2648 | 99 |
| Macbeth (FP1096) | 2378 | 67 | 100 | 1 | 2181 | 70 | 100 | 6.7 | 2280 | 85 |
| FP2112 | 2525 | 70 | 100 | 1 | 2158 | 78 | 97 | 8 | 2342 | 88 |
| FP2119 | 2401 | 59 | 96 | 1 | 2351 | 63 | 94 | 7.7 | 2376 | 89 |
| FP2161 | 2077 | 60 | 99 | 1 | 3125 | 65 | 92 | 4 | 2601 | 97 |
| Prairie Blue (FP2024) | 2965 | 69 | 103 | 1 | 2743 | 77 | 102 | 4 | 2854 | 107 |
| **Solin (yellow linseed)** | | | | | | | | | | |
| 2047 (SP2047) | 2256 | 70 | 103 | 1 | 2668 | 79 | 103 | 2.3 | 2462 | 92 |
| 2090 (SP2090) | 2558 | 65 | 102 | 1 | 2250 | 71 | 102 | 7.3 | 2404 | 90 |
| 2149 (SP2149) | 2182 | 69 | 101 | 1 | 2156 | 76 | 97 | 6.3 | 2169 | 81 |
| CDC Gold (SP2100) | 1994 | 68 | 100 | 1 | 1683 | 69 | 97 | 8 | 1839 | 69 |
| LSD (0.05) | 250 | 4 | 2 | NS[2] | 318 | 8 | 4 | 1.9 | - | - |
| CV (%) | 6.21 | 3.81 | 0.9 | 15.07 | 7.58 | 6.59 | 2.12 | 21.28 | - | - |

[1] lodging rating (1=erect, 9 = flat)
[2] not significant

Table 11. Yield and agronomic data for the 2006 Irrigated Sunflower Co-operative LMTS and EMSS Variety trial.

| Variety | Yield (kg/ha) | First Flower (days) | Maturity (days) | Plant Height (cm) | Seed Weight (mg) | Test Weight (kg/hl) | Oil (%) |
|---|---|---|---|---|---|---|---|
| **LMTS** | | | | | | | |
| 63A70 (check) | 3448 | 71 | 113 | 148 | 58.2 | 32.4 | 38.8 |
| 63A21 | 3336 | 63 | 106 | 134 | 65.7 | 33.4 | 36.3 |
| 63M02 | 3879 | 68 | 111 | 145 | 47.8 | 34.9 | 39.8 |
| 63M28 | 4026 | 69 | 113 | 140 | 59.3 | 32.2 | 40.7 |
| MSR 62 | 3932 | 68 | 108 | 129 | 59.7 | 35.2 | 41.9 |
| XF3425 | 3810 | 68 | 114 | 148 | 55.8 | 33 | 34.7 |
| **EMSS** | | | | | | | |
| 63A21 EMSS | 4586 | 63 | 106 | 149 | 57.6 | 34.9 | 38 |
| LSD (0.05) | 563 | 5 | 3 | 9 | 5.3 | 1.2 | 0.9 |
| CV (%) | 9.82 | 5 | 1.55 | 4.31 | 6.2 | 2.37 | 2.6 |

## Irrigated Wheat Regional Variety Trials

*Funded by the Irrigation Crop Diversification Corporation*

The irrigated wheat variety trials were conducted at four locations in the Outlook area. Each site and soil type are as follows:

CSIDC (SW 15-29-08-W3): Bradwell very fine sandy loam
CSIDC off-station (NW 12-29-08-W3): Asquith sandy loam
Weiterman (SW 16-31-07-W3): Asquith sandy loam - fine sandy loam
Pederson (SW 29-28-07-W3): Elstow loam

Wheat varieties for the different market classes were tested for their agronomic performance under irrigation. The CSIDC, CSIDC off-station, Weiterman and Pederson sites were seeded on May 11, 17, 17 and 18, respectively. Plot size was 1.5 m x 4.0 m. All plots received 112 kg N/ha as 46-0-0 and 45 kg $P_2O_5$/ha as 12-51-0 as a side band application during the seeding operation. Yields were estimated by harvesting the entire plot.

The CSIDC and CSIDC offstation sites were lost prior to harvest due to severe hail damage from a storm that passed through the area on August 23.

Irrigated wheat yield, height and lodge rating varied for the two sites that were not lost to hail (Table 12). Exceptionally high yields were observed for AC Vista Canada Prairie Spring wheat; Snowhite 475 and Snowhite 476 Canada Western Hard White Spring wheat; and AC Andrew, Bhisaj and SWS349 Canada Western Soft White Spring wheat. On average the Canada Western Soft White Spring, Canada Western Amber Durum and Canada Western Extra Strong market classes required a longer time to reach maturity than the other market classes. As well, the Canada Extra Strong market class varieties were taller and tended to lodge to a greater extent than varieties in the other market classes.

The results from these trials are used to update the irrigation variety database at CSIDC and provide information to irrigators on the best wheat varieties suited to irrigation conditions.

Table 12. Yield and agronomic data for the 2006 Irrigated Wheat Variety trial.

| | Pederson Site | | | | | Weiterman Site | | | | | CSIDC Main Site | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yield | | | | | Yield | | | | | | | |
| Variety | (kg/ha) | % AC Barrie | Height (cm) | Maturity (days) | Lodging rating[1] | (kg/ha) | % AC Barrie | Height (cm) | Maturity (days) | Lodging rating[1] | Height (cm) | Maturity (days) | Lodging rating |
| **Canada Western Red Spring** | | | | | | | | | | | | | |
| AC Barrie | 3405 | 100 | 89 | 95 | 1 | 5573 | 100 | 98 | 100 | 2 | 94 | 99 | 1.5 |
| 5602HR | 3533 | 104 | 91 | 95 | 1 | 5719 | 103 | 99 | 103 | 2.3 | 89 | 101 | 2 |
| CDC Alsask | 3313 | 97 | 91 | 94 | 1.5 | 4765 | 86 | 100 | 98 | 2.5 | 92 | 96 | 3.8 |
| CDC Go | 3410 | 100 | 78 | 92 | 1 | 5726 | 103 | 89 | 100 | 1 | 78 | 97 | 1.3 |
| CDC Imagine | 3316 | 97 | 86 | 95 | 1.3 | 5206 | 93 | 97 | 100 | 1.3 | 91 | 99 | 1 |
| CDC Osler | 2829 | 83 | 86 | 91 | 1.8 | 4737 | 85 | 99 | 97 | 2 | 89 | 97 | 1.3 |
| Harvest | 3145 | 92 | 88 | 95 | 1.8 | 5383 | 97 | 93 | 98 | 2.3 | 88 | 99 | 1.3 |
| Helios | 3241 | 95 | 91 | 93 | 1.8 | 5796 | 104 | 98 | 98 | 2.8 | 93 | 95 | 2.8 |
| Infifnity | 3711 | 109 | 93 | 94 | 1 | 5584 | 100 | 100 | 100 | 2 | 91 | 97 | 2.3 |
| Journey | 2802 | 82 | 86 | 94 | 1.8 | 5471 | 98 | 96 | 101 | 1.8 | 91 | 100 | 1 |
| Lillian | 3324 | 98 | 88 | 92 | 1.8 | 4886 | 88 | 100 | 97 | 3 | 92 | 97 | 3.8 |
| Lovitt | 2931 | 86 | 89 | 90 | 1.3 | 5131 | 92 | 99 | 97 | 2.5 | 95 | 97 | 2 |
| Peace | 2690 | 79 | 88 | 92 | 1.8 | 5285 | 95 | 99 | 98 | 2.5 | 93 | 96 | 2 |
| Somerset | 3147 | 92 | 97 | 94 | 1 | 5341 | 96 | 102 | 98 | 2.3 | 99 | 97 | 1.8 |
| Superb | 3211 | 94 | 82 | 93 | 1 | 5953 | 107 | 92 | 102 | 1.3 | 83 | 103 | 1 |
| **Canada Western Hard White Spring** | | | | | | | | | | | | | |
| Snowhite475 | 4139 | 122 | 79 | 94 | 1 | 7035 | 126 | 86 | 102 | 1 | 83 | 100 | 1.3 |
| Snowhite476 | 4091 | 120 | 83 | 97 | 1 | 7184 | 129 | 87 | 101 | 1.3 | 87 | 102 | 1 |
| Snowbird | 2935 | 86 | 90 | 94 | 2 | 4782 | 86 | 100 | 100 | 3.8 | 90 | 98 | 2.5 |
| **Canada Western Amber Durum** | | | | | | | | | | | | | |
| AC Avonlea | 4373 | 128 | 85 | 97 | 1 | 6381 | 114 | 95 | 104 | 2.3 | 93 | 102 | 2.3 |
| Strongfield | 4268 | 125 | 87 | 97 | 1 | 6478 | 116 | 98 | 104 | 3 | 90 | 101 | 5.3 |
| **Canada Prairie Spring - Red** | | | | | | | | | | | | | |
| 5701PR | 3490 | 102 | 81 | 97 | 1 | 6135 | 110 | 91 | 102 | 1.3 | 83 | 101 | 1.3 |
| **Canada Prairie Spring - White** | | | | | | | | | | | | | |
| AC Vista | 4315 | 127 | 83 | 98 | 1 | 7228 | 130 | 88 | 104 | 2 | 85 | 101 | 1.8 |
| **Canada Western Extra Strong** | | | | | | | | | | | | | |
| Burnside | 3146 | 92 | 93 | 95 | 1.8 | 5369 | 96 | 107 | 102 | 2.5 | 98 | 101 | 5.3 |
| CDC Rama | 3303 | 97 | 97 | 96 | 1.3 | 5601 | 101 | 106 | 102 | 2.8 | 96 | 99 | 3 |
| CDC Walrus | 3350 | 98 | 94 | 96 | 1.5 | 5530 | 99 | 107 | 102 | 2.8 | 93 | 102 | 3.8 |
| **Canada Western Soft White Spring** | | | | | | | | | | | | | |
| AC Andrew | 4531 | 133 | 82 | 98 | 1 | 7638 | 137 | 89 | 104 | 1 | 84 | 102 | 1 |
| AC Meena | 4022 | 118 | 78 | 95 | 1 | 6656 | 119 | 92 | 104 | 1.3 | 88 | 103 | 1.3 |
| AC Reed | 4550 | 134 | 77 | 96 | 1 | 6401 | 115 | 88 | 104 | 1.3 | 77 | 102 | 1 |
| Bhishaj | 4764 | 140 | 80 | 96 | 1 | 7091 | 127 | 90 | 104 | 1.5 | 80 | 101 | 1.5 |
| SWS349 | 4707 | 138 | 80 | 97 | 1 | 7700 | 138 | 92 | 104 | 1 | 87 | 102 | 1 |
| LSD (0.05) | 430 | - | 5 | 2 | 0.4 | 607 | - | 5 | 1 | 0.7 | 5 | 1 | 1 |
| CV (%) | 8.5 | - | 4.5 | 1.2 | 25.2 | 7.3 | - | 3.7 | 0.8 | 26.2 | 4.1 | 0.9 | 35.3 |

[1] lodging rating (1=erect, 9=flat)

## Saskatchewan Variety Performance Group
## Irrigated Common Wheat, Durum Wheat and Barley Regional Variety Trials

*Funded by the Saskatchewan Variety Performance Group (SAF) and*
*Agriculture and Agri-Food Canada, PFRA*

The Saskatchewan Variety Performance Group (SVPG) wheat regional and barley regional trials were seeded on May 12 and 15 respectively. Plot size was 1.5 m x 4.0 m. All plots received 112 kg N/ha as 46-0-0 and 45 kg $P_2O_5$/ha as 12-51-0 as a side band application during the seeding operation. Separate trials were conducted for wheat (CWRS and CWHWS), durum (CWAD) and soft white (CWSWS) wheat market classes and 2-row and 6-row barley. Yields were estimated by harvesting the entire plot.

The wheat trials were lost to a severe hail storm on August 23. No yield data was collected.

Results for data collected for the wheat trial (CWRS and CWHWS) prior to the hail storm on August 23 are shown in Table 13. All varieties in the trial showed good lodging resistance. Somerset and Alvena were the tallest varieties while Snowhite 475, Snowhite 476, BW315a and BW824 were the shortest varieties. BW824 was the latest maturing variety while Alvena was the earliest maturing variety.

Results for data collected for the durum wheat trial (CWAD) prior to the hail storm on August 23 are shown in Table 14. All varieties in the trial showed good lodging resistance. Strongfield and AC Avonlea were the tallest CWAD varieties. All durum varieties were significantly shorter than the check variety AC Barrie. All durum varieties had days to maturity similar to the check AC Barrie. No data was collected for the soft white spring wheat (CWSWS) trial due to the severe hail storm on August 23.

Results for the 2-row and 6-row barley trials are shown in Tables 15 and 16 respectively. AC Metcalfe, a 2-row barley, was used as the check for both the 2-row and 6-row barley trials. The 2-row test consisted of three malt varieties and eleven feed varieties while the 6-row test consisted of five malt varieties and four feed varieties. In the 2-row trial most varieties had plant height similar to the check except for the feed varieties CDC Cowboy and McLeod which were taller and shorter than the check respectively. CDC Cowboy was later maturing than all 2-row varieties tested while CONLON was the earliest maturing 2-row variety. Champion lodged to the greatest extent while all other 2-row varieties had a lodge rating equivalent to or better than the check. The 2-row malt variety Calder had the highest overall yield. CONLON was the only variety that had a lower yield than the check. CDC Cowboy had the largest seed size while Ponoka had the smallest seed size. CDC Trey and Ponoka had the highest and lowest test weight respectively. In the 6-row trial all varieties tested had yields higher than the check variety. The feed variety Vivar was the highest yielding 6-row variety tested. As well, all 6-row varieties tested matured later, had greater lodging resistance, smaller seed size and lower test weight than the check variety.

The results from these SVPG wheat and barley trials are used to update the irrigation variety database at CSIDC and provide information to irrigators on the best wheat and barley varieties suited to irrigation conditions.

Table 13. Saskatchewan Variety Performance Group 2006 Irrigated Wheat Regional Variety trial, Outlook.

| Variety | Height (cm) | Maturity (days) | Lodging rating[1] |
|---|---|---|---|
| AC Barrie (BW661) | 72 | 93 | 1 |
| 5602HR (BW297) | 76 | 93 | 1 |
| CDC Alsask (BW301) | 77 | 93 | 1 |
| Infinity (BW799) | 72 | 94 | 1 |
| Somerset (BW307) | 84 | 93 | 1 |
| Helios (PT211) | 73 | 92 | 1 |
| PT425 | 76 | 90 | 1.3 |
| KANE (BW342) | 71 | 93 | 1 |
| BW824 | 69 | 96 | 1 |
| Alvena (PT213) | 83 | 90 | 1.7 |
| BW315a | 69 | 93 | 1 |
| Snowhite 475 (HY475) | 65 | 93 | 1 |
| Snowhite 476 (HY476) | 68 | 94 | 1 |
| LSD (0.05) | 7 | 1 | NS[2] |
| CV (%) | 5.6 | 0.6 | |

[1] lodging rating (1=erect, 9=flat)
[2] not significant

Table 14. Saskatchewan Variety Performance Group 2006 Irrigated Canada Western Amber Durum Wheat (CWAD) Regional Variety trial, Outlook.

| Variety | Height (cm) | Maturity (days) | Lodging rating[1] |
|---|---|---|---|
| AC Barrie (BW661) | 81 | 92 | 1 |
| AC Avonlea (DT661) | 70 | 92 | 1.3 |
| AC Navigator (DT673) | 68 | 93 | 1 |
| Commander (DT722) | 64 | 92 | 1 |
| Strongfield (DT712) | 72 | 93 | 1.7 |
| LSD (0.05) | 8 | 1 | NS[2] |
| CV (%) | 5.7 | 0.4 | |

[1] lodging rating (1=erect, 9=flat)
[2] not significant

Table 15. Saskatchewan Variety Performance Group 2006 Irrigated 2-Row Barley Regional Variety trial, Outlook.

| Variety | Yield (kg/ha) | Yield % of AC Metcalfe | Height (cm) | Maturity (days) | Lodging rating[1] | Seed weight (mg) | Test weight (kg/hl) |
|---|---|---|---|---|---|---|---|
| **Malting** | | | | | | | |
| AC Metcalfe (TR232) | 6996 | 100 | 78 | 88 | 2.3 | 47.3 | 67.1 |
| CONLON (TR982) | 5942 | 85 | 72 | 81 | 1.3 | 54.5 | 67.7 |
| Calder (TR262) | 9076 | 130 | 75 | 85 | 1.3 | 51.1 | 67.4 |
| Newdale (TR258) | 8783 | 126 | 75 | 86 | 1.3 | 49.2 | 66.2 |
| **Feed** | | | | | | | |
| CDC Cowboy (FB201) | 6924 | 99 | 97 | 89 | 2.3 | 56 | 67.2 |
| Ponoka (TR01656) | 7156 | 102 | 71 | 86 | 1.7 | 44.1 | 64.7 |
| McLeod (TR710) | 8643 | 124 | 70 | 82 | 1 | 52.7 | 67.6 |
| CDC Coalition (TR03373) | 8518 | 122 | 74 | 83 | 1 | 51.9 | 66.8 |
| Champion (TR04719) | 7704 | 110 | 75 | 83 | 3.7 | 48.9 | 65.9 |
| Formosa | 7133 | 102 | 75 | 84 | 1.3 | 50.9 | 68.2 |
| CDC Mindon (TR04378) | 8163 | 117 | 79 | 82 | 1 | 51.2 | 66.8 |
| Niobe (TR651) | 8743 | 125 | 79 | 87 | 1.3 | 47.7 | 68.1 |
| Rivers (TR256) | 8872 | 127 | 78 | 83 | 1 | 52.4 | 66.6 |
| CDC Trey (TR359) | 8424 | 120 | 75 | 86 | 1 | 50.8 | 68.8 |
| CDC Helgason (TR346) | 8876 | 127 | 76 | 85 | 1 | 48.5 | 68.1 |
| LSD (0.05) | 808 | - | 6 | 3 | NS[2] | 2.8 | 1.2 |
| CV (%) | 6 | - | 5.1 | 1.9 | 51.2 | 3.3 | 1 |

[1] lodging rating (1=erect, 9=flat)
[2] not significant

Table 16. Saskatchewan Variety Performance Group 2006 Irrigated 6-Row Barley Regional Variety trial, Outlook.

| Variety | Yield (kg/ha) | Yield % of AC Metcalfe | Height (cm) | Maturity (days) | Lodging rating[1] | Seed weight (mg) | Test weight (kg/hl) |
|---|---|---|---|---|---|---|---|
| **Malting** | | | | | | | |
| AC Metcalfe (TR232) | 6996 | 100 | 78 | 88 | 2.3 | 47.3 | 67.1 |
| CDC Laurence (BT493) | 8800 | 126 | 84 | 93 | 1.7 | 43.7 | 62.4 |
| CDC Clyde (BT490) | 8633 | 123 | 74 | 90 | 1 | 40.5 | 64.5 |
| Tradition (BT954) | 7104 | 102 | 79 | 89 | 1 | 39.9 | 63.6 |
| CDC Battleford (BT456) | 9173 | 131 | 82 | 96 | 1.7 | 43.5 | 62.5 |
| Legacy (BT950) | 8442 | 121 | 80 | 95 | 2 | 40.7 | 63.7 |
| **Feed** | | | | | | | |
| Manny (BT562) | 8309 | 119 | 77 | 95 | 1.3 | 41.7 | 62.2 |
| Alston (BT974) | 7858 | 112 | 72 | 96 | 1 | 45.1 | 63.2 |
| Sundre (BT566) | 8799 | 126 | 79 | 92 | 2 | 42.4 | 63.1 |
| Vivar (SD 516) | 10038 | 143 | 72 | 94 | 1 | 46.3 | 62.3 |
| LSD (0.05) | 1108 | - | 6 | 3 | NS[2] | 2.2 | 1.1 |
| CV (%) | 7.7 | - | 4.2 | 2 | 51.8 | 3 | 1 |

[1] lodging rating (1=erect, 9=flat)
[2] not significant

# Alberta Corn Committee Hybrid Performance Trials

*Funded by the Alberta Corn Committee and Agriculture and Agri-Food Canada, PFRA*

*Co-investigators: B. Beres, Lethbridge Research Centre, Lethbridge, Alberta;*
*L. Bohrson, ICDC, Swift Current, Saskatchewan*

The Alberta Corn Committee grain and silage hybrid performance trials were established in the spring of 2006 at CSIDC located on the SW15-29-08-W3. The soil, developed on medium to moderately coarse-textured lacustrine deposits, is classified as Bradwell loam to silty loam.

All seeding operations were conducted using a specially designed small plot six row double disc press drill with two sets of discs. One set of discs was used for seed placement while the second set of discs allowed for side band placement of fertilizer. Treatments consisted of selected corn hybrids with varying corn heat unit maturity ratings. The corn was seeded on an 80 cm row spacing using single row cones. Two rows were seeded per pass. The grain corn plots consisted of four rows and measured 2.4 m x 6 m while the silage corn plots consisted of two rows and measured 1.2 m x 6 m. A seeding rate of 47 kernels/row (~59,000 plants/ha) and 56 kernels/row (~74,000 plants/ha) were used for grain and silage corn, respectively. Separate trials were established for grain and silage corn hybrids. The treatments were arranged in a randomized complete block design and replicated four times.

The trials were seeded on May 16 and harvested on September 11 and October 5 for the silage and grain trials respectively. Soil analysis of samples collected in the spring prior to plot establishment indicated soil available $NO_3$-N (0-24") was 63 kg/ha, P (0-12") was 57 kg/ha and K (0-12") 336 kg/ha. Fertilizer was broadcast and incorporated prior to seeding at a rate of 112 kg N/ha as Urea (46-0-0) and 112 kg $K_2O$/ha as potassium chloride (0-0-60). An additional 50 kg N/ha applied as ammonium sulfate (21-0-0-24) was broadcast at the 6-leaf stage and watered in with an irrigation application. Growing season rainfall (May 1 to September 30) and irrigation was 337 mm and 240 mm, respectively. Cumulative Corn Heat Units (CHU) were 2639 from May 15 until the first frost of -2$^0$C or greater which occurred on October 9. Growing season conditions in 2006 at CSIDC were wetter and warmer than the long term mean. A severe hail storm late in the growing season (August 23) stripped the leaves on the corn plants and damaged the stocks.

## Grain Corn

Eleven grain corn hybrids from six companies were tested with CHU maturity rating varying from 2,100 to 2,300 (Table 17). Plant stand varied among the hybrids ranging from a low of 60,234 plants/ha to a high of 75,613 plants/ha. All plots exceeded the targeted plant population of 59,000 plants/ha.

Days to 10% anthesis (range: 62-71 days), days to 50% silking (range: 68-74 days) and grain yield @ 14.5% moisture content (range: 5455-7943 kg/ha) showed no trend in relation to the CHU maturity rating. Yield was low and probably affected by the late season hail storm and as a result caution should be exercised in interpreting this data. Corn grain test weight ranged from a low of 65.1 kg/hl to a high of 72.9 kg/hl but showed no specific trend in relation to CHU maturity rating or grain yield. The higher heat unit varieties showed a trend of higher moisture content at harvest indicating later maturity and a slower rate of dry down. Even with the hail damage yields and test weight were higher than in previous years (2004 and 2005) where growing conditions were cooler.

**Silage Corn**

Thirty-seven silage corn hybrids from eight companies were tested with CHU maturity rating varying from 2000 to 2650 (Table 18). Plant stand varied among the hybrids ranging from a low of 74,588 plants/ha to a high of 90,736 plants/ha. All plots exceeded the targeted plant population of 74,000 plants/ha.

Days to 10% anthesis (range: 63-83 days) and days to 50% silking (range: 68-85 days) showed a general trend of increasing as the CHU rating increased. Dry yield (range: 9.1-14.1 t/ha) showed no trend in relationship to CHU maturity rating. Yield was low and probably affected by the late season hail storm and as a result caution should be exercised in interpreting this data. The cobs on some varieties did not mature properly for the higher heat unit varieties thus the full yield potential of these varieties was not obtained due to the severe hail storm late in the growing season. Results from these trials are posted on the Alberta Corn Committee website at www.albertacorn.com.

Table 17. ACC 2006 Grain Hybrid Performance trial, Outlook.

| Company | Hybrid | CHU Maturity Rating | Plant Stand (#/ha) | 10% Anthesis (days) | 50% Silking (days) | Harvest Grain Moisture (%) | Yield @ 14.5% moisture (kg/ha) | Test weight (kg/hl) |
|---|---|---|---|---|---|---|---|---|
| Hyland | HL 2093 | 2225 | 67924 | 69 | 74 | 21.5 | 5919 | 72.1 |
| | HL B209 | 2225 | 60234 | 70 | 74 | 27.1 | 5455 | 68.4 |
| Monsanto | DKC26-78 | 2150 | 75613 | 67 | 71 | 23.2 | 7652 | 71.9 |
| Syngenta | N05-C7 | 2250 | 70231 | 71 | 74 | 23.4 | 5606 | 72.9 |
| | N06-C1 | 2200 | 75869 | 68 | 74 | 27.9 | 7380 | 65.9 |
| La Coop Federee | 30A27 RR | 2200 | 62285 | 69 | 73 | 22.7 | 6476 | 72.2 |
| Maizex | MZ 115 | 2150 | 72794 | 67 | 72 | 26.2 | 7290 | 67.5 |
| | EX 1263 | 2300 | 70231 | 68 | 74 | 33.8 | 7442 | 65.1 |
| | EX 1264 | 2100 | 73050 | 62 | 68 | 23.1 | 7692 | 71.7 |
| | EX 1265 | 2300 | 72281 | 67 | 72 | 28.2 | 7943 | 68 |
| MTI Maize | 6MA06 | - | 65617 | 68 | 73 | 32 | 7630 | 65.6 |
| | | LSD (0.05) | NS[1] | 1 | 1 | 1.8 | 1380 | 3.6 |
| | | CV (%) | 13.8 | 1.5 | 1 | 4.8 | 13.7 | 3.6 |

[1] not significant

Table 18. ACC 2006 Corn Silage Hybrid Performance trial, Outlook.

| Company | Hybrid | CHU Maturity Rating | Plant Stand (#/ha) | 10% Anthesis (days) | 50% Silking (days) | Dry yield (t/ha) | Harvest Whole Plant Moisture (%) |
|---|---|---|---|---|---|---|---|
| Hyland | HL S007 | 2250 | 75870 | 71 | 76 | 11.3 | 73.7 |
| | HL S011 | 2325 | 76382 | 79 | 81 | 11.4 | 75.2 |
| | HL 2093 | 2225 | 79458 | 68 | 73 | 11.9 | 64.8 |
| | HL B209 | 2225 | 78689 | 71 | 75 | 11.8 | 68.1 |
| | HLSX R01 | 2250 | 80227 | 82 | 85 | 11.7 | 76.4 |
| | HL R219 | 2400 | 79202 | 74 | 75 | 12.5 | 72.7 |
| | HL R228 | 2525 | 83303 | 75 | 78 | 13.8 | 75.9 |
| | HL R208 | 2250 | 79971 | 69 | 73 | 11.6 | 71.7 |
| | HL B16R | 2350 | 74075 | 70 | 74 | 9.1 | 70.6 |
| | HKRX660 | 2250 | 80227 | 71 | 75 | 10.1 | 71 |
| | Baxxos RR | 2250 | 79971 | 69 | 73 | 11.7 | 70.9 |
| | Bixxio RR | 2225 | 85353 | 67 | 72 | 12.6 | 70.6 |
| La Coop Federee | 46T07 RR | 2300 | 85353 | 71 | 74 | 13.4 | 69.3 |
| Maizex | EX1261 | 2250 | 82021 | 67 | 71 | 13.4 | 68.6 |
| | LF725 | 2250 | 76895 | 72 | 74 | 12.8 | 70.8 |
| | MZ16-05RR | 2450 | 81765 | 74 | 78 | 12.8 | 75.7 |
| | MZ18-02RR | 2450 | 85866 | 73 | 76 | 11.7 | 75.9 |
| Monsanto | DKC26-78 | 2150 | 82277 | 67 | 71 | 11.2 | 69.2 |
| | DKC30-02 | 2375 | 86635 | 73 | 75 | 14 | 70.6 |
| | DKC33-10 | 2550 | 74844 | 74 | 76 | 11.3 | 76.5 |
| MTI Maize | 6MA19 | - | 85610 | 73 | 78 | 11.8 | 73.4 |
| Pioneer | 39A94 | 2550 | 84584 | 74 | 78 | 10.3 | 72.6 |
| | 39B93 | 2150 | 82021 | 73 | 75 | 12.4 | 70.7 |
| | 39F45 | 2000 | 86379 | 63 | 68 | 12.7 | 53.4 |
| | 39F59 | 2200 | 86891 | 73 | 75 | 10.8 | 68.5 |
| | 39H83 | 2450 | 82790 | 72 | 76 | 12.5 | 72.6 |
| | 39P78 | 2050 | 85097 | 66 | 71 | 10.8 | 65.3 |
| | 39T67 | 2200 | 79714 | 69 | 74 | 11.5 | 67.6 |
| Pride Seeds | A4741HM | 2475 | 82534 | 73 | 75 | 10.4 | 73.1 |
| | A4950RR | 2500 | 90736 | 72 | 75 | 12.4 | 75.6 |
| Syngenta | G4043 | 2600 | 85097 | 75 | 78 | 12.9 | 76 |
| | N05-C7 | 2250 | 77151 | 70 | 72 | 12.5 | 67.6 |
| | N11-F4 | 2475 | 74588 | 72 | 75 | 10.3 | 76.1 |
| | N15-P6 | 2575 | 80740 | 76 | 78 | 11.6 | 72.1 |
| | N22-L1 | 2675 | 89711 | 74 | 78 | 14.1 | 75.2 |
| | NX2194 | 2550 | 80740 | 82 | 84 | 13.8 | 76.9 |
| | N24-V8 | 2650 | 83303 | 83 | 85 | 13.4 | 76.6 |
| | | LSD (0.05) | NS[1] | 1 | 1 | 2.4 | 2 |
| | | CV (%) | 9 | 1.4 | 1.3 | 14.6 | 2 |

[1] not significant

## Short Season Narrow Row Dry Bean Cooperative Trials A & B in Western Canada

*Co-investigator: A. Vandenberg, Crop Development Centre, Saskatoon, Saskatchewan*

The Short Season Narrow Row Dry Bean Cooperative Trial in Western Canada consisted of Trial A (black and navy types) with 18 entries and Trial B (great northern, pink, pinto, small red and other market classes) with 30 entries. For the pinto, black and navy market classes, both determinate and indeterminate checks were included. All trials had three replicates. All plots were grown at a row spacing of 30 cm. The trials experienced severe hail damage prior to harvest and were abandoned.

## Dry Bean Narrow Row Regional Variety Trial

*Co-investigator: A. Vandenberg, Crop Development Centre, Saskatoon, Saskatchewan*

The potential for development of the dry bean sector of Saskatchewan's pulse industry has been limited by the lack of adapted varieties. Adapted breeding lines from the Crop Development Centre (CDC), U of S, Saskatoon, Saskatchewan, are at the stage of recommendation for registration. The next step in the development process is regional testing of new varieties. Regional performance trials provide information on the various production regions available in Saskatchewan to assess productivity and risk. This information is used by extension personnel, pulse growers and researchers across Saskatchewan to become familiar with these new pulse crops.

A Dry Bean Narrow Regional variety trial was established in the spring of 2006 at CSIDC and CSIDC off-station sites. The varieties that were included were specifically bred for narrow row production systems (20 cm/8 in. row spacing). Sixteen dry bean varieties consisting of five market classes (pinto, navy, black, great northern, small red) were evaluated (Table 19). The trials experienced severe hail damage prior to harvest and were abandoned.

## Short Season Wide Row Irrigated Bean Co-operative Registration Trial

*Funded by Agriculture and Agri-Food Canada, PFRA*
*Co-investigators: H. Mundel, Cathy Daniels and J. Braun, Lethbridge Research Centre, Lethbridge, Alberta*

This project evaluates dry bean germplasm for its adaptation to western Canada under irrigated row crop production conditions. The germplasm sources include advanced lines from the AAFC Lethbridge Research Centre and the Crop Development Centre, University of Saskatchewan. These lines are compared to registered varieties within each market class.

An irrigated site was conducted at CSIDC. Standard fertilizer, weed control and irrigation practices for irrigated dry bean production were followed. The test consisted of 16 entries in a 4 x 4 lattice design that included 7 checks from 4 standard market classes (pinto, small red, great northern and black) and 9 advanced breeding lines from AAFC-Lethbridge - including 3 pintos, 2 great northern, 2 black and 2 small reds. Individual plots consisted of two rows with 60 cm row spacing and measured 1.2 m x 3.7 m. The trial was destroyed by hail shortly before all lines could mature so maturity data is limited and yield data was not collected.

## Alberta Dry Bean Wide Row and Narrow Regional Variety Trials

*Co-investigators: H. Mundel and J. Braun, Lethbridge Research Centre, Lethbridge, Alberta*

A Dry Bean Wide Row and Narrow Regional variety trial were established in the spring of 2006 at CSIDC and CSIDC off-station sites. The 2006 Wide Row Dry Bean Regional Trial (60 cm/24 in. row spacing) included mainly varieties that were specifically bred for wide row production systems while the Narrow Row Regional Trial (20 cm/8 in. row spacing) included varieties more suited to narrow row production systems.

In the Wide Row trial, sixteen dry bean varieties consisting of five market classes (pinto, small red, great northern, black, pink) were evaluated (Table 21). In the Narrow Row trial, thirteen varieties consisting of five market classes (pinto, small red, great northern, black, pink) were evaluated (Table 22). Individual plots consisted of two rows with 60 cm row spacing for the wide row trial and 6 rows with 20 cm spacing for the narrow row trial and measured 1.2 m x 3.7 m. The trials were destroyed by hail shortly before all lines could mature so maturity data is limited and yield data was not collected.

Table 19. 2006 Irrigated Dry Bean Narrow Row Regional Variety trials, CSIDC and CSIDC off-station sites.

| Variety | CSIDC | | CSIDC off-station | |
|---|---|---|---|---|
| | Days to Flower | Plant Height (cm) | Days to Flower | Plant Height (cm) |
| **Pinto** | | | | |
| CDC Pintium | 48 | 33 | 48 | 37 |
| Othello | 53 | 37 | 53 | 37 |
| CDC Minto | 53 | 36 | 53 | 35 |
| Maverick | 54 | 34 | 53 | 37 |
| **Navy** | | | | |
| AC Cruiser | 54 | 39 | 52 | 45 |
| Cirrus | 53 | 34 | 51 | 37 |
| Envoy | 51 | 32 | 51 | 36 |
| Kippen | 52 | 32 | 51 | 40 |
| Morden 003 | 51 | 33 | 52 | 34 |
| T9903 | 53 | 36 | 53 | 43 |
| **Black** | | | | |
| AC Black Diamond | 53 | 36 | 54 | 40 |
| CDC Expresso | 47 | 26 | 47 | 32 |
| CDC Jet | 54 | 35 | 58 | 39 |
| CDC Rio (316-13) | 54 | 33 | 54 | 40 |
| **Great Northern** | | | | |
| Resolute | 50 | 36 | 51 | 49 |
| 1006S-1 | 50 | 34 | 51 | 35 |
| **Small Red** | | | | |
| AC Redbond | 52 | 38 | 50 | 39 |
| LSD (0.05) | 1 | 5 | 1 | 7 |
| CV (%) | 0.9 | 8.2 | 1.3 | 10.7 |

Table 20. 2006 Short Season Wide Row Irrigated Bean Co-operative Registration trial.

| Variety | Days to Flower | Days to Maturity[1] | Plant Height (cm) |
|---|---|---|---|
| **Pinto** | | | |
| Othello (check) | 52 | >92 | 31 |
| AC Agrinto | 53 | 91 | 36 |
| L03B748 | 52 | 91 | 35 |
| L03B754 | 51 | 91 | 37 |
| L04B815 | 52 | 90 | 31 |
| **Small Red** | | | |
| AC Redbond (check) | 50 | 90 | 37 |
| L98D347 | 52 | 90 | 31 |
| L98D347a | 53 | 89 | 31 |
| **Great Northern** | | | |
| AC Polaris (check) | 53 | 91 | 35 |
| US1140 | 52 | >92 | 31 |
| L03E398 | 50 | 91 | 36 |
| L03E456 | 51 | 90 | 31 |
| **Black** | | | |
| AC Black Diamond (check) | 52 | 90 | 39 |
| CDC Rio (316-13) | 53 | >92 | 36 |
| L03F238 | 51 | 90 | 35 |
| LO4F298 | 53 | >92 | 32 |
| LSD (0.05) | 1.2 | - | 6 |
| CV (%) | 1.3 | - | 10.8 |

[1] 50% of pods at buckskin stage. Plots that were destroyed by hail prior to reaching maturity were recorded as '>92'.

Table 21. 2006 Irrigated Alberta Dry Bean Wide Row Regional Variety trial, CSIDC and CSIDC off-station sites.

| | CSIDC | | CSIDC off-station | |
|---|---|---|---|---|
| Variety | Days to Flower | Plant Height (cm) | Days to Flower | Plant Height (cm) |
| **Pinto** | | | | |
| Othello (check) | 53 | 36 | 53 | 37 |
| AC Agrinto | 54 | 37 | 56 | 43 |
| CDC Pinnacle | 54 | 38 | 56 | 40 |
| CDC Minto (958310) | 53 | 36 | 54 | 41 |
| Winchester | 47 | 37 | 50 | 44 |
| **Great Northern** | | | | |
| AC Polaris | 53 | 37 | 55 | 41 |
| CDC 1006S-1 | 50 | 33 | 51 | 36 |
| AC Resolute | 51 | 36 | 52 | 40 |
| AC Alert | 54 | 40 | 58 | 47 |
| **Pink** | | | | |
| Viva (check) | 54 | 31 | 53 | 38 |
| Early Rose (L94C356) | 52 | 33 | 54 | 36 |
| **Black** | | | | |
| AC Black Diamond (check) | 54 | 35 | 55 | 38 |
| CDC Jet (315-18) | 56 | 39 | 59 | 40 |
| Black Violet (L95F025) | 58 | 40 | 59 | 40 |
| CDC Rio (316-13) | 54 | 38 | 57 | 37 |
| **Small Red** | | | | |
| AC Redbond (check) | 52 | 37 | 51 | 44 |
| LSD (0.05) | 1 | 6 | 2 | NS[1] |
| CV (%) | 1.7 | 12 | 2.4 | 12.5 |

[1] not significant

Table 22. 2006 Irrigated Alberta Dry Bean Narrow Row Regional Variety trial, CSIDC and CSIDC off-station sites.

| Variety | CSIDC Days to Flower | CSIDC Plant Height (cm) | CSIDC off-station Days to Flower | CSIDC off-station Plant Height (cm) |
|---|---|---|---|---|
| **Pinto** | | | | |
| Othello (check) | 57 | 35 | 53 | 39 |
| CDC Pintium | 48 | 31 | 48 | 32 |
| CDC Minto (958310) | 55 | 38 | 54 | 37 |
| AC Agrinto | 56 | 41 | 54 | 45 |
| **Great Northern** | | | | |
| AC Polaris | 55 | 36 | 53 | 39 |
| AC Alert | 57 | 45 | 53 | 44 |
| AC Resolute | 50 | 38 | 51 | 42 |
| **Pink** | | | | |
| Viva (check) | 56 | 34 | 53 | 34 |
| Early Rose (L94C356) | 55 | 36 | 52 | 32 |
| **Black** | | | | |
| AC Black Diamond (check) | 56 | 35 | 54 | 38 |
| CDC Rio (316-13) | 57 | 37 | 54 | 37 |
| **Small Red** | | | | |
| AC Redbond (check) | 53 | 43 | 50 | 40 |
| **Canario Mexicano** | | | | |
| Arikara Yellow | 47 | 34 | 47 | 38 |
| LSD (0.05) | 1 | 6 | 1 | 6 |
| CV (%) | 1.8 | 12.1 | 1.6 | 11 |

## Field Pea Co-operative Registration Test A and Test B

*Project Leads: T. Warkentin, Crop Development Centre, Saskatoon, Saskatchewan;*
*D. Bing and D. Beauchesne, Lacombe Research Centre, Lacombe, Alberta;*
*A. Sloan, Morden Research Centre, Morden, Manitoba*

This project evaluates pea germplasm for growing conditions in western Canada. The germplasm sources included advanced lines from the AAFC Morden Research Centre; Crop Development Centre, University of Saskatchewan; Crop Diversification Centre North, Alberta Agriculture; and private seed companies. Fifty-six candidate entries were divided into two tests, Test A with 30 entries and Test B with 26 entries. Each test had two yellow check varieties, Eclipse and Cutlass, and two green check varieties, CDC Striker and Cooper.

An irrigated site was conducted at CSIDC. Standard fertilizer, weed control and irrigation practices for irrigated pea production were followed. Each test was arranged as a randomized complete block design with three replicates. Individual plots measured 1.2 m x 3.7 m. All rows were harvested to determine yield.

In test A, one yellow line and four green lines had yield greater than or equal to the check variety Eclipse (Table 23). Only six green lines had yield higher than the green check CDC Striker. All yellow lines except APCM8.60.10 had maturity equal to or greater than the yellow check Eclipse. All green lines except SWC6185 and MP1835 had maturity greater than the green check CDC Striker. All yellow lines had lodge rating greater than or equal to the yellow check variety Eclipse while five green lines (IN1097, CDC1503-3, JS01111-25, MP1835 and MP1848) had lodge rating less than the green check variety CDC Striker. All other yellow and green lines had lodge ratings higher than the respective checks. Highest seed weight was recorded for the green line DS49519.

In test B, all lines yielded greater than the check variety Eclipse except for IN4178, SWD5184, MP1845 and MP1847 (Table 24). Two lines SWD5014 and MP1846 had exceptionally high yield. Most lines had maturity less than or equal to the checks. Most lines tested had lodge rating greater than the check variety Eclipse. The highest seed weight was recorded for lines IN4178 and CDC1658-7. Line CDC 1400-8 had exceptionally low seed weight compared to the check.

| Entry | Yield (kg/ha) | Yield % of check | Pre-Harvest Lodging Rating 1=erect ; 9=flat | Vine Length (cm) | Days to Maturity | Seed Weight (mg) |
|---|---|---|---|---|---|---|
| **Yellow** | | | | | | |
| Eclipse (check) | 6223 | 100 | 5 | 90 | 92 | 216 |
| Cutlass | 5993 | 96 | 6.3 | 79 | 92 | 224 |
| CEB4159 | 3326 | 53 | 5 | 82 | 93 | 218 |
| CEB4163 | 6169 | 99 | 7.3 | 75 | 94 | 240 |
| APCM9.71.07 | 5038 | 81 | 8.3 | 84 | 92 | 244 |
| APCM8.60.10 | 5940 | 95 | 6 | 88 | 91 | 300 |
| CDC1408-6 | 5807 | 93 | 7.7 | 80 | 94 | 174 |
| CDC1330-7 | 6110 | 98 | 6.7 | 91 | 94 | 186 |
| CDC1474-5 | 6817 | 110 | 7 | 93 | 92 | 165 |
| **Green** | | | | | | |
| CDC Striker | 5975 | 96 | 5.7 | 87 | 92 | 245 |
| Cooper | 5995 | 96 | 7.3 | 74 | 94 | 254 |
| IN1096 | 5838 | 94 | 6.3 | 90 | 92 | 194 |
| IN1097 | 5441 | 87 | 5 | 88 | 92 | 284 |
| IN1098 | 5435 | 87 | 6 | 82 | 92 | 279 |
| DS49519 | 4510 | 72 | 7 | 76 | 92 | 379 |
| APCM0.038.21 | 5403 | 87 | 6 | 83 | 92 | 311 |
| CDC1503-3 | 6066 | 97 | 5 | 89 | 93 | 167 |
| CDC1434-20 | 5904 | 95 | 6 | 86 | 92 | 173 |
| CDC1767-18 | 6679 | 107 | 6.7 | 91 | 93 | 199 |
| CDC1767-23 | 6631 | 107 | 6.3 | 91 | 93 | 205 |
| CDC1812-5 | 6582 | 106 | 6 | 96 | 93 | 216 |
| CDC1770-3 | 5911 | 95 | 6 | 84 | 92 | 210 |
| CDC1687-9 | 6247 | 100 | 6.7 | 87 | 93 | 211 |
| SWC6185 | 6009 | 97 | 6.3 | 81 | 91 | 245 |
| JS01111-23 | 5116 | 82 | 6 | 80 | 93 | 160 |
| JS01111-25 | 5722 | 92 | 5 | 93 | 92 | 164 |
| MP1835 | 5695 | 92 | 5 | 84 | 91 | 207 |
| MP1841 | 5498 | 88 | 5.7 | 95 | 93 | 166 |
| MP1848 | 5924 | 95 | 5 | 87 | 92 | 263 |
| MP1849 | 5094 | 82 | 5.7 | 89 | 92 | 220 |
| LSD (0.05) | 685 | - | - | - | - | - |
| CV (%) | 7.1 | - | - | - | - | - |

Table 23. 2006 Pea Co-operative Registration Test A.

| Table 24. 2006 Pea Co-operative Registration Test B. | | | | | | |
|---|---|---|---|---|---|---|
| Entry | Yield (kg/ha) | Yield % of check | Pre-Harvest Lodging Rating 1=erect; 9=flat | Vine Length (cm) | Days to Maturity | Seed Weight (mg) |
| **Yellow** | | | | | | |
| Eclipse (check) | 5562 | 100 | 5.3 | 88 | 95 | 228 |
| Cutlass | 6255 | 112 | 6.3 | 88 | 92 | 222 |
| CDC Striker | 5927 | 107 | 5.3 | 85 | 92 | 243 |
| Cooper | 4951 | 89 | 7 | 66 | 94 | 249 |
| CEB4160 | 6092 | 110 | 5 | 91 | 93 | 255 |
| IN4176 | 6287 | 113 | 4.7 | 92 | 92 | 227 |
| IN4177 | 5679 | 102 | 6 | 84 | 92 | 255 |
| IN4178 | 4902 | 88 | 6.3 | 91 | 92 | 281 |
| IN4179 | 6345 | 114 | 5.3 | 87 | 93 | 252 |
| CDC1400-8 | 5984 | 108 | 6.7 | 91 | 93 | 147 |
| CDC1410-15 | 6097 | 110 | 5.7 | 94 | 90 | 202 |
| CDC1759-6 | 6048 | 109 | 5.7 | 89 | 93 | 236 |
| CDC1659-13 | 6523 | 117 | 6.7 | 93 | 96 | 206 |
| CDC1734-5 | 7248 | 130 | 6.3 | 96 | 96 | 234 |
| CDC1658-7 | 6593 | 119 | 6.7 | 95 | 94 | 281 |
| CDC1657-5 | 6330 | 114 | 7.7 | 93 | 93 | 217 |
| CDC1749-8 | 6439 | 116 | 5.7 | 90 | 93 | 207 |
| CDC1759-30 | 6331 | 114 | 6.3 | 90 | 95 | 206 |
| SWD5014 | 6915 | 124 | 6 | 89 | 89 | 209 |
| SWD5184 | 4813 | 87 | 6 | 76 | 88 | 219 |
| MP1833 | 5853 | 105 | 7 | 83 | 93 | 231 |
| MP1838 | 6069 | 109 | 8.7 | 79 | 92 | 192 |
| MP1844 | 5700 | 102 | 5 | 87 | 90 | 264 |
| MP1845 | 5101 | 92 | 7 | 75 | 88 | 192 |
| MP1846 | 6776 | 122 | 5.3 | 86 | 92 | 254 |
| MP1847 | 5258 | 95 | 7.3 | 77 | 93 | 256 |
| LSD (0.05) | 1066 | - | - | - | - | - |
| CV (%) | 10.5 | - | - | - | - | - |

## Irrigated Field Pea Regional Variety Trial

*Funded by the Irrigation Crop Diversification Corporation and the Crop Development Centre, Saskatoon, Saskatchewan*

Pea Regional variety trials were conducted at four locations in the Outlook irrigation area. Each site and soil type are as follows:

CSIDC (SW15-29-08-W3): Bradwell very fine sandy loam
CSIDC off-station (NW12-29-08-W3): Asquith sandy loam
Weiterman (SW16-31-07-W3): Asquith sandy loam - fine sandy loam
Pederson (SW29-28-07-W3): Elstow loam

Pea varieties were tested for their agronomic performance under irrigation. The CSIDC, CSIDC off-station, Weiterman, and Pederson sites were seeded on May 11, 11, 18 and 17, respectively. Plot size was 1.5 m x 4.0 m. All plots received 45 kg $P_2O_5$/ha as 12-51-0 as a side band application during the seeding operation. Yields were estimated by harvesting the entire plot.

Irrigated pea yield, height and lodging rating (Table 25) as well as seed weight (Table 26) varied among the four sites. The Weiterman site generally had lower seed weights possibly due to the higher incidence of foliar disease at this site. Lodging rating varied considerably among the sites, possibly a function of environmental growing conditions. As well, there was considerable variation in lodging among the varieties within each site. Maturity showed a general trend of being slightly longer at the Weiterman site than the other three sites. The highest yielding yellow varieties were CDC Centennial and Tudor while the highest yielding green variety was Cooper averaged over the four sites.

The results from these trials are used to update the irrigation variety trial database at CSIDC and provide recommendations to irrigators on the best pea varieties suited to irrigation conditions.

## Irrigated Fababean Regional Variety Trial

*Funded by the Crop Development Centre, Saskatoon, Saskatchewan*

A fababean regional variety trial was established in the spring of 2006 at CSIDC. Individual plots consisted of six rows with 20 cm row spacing and measured 1.2 m x 3.7 m. All plots received 45 kg $P_2O_5$/ha as 12-51-0 as a side band application during the seeding operation.

Most varieties flowered earlier than the check Snowbird and matured within 1-2 days of the check (Table 27). Five varieties were significantly taller than the check. All but six varieties had lodging rating greater than the check.

The trials experienced severe hail damage prior to harvest and as a result yield data was not collected.

# Irrigated Soybean Performance Evaluation Demonstration Trial

*Funded by Agriculture and Agri-Food Canada and the Irrigation Crop Diversification Corporation*

A soybean performance evaluation demonstration trial was established in the spring of 2006 at CSIDC. Soybean varieties were tested for their agronomic performance under irrigation and dryland conditions at one site (CSIDC). Plot size was 1.5 m x 4.0 m. All plots received 45 kg $P_2O_5$/ha as 12-51-0 as a side band application during the seeding operation. Granular inoculant of the appropriate *Rhizobium* strain specific for soybean was seed placed during the seeding operation. Yields were estimated by harvesting the entire plot.

Growing season rainfall (May 1 to September 30) and irrigation was 337 mm and 175 mm, respectively. Cumulative Corn Heat Units (CHU) were 2639 from May 15 until the first frost of -2$^0$C or greater which occurred on October 9. Growing season conditions in 2006 at CSIDC were wetter and warmer than the long term mean. A severe hail storm late in the growing season (August 23) stripped the leaves on the soybean plants and damaged the pods to some extent.

Nine soybean varieties with a range in heat unit maturity ratings (2350-2550) were evaluated. Both the irrigated and dryland trials indicated that higher yields were generally obtained for the higher heat unit varieties except 90M01, the highest heat unit variety (Tables 28 and 29). All varieties except 90M01 had started to turn colour prior to the hail storm damage indicating the onset of maturity. The lower yield for 90M01, the highest heat unit variety, was probably due to the fact that this variety was not mature prior to the hail damage.

Since this trial was damaged by hail, compromising the data, care should be used in interpretation of the data.

Table 25. Yield and agronomic data for the 2006 Irrigated Field Pea Regional Variety trial.

| Variety | Pederson site | | | | Weiterman site | | | | CSIDC off-station site | | | | CSIDC site | | | | Mean yield | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yield (kg/ha) | Height (cm) | Maturity (days) | Lodging rating[1] | Yield (kg/ha) | Height (cm) | Maturity (days) | Lodging rating[1] | Yield (kg/ha) | Height (cm) | Maturity (days) | Lodging rating[1] | Yield (kg/ha) | Height (cm) | Maturity (days) | Lodging rating[1] | Yield kg/ha | % of Alfetta |
| **Yellow** | | | | | | | | | | | | | | | | | | |
| Alfetta | 4600 | 55 | 81 | 8 | 5431 | 87 | 85 | 8 | 7094 | 76 | 86 | 6.3 | 6799 | 92 | 84 | 6.3 | 5981 | 100 |
| Canstar | 4701 | 69 | 83 | 4.7 | 5039 | 96 | 86 | 5.3 | 5725 | 84 | 88 | 4.3 | 6925 | 93 | 84 | 4 | 5598 | 94 |
| CDC Meadow | 5208 | 68 | 81 | 4.7 | 5348 | 109 | 86 | 4.3 | 6834 | 96 | 88 | 5.7 | 7413 | 95 | 84 | 3.7 | 6201 | 104 |
| CDC Centennial | 6404 | 63 | 85 | 7.3 | 4086 | 90 | 87 | 8 | 7721 | 89 | 91 | 7.7 | 7669 | 81 | 89 | 7.7 | 6470 | 108 |
| CDC Mozart | 5253 | 60 | 83 | 7.3 | 4232 | 90 | 87 | 7.7 | 7263 | 90 | 90 | 7.7 | 7438 | 82 | 88 | 6.7 | 6047 | 101 |
| Cutlass | 5062 | 65 | 83 | 5.3 | 5142 | 93 | 86 | 6.3 | 6004 | 83 | 89 | 5 | 5683 | 88 | 85 | 5.7 | 5473 | 92 |
| Eclipse | 4295 | 66 | 86 | 3.3 | 4806 | 91 | 89 | 4.7 | 4619 | 80 | 92 | 4 | 6360 | 86 | 88 | 4.7 | 5020 | 84 |
| Fusion | 3866 | 63 | 84 | 3.3 | 5147 | 94 | 89 | 4.7 | 5992 | 98 | 92 | 5 | 6815 | 93 | 89 | 5 | 5455 | 91 |
| Polstead | 4415 | 57 | 86 | 5.7 | 4249 | 83 | 89 | 6 | 6800 | 76 | 91 | 4.3 | 7564 | 87 | 89 | 6 | 5757 | 96 |
| Reward | 4601 | 68 | 84 | 2.3 | 5335 | 103 | 89 | 4.3 | 6412 | 94 | 91 | 3 | 7148 | 108 | 89 | 2.7 | 5874 | 98 |
| SW Benefit | 2356 | 55 | 85 | 4.3 | 4750 | 86 | 87 | 5.3 | 3451 | 68 | 89 | 4.3 | 4754 | 83 | 89 | 3.7 | 3828 | 64 |
| SW Carousel | 4773 | 67 | 85 | 3.7 | 5317 | 97 | 88 | 4.7 | 6117 | 94 | 90 | 5.3 | 7199 | 106 | 88 | 5 | 5852 | 98 |
| SW Cartier | 4561 | 65 | 83 | 6.3 | 4831 | 98 | 86 | 8 | 6184 | 91 | 89 | 7.7 | 6861 | 96 | 88 | 6 | 5609 | 94 |
| SW Marquee | 3716 | 65 | 82 | 4 | 4886 | 102 | 87 | 5.3 | 5236 | 87 | 90 | 4.7 | 6569 | 95 | 86 | 3 | 5111 | 85 |
| SW Midas | 4749 | 66 | 83 | 5.3 | 5701 | 92 | 86 | 6 | 5878 | 87 | 88 | 4 | 6957 | 92 | 85 | 4 | 5821 | 97 |
| Tudor | 6089 | 76 | 87 | 4 | 5243 | 105 | 88 | 5 | 7334 | 92 | 90 | 4.3 | 7271 | 96 | 88 | 4 | 6484 | 108 |
| **Green** | | | | | | | | | | | | | | | | | | |
| Bluebird | 3893 | 53 | 85 | 6.3 | 3700 | 75 | 86 | 8 | 4706 | 65 | 90 | 8.3 | 6275 | 78 | 90 | 7.3 | 4644 | 78 |
| Camry | 3089 | 48 | 86 | 4.3 | 4350 | 77 | 88 | 5.7 | 4964 | 69 | 93 | 4.7 | 6122 | 74 | 91 | 4 | 4881 | 82 |
| CDC Sage | 2665 | 62 | 87 | 2.7 | 3235 | 90 | 89 | 6.7 | 4587 | 85 | 93 | 5 | 5241 | 84 | 90 | 6 | 3932 | 66 |
| CDC Striker | 4219 | 68 | 85 | 2.3 | 5451 | 107 | 88 | 5.3 | 6142 | 89 | 90 | 4.7 | 6152 | 96 | 89 | 3 | 5491 | 92 |
| Cooper | 4826 | 67 | 88 | 3.3 | 4905 | 93 | 91 | 3.3 | 7277 | 92 | 93 | 2.7 | 7362 | 90 | 91 | 2.3 | 6093 | 102 |
| SW Sergeant | 3935 | 64 | 85 | 3 | 4227 | 97 | 88 | 6.7 | 5483 | 89 | 91 | 5.3 | 5439 | 102 | 90 | 3.7 | 4771 | 80 |
| Tamora | 3534 | 60 | 88 | 2.7 | 5053 | 96 | 91 | 3.3 | 5617 | 85 | 93 | 3.7 | 7271 | 89 | 90 | 3 | 5369 | 90 |
| **Tan** | | | | | | | | | | | | | | | | | | |
| CDC Dundurn | 2368 | 54 | 84 | 7.3 | 3238 | 77 | 87 | 7.3 | 4549 | 87 | 89 | 4.3 | 4285 | 82 | 83 | 5.3 | 5077 | 85 |
| **Maple** | | | | | | | | | | | | | | | | | | |
| CDC 617-20 | 4936 | 68 | 84 | 4 | 4006 | 97 | 87 | 5 | 6510 | 103 | 90 | 6.3 | 6862 | 97 | 88 | 4.7 | 5579 | 93 |
| **Silage** | | | | | | | | | | | | | | | | | | |
| CDC 1096-8 | 4316 | 70 | 86 | 2.3 | 3058 | 102 | 91 | 4.3 | 5645 | 101 | 92 | 3.7 | 6173 | 98 | 91 | 2.7 | 4798 | 80 |
| LSD (0.05) | 647 | 6 | 2 | 1.8 | 734 | 6 | 1 | 1.2 | 1158 | 10 | 1 | 1.8 | 749 | 15 | 2 | 1.6 | - | - |
| CV (%) | 9.2 | 6 | 1.6 | 24.1 | 9.6 | 4.1 | 0.8 | 13 | 11.9 | 6.9 | 0.7 | 21 | 7 | 9.8 | 1.6 | 21.1 | - | - |

[1] lodging rating (1=erect, 9=flat)

| Table 26. Seed weight data for the 2006 Irrigated Field Pea Regional Variety trial. | | | | |
|---|---|---|---|---|
| Variety | Seed weight (mg) | | | |
| | Pederson site | Weiterman site | CSIDC off-station site | CSIDC site |
| **Yellow** | | | | |
| Alfetta | 294 | 234 | 300 | 282 |
| Canstar | 246 | 196 | 248 | 258 |
| CDC Meadow | 223 | 165 | 205 | 215 |
| CDC Centennial | 275 | 214 | 264 | 264 |
| CDC Mozart | 237 | 181 | 239 | 240 |
| Cutlass | 205 | 174 | 214 | 215 |
| Eclipse | 245 | 197 | 250 | 254 |
| Fusion | 266 | 225 | 260 | 272 |
| Polstead | 287 | 226 | 303 | 290 |
| Reward | 255 | 201 | 255 | 254 |
| SW Benefit | 191 | 177 | 207 | 213 |
| SW Carousel | 253 | 197 | 244 | 250 |
| SW Cartier | 209 | 170 | 216 | 221 |
| SW Marquee | 196 | 160 | 203 | 201 |
| SW Midas | 203 | 175 | 217 | 218 |
| Tudor | 279 | 226 | 289 | 294 |
| **Green** | | | | |
| Bluebird | 266 | 205 | 277 | 283 |
| Camry | 258 | 203 | 263 | 262 |
| CDC Sage | 161 | 131 | 175 | 165 |
| CDC Striker | 247 | 205 | 251 | 248 |
| Cooper | 287 | 243 | 298 | 299 |
| SW Sergeant | 199 | 157 | 200 | 203 |
| Tamora | 289 | 250 | 310 | 322 |
| **Tan** | | | | |
| CDC Dundurn | 192 | 159 | 199 | 204 |
| **Maple** | | | | |
| CDC 617-20 | 210 | 157 | 198 | 212 |
| **Silage** | | | | |
| CDC 1096-8 | 165 | 134 | 176 | 173 |
| LSD (0.05) | 11 | 14 | 13 | 14 |
| CV (%) | 2.8 | 4.5 | 3.3 | 3.4 |

| Table 27. Yield and agronomic data for the 2006 Irrigated Fababean Regional Variety trial. | | | | |
|---|---|---|---|---|
| Variety | Flower (days) | Maturity (days) | Height (cm) | Lodging rating (1-9) |
| Snowbird (check) | 53 | 97 | 117 | 2 |
| Ben | 53 | 97 | 120 | 3.3 |
| CDC Blitz | 53 | 96 | 126 | 6.3 |
| CDC Fatima | 47 | 96 | 132 | 6.3 |
| CEB04928 | 50 | 98 | 125 | 3.3 |
| Disco | 50 | 97 | 125 | 4.7 |
| Dixie | 48 | 95 | 109 | 5 |
| Earlibird | 43 | 95 | 113 | 2.7 |
| Gloria | 49 | 96 | 118 | 4.3 |
| IN 05930 | 47 | 100 | 135 | 1.3 |
| Louxor | 49 | 98 | 108 | 2 |
| NPZ3-7080 | 46 | 98 | 123 | 1.7 |
| NPZ4-7460 | 49 | 97 | 113 | 1.3 |
| NPZ4-7540 | 49 | 97 | 116 | 2 |
| NPZ5-7530 | 49 | 97 | 123 | 4 |
| SSNS-1 | 53 | 97 | 140 | 4.3 |
| Syn | 54 | 99 | 117 | 2 |
| Taboar | 49 | 98 | 138 | 6 |
| Valeria | 50 | 97 | 136 | 5 |
| LSD (0.05) | 1 | 3 | 10 | 2 |
| CV (%) | 1.3 | 1.7 | 5.2 | 35.1 |

| Table 28. Agronomic data for the 2006 Irrigated Soybean Variety Performance trial, CSIDC site. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variety | Type | Heat unit rating | Plant height (cm) | Height of 1st pod (cm) | # nodes | Yield (kg/ha) | Seed weight (mg) | Test weight (kg/hl) |
| OAC Vision | Conv | 2350 | 68 | 5 | 14 | 2396 | 168 | 71.5 |
| Gaillard | Conv | 2350 | 75 | 5 | 16 | 2698 | 151 | 69.1 |
| 90A01 | Conv | 2350 | 75 | 4 | 15 | 3044 | 141 | 69.9 |
| OAC Prudence | Conv | 2450 | 91 | 4 | 15 | 3128 | 168 | 72.8 |
| Tyndall | RR | 2400 | 76 | 5 | 15 | 3427 | 137 | 71.8 |
| Apollo RR | RR | 2450 | 84 | 4 | 16 | 3004 | 159 | 70.7 |
| RR Rosco | RR | 2450 | 82 | 3 | 16 | 3132 | 153 | 70.8 |
| 24-51R | RR | 2500 | 88 | 6 | 15 | 3454 | 134 | 72.1 |
| 90M01 | RR | 2550 | 85 | 5 | 16 | 2023 | 139 | 72.8 |
| | | LSD (0.05) | 6 | 2 | NS[1] | 544 | 12 | 0.6 |
| | | CV (%) | 4.4 | 23.3 | 8.7 | 10.8 | 4.4 | 0.5 |

[1] not significant

| Table 29. Agronomic data for the 2006 Dryland Soybean Variety Performance trial, CSIDC site. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variety | Type | Heat unit rating | Plant height (cm) | Height of 1st pod (cm) | # nodes | Yield (kg/ha) | Seed weight (mg) | Test weight (kg/hl) |
| OAC Vision | Conv | 2350 | 70 | 7 | 14 | 2515 | 168 | 70.5 |
| Gaillard | Conv | 2350 | 70 | 7 | 12 | 2609 | 152 | 69.5 |
| 90A01 | Conv | 2350 | 63 | 6 | 12 | 3017 | 147 | 68.8 |
| OAC Prudence | Conv | 2450 | 83 | 7 | 13 | 3172 | 167 | 72.3 |
| Tyndall | RR | 2400 | 68 | 7 | 13 | 2927 | 135 | 71.4 |
| Apollo RR | RR | 2450 | 75 | 6 | 13 | 3036 | 162 | 69.8 |
| RR Rosco | RR | 2450 | 74 | 6 | 14 | 3135 | 155 | 71 |
| 24-51R | RR | 2500 | 72 | 7 | 13 | 3432 | 128 | 70.4 |
| 90M01 | RR | 2550 | 83 | 9 | 14 | 2376 | 140 | 73.7 |
| | | LSD (0.05) | 8 | NS[1] | NS[1] | 616 | 15 | 1.1 |
| | | CV (%) | 6 | 19.6 | 8.8 | 12.2 | 5.8 | 0.9 |

[1] not significant

# Agronomic Trials

## Soybean Plant Population Trial

*Funded by Agriculture and Agri-Food Canada, PFRA*

An irrigated soybean plant population demonstration trial was established in the spring of 2006 at CSIDC. Gaillard, a 2350 heat unit soybean variety, was grown at four target plant populations in six row plots measuring 1.2 m x 4.0 m. All plots received 45 kg $P_2O_5$/ha as 12-51-0 as a side band application during the seeding operation. Granular inoculant of the appropriate *Rhizobium* strain specific for soybean was seed placed during the seeding operation. Yields were estimated by harvesting the entire plot.

A severe hail storm late in the growing season (August 23) stripped the leaves on the soybean plants and damaged the pods to some extent.

Yield increased up to a plant population of 360,000 plants/ac but the yield increases above a plant population of 200,000 plants/ac were not significant (Table 30). There was no effect of soybean plant population on plant height, seed weight or test weight. These results indicate that the yield response of soybean to plant population showed a general trend of increasing up to a plant population of 200,000 plants/ac. Further work is required to verify these results so that recommendations on the proper seeding rate of soybean can be made to producers.

Since this trial was damaged by hail, compromising the data, care should be used in interpretation of the data.

Table 30. Agronomic data for the 2006 Irrigated Soybean Plant Population trial, CSIDC site.

| Target plant population | Plant height (cm) | Height of 1st pod (cm) | # nodes | Yield (kg/ha) | Seed weight (mg) | Test weight (kg/hl) |
|---|---|---|---|---|---|---|
| 120,000 plants/ac | 72 | 4 | 14 | 2605 | 149 | 69.8 |
| 200,000 plants/ac | 70 | 3 | 15 | 3052 | 147 | 70.3 |
| 280,000 plants/ac | 72 | 5 | 15 | 3109 | 151 | 70 |
| 360,000 plants/ac | 68 | 6 | 13 | 3201 | 150 | 69.8 |
| LSD (0.05) | NS[1] | 2 | NS[1] | 395 | NS[1] | NS[1] |
| CV (%) | 5.4 | 25.9 | 9 | 8.3 | 5 | 1.3 |

[1] not significant

# Soybean Seeding Date Trial

*Funded by Agriculture and Agri-Food Canada, PFRA*

An irrigated soybean seeding date trial was established in the spring of 2006 at CSIDC. RR Rosco, a 2450 heat unit soybean variety, was seeded at four different seeding dates in six row plots measuring 1.2 m x 4.0 m. All plots received 45 kg $P_2O_5$/ha as 12-51-0 as a side band application during the seeding operation. Granular inoculant of the appropriate *Rhizobium* strain specific for soybean was seed placed during the seeding operation. Yields were estimated by harvesting the entire plot.

A severe hail storm late in the growing season (August 23) stripped the leaves on the soybean plants and damaged the pods to some extent compromising the data from this trial.

Highest yield was observed for the May 15 seeding date while the lowest yield was observed for the May 29 seeding date (Table 31). The soybean plants for the May 29 seeding date had not reached maturity prior to the hail storm on August 23 and as a result seed yield was probably lowered due to the damage on the leaves and pods of the plants. The hail damage prior to maturity for the May 29 seeding date also resulted in a lower seed weight for this treatment.

Table 31. Agronomic data for the 2006 Irrigated Soybean Seeding Date trial, CSIDC site.

| Seeding Date | Plant height (cm) | Height of 1st pod (cm) | # nodes | Yield (kg/ha) | Seed weight (mg) | Test weight (kg/hl) |
|---|---|---|---|---|---|---|
| May 8 | 67 | 4 | 14 | 2886 | 137 | 69.4 |
| May 15 | 70 | 6 | 14 | 3529 | 133 | 69.3 |
| May 22 | 70 | 4 | 13 | 3038 | 138 | 71.8 |
| May 29 | 68 | 3 | 13 | 1944 | 129 | 73.5 |
| LSD (0.05) | NS[1] | 2 | NS[1] | 349 | 5 | 1.4 |
| CV (%) | 8.5 | 22.8 | 10.6 | 6.1 | 1.7 | 1 |

[1] not significant

# Control of Stemphylium Blight (*Stemphylium botryosum*) in Lentil through Fungicide Application

*Project Lead: S. Banniza, Crop Development Centre, Saskatoon, Saskatchewan*

## Background

*Stemphylium botryosum* causes leaf blight on lentil that can result in large-scale defoliation of plants. The fungus has been a serious pathogen in Bangladesh for many years where yield losses of 62% and more have been experienced due to the disease. In recent years, stemphylium blight has been observed increasingly in lentil fields in Saskatchewan and *S. botryosum* has been found in increasing numbers on seed tested for infection with *A. lentis* and other common lentil pathogens. The pathogen is a poorly researched fungus and it is not clear what economic impact it has on lentil production in Canada. It is also unknown whether and how much impact fungicide applications for the control of ascochyta blight and anthracnose have on this particular pathogen.

Small scale experiments under controlled conditions indicated that Lance had highest efficacy in controlling *S. botryosum* on lentil. The product showed highest inhibition of fungal growth in plate tests, and best control of the pathogen on inoculated lentil plants. However, lentil plants were inoculated with mycelial suspensions due to the poor spore producing capability of the pathogen on artificial media. Thus, both tests evaluated the efficacy of fungicides in inhibiting mycelial growth rather than inhibiting spores. It may be that the strobilurin fungicides Quadris and Headline would have shown higher efficacy in controlling stemphylium blight if spore suspensions had been used for inoculation as this group of fungicides is known to be particularly effective in arresting spore germination.

A second issue with stemphylium blight control is the timing of fungicide applications. Field observations to date indicate that the disease appears very late in the season, shortly before crop maturity.

## Objective

To determine the efficacy of various fungicide applications on the control of stemphylium blight in lentil.

## Materials and Methods

A field experiment was conducted under irrigation at the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) at Outlook. Edge granular was incorporated pre-plant on April 28, 2006. On May 19, 2006, the lentil cultivar CDC Milestone was seeded in 3 m x 10 m plots with rows at 100 plants/$m^2$ with 25 cm between rows. A granular inoculant was placed with the seed at 10 kg $ha^{-1}$. An amount of 45 kg $ha^{-1}$ of $P_2O_5$ SB was applied as well. For disease inoculation, lentil plants were grown in the greenhouse in 3 gallon pots, inoculated with a mycelial suspension after two weeks and incubated until first disease symptoms appeared. Two pots with diseased plants were placed between the centre rows of each plot. Pots were removed when fungicides were applied.

The fungicides Lance and Headline were applied in 6 treatment combinations plus an unsprayed control plot as described in Table 32, with 4 replicate plots laid out as a RCBD. The first fungicide spray was applied July 6, 2006, and the second on July 19, 2006 at 100L $ha^{-1}$. Plots were inspected every 7 to 10 days starting July 4. First symptoms of stemphylium blight were observed on July 25. Plots were rated on that day, on August 1 and on August 4 by assessing the amount of necrotic lentil tissue due to stemphylium blight. Plants matured shortly afterwards, changed colour and dried off. Final disease data was used for statistical analysis.

An area of 1.5 m x 10 m was harvested from each plot on August 21, 2006. A random sample of 100 seeds of each plot was plated out on potato dextrose agar and stemphylium blight incidence was recorded 10 days after plating.

Table 32. Fungicide application treatments for the control of stemphylium blight in CDC Milestone lentil at CSIDC at Outlook in 2006.

| Treatment | Formula Concentration | Formulation | Product Rate | Application Rate (g a.i./ha) | Application Time |
|---|---|---|---|---|---|
| Check | | | | | |
| Headline | 250 g/L | EC | 0.4 l/ha | 100 | E1 |
| Lance | 70% | WG | 0.357 kg/ha | 250 | E1 |
| Lance | 70% | WG | 0.357 kg/ha | 250 | E2 |
| Headline | 250 g/L | EC | 0.4 l/ha | 100 | E1 |
| Lance | 70% | WG | 0.357 kg/ha | 250 | E2 |
| Lance<br>Headline | 70%<br>250 g/L | WG<br>EC | 0.357 kg/ha<br>0.4 l/ha | 250<br>100 | E1<br>E2 |
| Lance | 70% | WG | 0.357 kg/ha | 250 | E1 |
| Lance | 70% | WG | 0.357 kg/ha | 250 | E2 |

## Results

*Field observations:*

Stemphylium blight developed late in the season when the lentil canopy had closed. Disease symptoms appeared in upper part of the canopy and characteristic beige lesions were visible. The field trial was also infected with *C. truncatum* (anthracnose) that was not well controlled by the fungicide applications. The evaluation of stemphylium blight damage was hampered by anthracnose symptoms because both diseases can lead to significant leaf drop. The assessment of stemphylium blight was based on those symptoms that could clearly be attributed to this disease, so the ratings may underestimate true stemphylium blight severity. Anthracnose ratings were recorded separately and used as a covariant in the analysis. However, it had no significant effect and was dropped from the model.

*Disease severity:*

Disease severity was very low on July 25 with less than 10% stemphylium blight in most plots. This increased to levels of 10 % to 50 % by August 1, and stabilized thereafter. By August 4, plants were starting to turn yellow and no further ratings were taken beyond that date. Analysis of disease severity by ANOVA revealed no significant difference among treatments ($P = 0.21$). However, comparison of means (LSD) and contrast analysis showed that a combination of Lance and Headline resulted in significantly lower stemphylium blight levels compared to the unsprayed control (Figures 1 and 2; Tables 33 and 34).

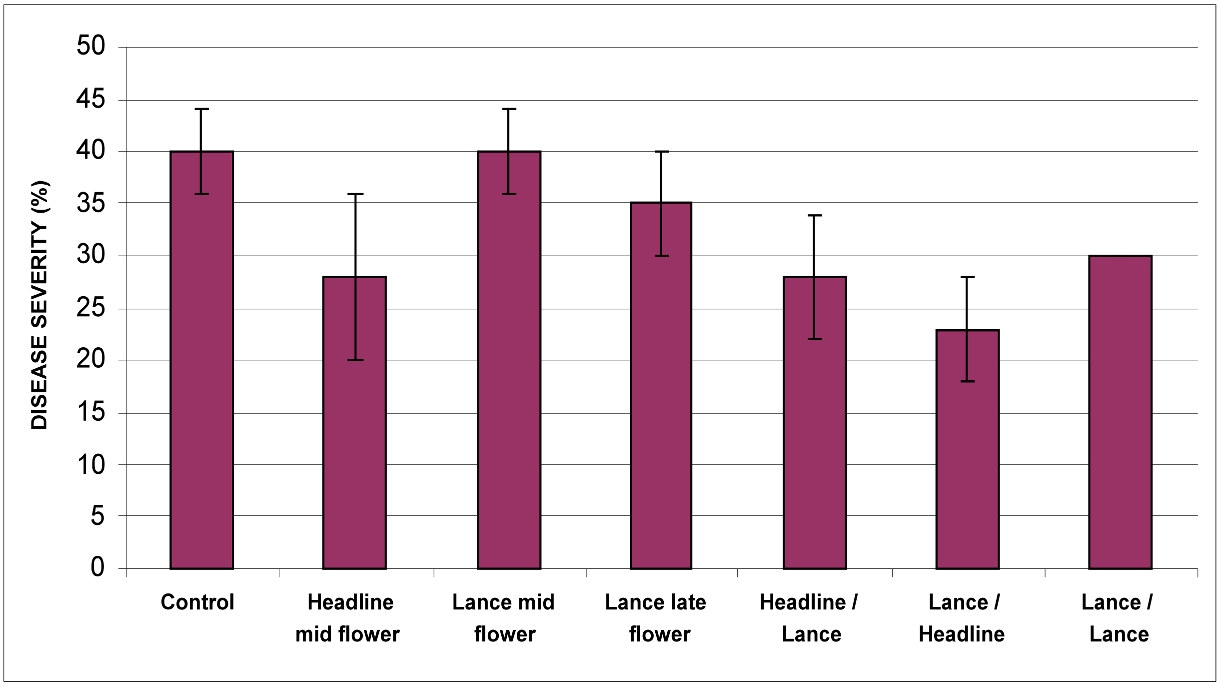



Figure 1. Severity of stemphylium blight in CDC Milestone lentil sprayed with Lance and/or Headline in a field experiment at CSIDC at Outlook in 2006.

Table 33. Results from contrast analysis of stemphylium blight severity data from CDC Milestone lentil at CSIDC at Outlook in 2006.

| Contrast | | | DF | Contrast SS | MS | F | P>F |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Control | vs | spray | 1 | 0.031488 | 0.031488 | 2.97 | 0.0994 |
| Control | vs | Headline | 1 | 0.011250 | 0.001125 | 1.06 | 0.3145 |
| Control | vs | Head/Lance | 1 | 0.03125 | 0.03125 | 2.95 | 0.1006 |
| Control | vs | Lance/Head | 1 | 0.06125 | 0.06125 | 5.78 | 0.026 |
| Control | vs | Lance/Lance | 1 | 0.02 | 0.02 | 1.89 | 0.184 |

Table 34. Comparison of mean stemphylium blight severity in control and fungicide treated plots.

| Treatment | Mean | |
|---|---|---|
| Control | 0.4 | a |
| Lance mid | 0.4 | a |
| Headline | 0.325 | ab |
| Lance late | 0.3 | ab |
| Lance/Lance | 0.3 | ab |
| Headline/Lance | 0.275 | ab |
| Lance/Headline | 0.225 | b |
| LSD | 0.1514 | |

*Seed infection*:
Average seed infection rates were very low with levels at or below 0.5%. Data were not further analyzed (Figure 2).

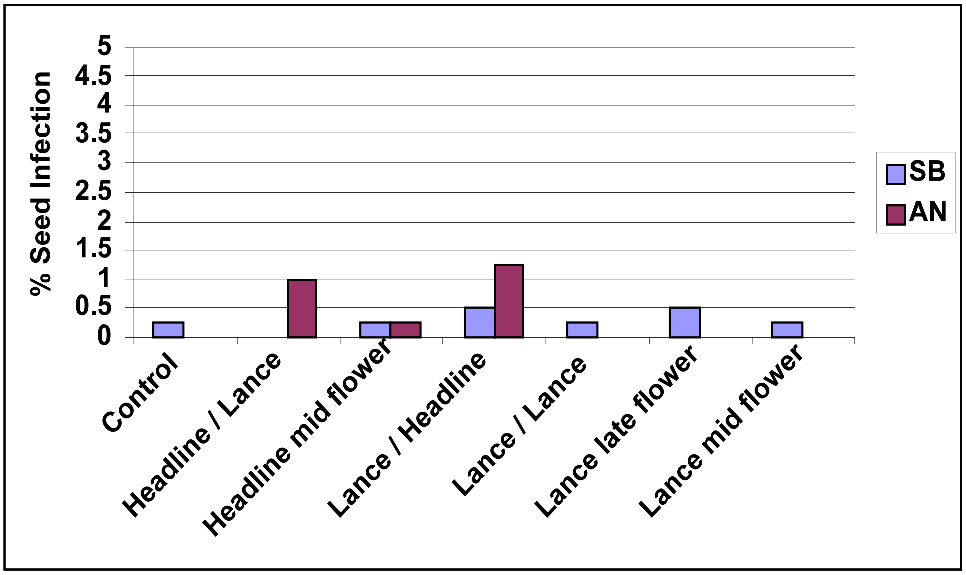



Figure 2. Seed infection rates for stemphylium blight and anthracnose in CDC Milestone.

*Yield*:
Highly significant differences were observed among yields. Plots that received an application of Headline, irrespective of whether this was as a single application or in combination with Lance, had significantly higher yields than control plots or those only treated with Lance (Figure 3, Table 35).

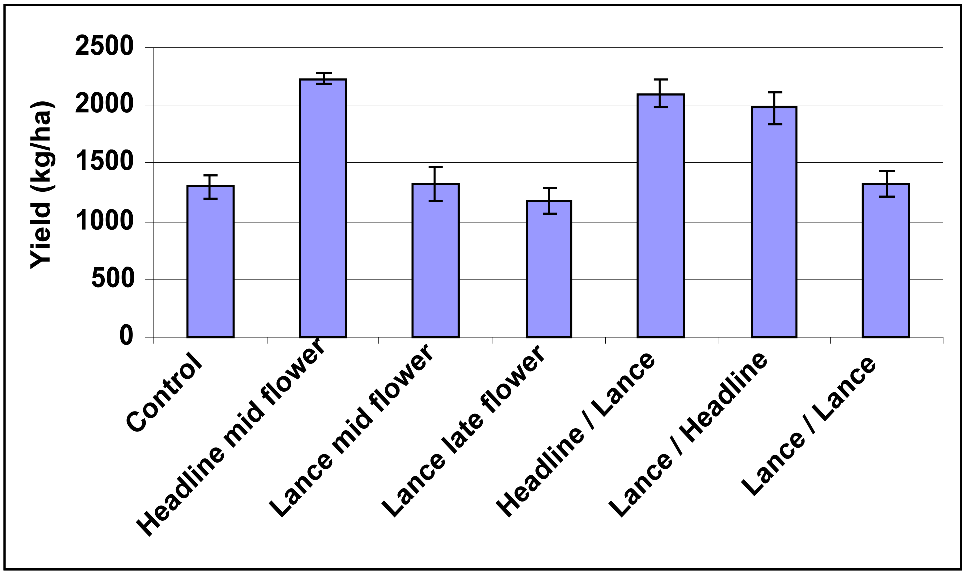



Figure 3. Yields of CDC Milestone in plots treated with Lance and/or Headline to control stemphylium blight in a field experiment at CSIDC at Outlook in 2006.

Table 35. Comparison of yields in plots treated with Lance and/or Headline to control stemphylium blight in a field experiment at CSIDC at Outlook in 2006.

| Treatment | Mean | |
|---|---|---|
| Headline | 2227.3 | a |
| Headline/Lance | 2103.5 | a |
| Lance/Headline | 1974.3 | a |
| Lance/Lance | 1325.5 | b |
| Lance mid | 1322.3 | b |
| Control | 1294.8 | b |
| Lance late | 1174.3 | b |

## Conclusions

Although Lance showed good efficacy in controlling stemphylium blight on lentil plants inoculated with a mycelium suspension in previous studies under greenhouse conditions, results from this field study suggest that Headline in combination with Lance is more effective under field conditions. Yield data showed a significant increase in yield when Headline was applied, on its own or in combination with Lance. Because there was a significant infection of anthracnose in the plots, it is not clear how much of this gain in yield can be attributed to stemphylium blight control.

# Dry Bean Minor Use Research Registration Trial: Imazamox + Bentazon Weed Efficacy & Crop Tolerance

*Funded by Agriculture and Agri-Food Canada*
*Co-investigators: E. Johnson and D. Ulrich, Scott Research Farm*

Imazamox (Solo WDG - 70%) + Bentazon (Basagran Forte - 480 g/L) herbicide weed control (efficacy)/crop tolerance trials for three market classes of dry bean were established in the spring of 2006 at the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) located on the SW15-29-08-W3. The soil, developed on medium to moderately coarse-textured lacustrine deposits, was classified as Bradwell L-FL.

All seeding operations were conducted using a specially designed small plot six row double disc press drill with two sets of discs. One set of discs was used for seed placement while the second set of discs allowed for side band placement of fertilizer. Treatments consisted of imazamox and bentazon alone, in combination at 1x and 2x recommended rate and +/- the addition of liquid fertilizer (Table 36). Dry bean was seeded on a 20 cm row spacing. The plots consisted of 6 rows and measured 1.2 m x 4 m. A seeding rate of 45 seeds/$m^2$ was used. Separate trials were seeded for navy (cv. Envoy), great northern (cv. AC Polaris) and cranberry (cv Cran 09) dry bean market classes. The entire trial area was cross-seeded with wild oats prior to seeding the dry bean. All plots received a side band application of 12-51-0 at a rate of 45 kg $P_2O_5$/ha during the seeding operation. The treatments were arranged in a randomized complete block design and replicated four times. The trials were seeded on May 25.

Herbicide treatments were applied when the majority of the broadleaved weeds were at the cotyledon to four leaf stage, annual grasses at the one to four leaf stage and the dry bean at the one to four trifoliate leaf stage. Weed control and crop tolerance ratings were conducted at three time intervals after the herbicide treatments were applied.

Growing season conditions in 2006 at CSIDC were hotter and wetter than the long term mean. The dry bean plants developed rapidly in the warm growing conditions. The main weeds present were wild oats, green foxtail, redroot pigweed and lambs' quarters. Wild oat weed pressure was high.

A severe hail storm late in the growing season (August 23) damaged the dry bean plants. The great northern dry bean plots were damaged to the greatest extent with severe shelling occurring. The great northern trial was abandoned at this stage and was not harvested. The navy and cranberry trials received less damage and little shelling occurred. The plants in these trials were pulled on August 30 and layed in a swath to dry prior to harvesting on September 7.

## Weed Efficacy

The imazamox alone and imazamox + bentazon treatments reduced both grassy and broadleaved weed growth while the bentazon alone reduced grassy weed growth compared to the weedy check treatment as indicated by the weed control ratings observed at the three rating times for all three dry bean market classes (Table 37-39). Weed control increased as the rate of herbicide was increased and with the addition of surfactant. As well, weed control increased with time showing little difference among the treatments by the final rating.

**Crop Tolerance**

All herbicide treatment applications resulted in slight discolouration of some leaves on the dry bean plants at the first crop tolerance rating time 7-14 days after herbicide application (Table 40). The dry bean plants outgrew most of the discolouration by the second crop tolerance rating time 21-35 days after application. There were no visual differences among the treatments later in the growing season.

Dry bean yield for the cranberry and navy market classes was highest for the weed-free check but showed little difference from the imazamox + benatzon + adjuvant treatments (Table 37 and 38). The yield data was in good agreement with the weed control ratings.

The results from these trials indicate that the imazamox + bentazon herbicide provide good weed control in dry bean with little or no affect on dry bean growth.

These results along with that from other sites will be used to apply for minor use registration of these herbicides for application to dry bean.

| Table 36. Treatments for the Dry Bean MURR Herbicide Weed Efficacy/Crop Tolerance Trial. | | | | |
|---|---|---|---|---|
| Trt # | Treatment Name | Application Rate | Timing | |
| 1 | Untreated check (weedy) | | | |
| 2 | imazamox + bentazon | 20.3 g a.e./ha + 600 g a.e./ha | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | 1X, - fertilizer |
| 3 | imazamox + bentazon + fertilizer solution (28-0-0) | 20.3 g a.e./ha + 600 g a.e./ha + 2 L/ha | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | 1X, + fertilizer |
| 4 | imazamox + bentazon | 40.6 g a.e./ha + 1200 g a.e./ha | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | 2X, - fertilizer |
| 5 | imazamox + bentazon + fertilizer solution (28-0-0) | 40.6 g a.e./ha + 1200 g a.e./ha + 4 L/ha | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | 2X, + fertilizer |
| 6 | imazamox | 20.3 g a.e./ha | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | |
| 7 | bentazon | 600 g a.e./ha | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | |
| 8 | imazamox + Merge | 20.3 g a.e./ha + 0.5% v/v | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | Solo 1X |
| 9 | imazamox + Merge | 40.6 g a.e./ha + 1% v/v | Postemergent: 1-4 leaf dry bean, cotyledon-4 leaf broadleaved weeds, 1-4 leaf annual grasses | Solo 2X |
| 10 | Untreated check (weed-free) | | | |

Table 37. Treatments, weed control ratings, plant height and yield for the Cranberry dry bean imazamox + bentazon MURR trial.

| Treatment | Plant height (cm) | Yield (kg/ha) | Weed Control Rating (%) [1] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 7-14 DAA[2] (July 4) | | | | 21-35 DAA (July 18) | | | | 42-56 DAA (August 16) | | | |
| | | | WO[3] | GF | RP | LQ | WO | GF | RP | LQ | WO | GF | RP | LQ |
| Weedy check | 42 | 3582 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| imazamox (1x) + bentazon (1x) | 39 | 4870 | 60 | 63 | 85 | 93 | 84 | 96 | 98 | 98 | 84 | 100 | 100 | 98 |
| imazamox (1x) + bentazon (1x) + fertilizer | 41 | 5800 | 61 | 64 | 84 | 89 | 94 | 94 | 100 | 100 | 100 | 100 | 100 | 100 |
| imazamox (2x) + bentazon (2x) | 40 | 5501 | 79 | 81 | 48 | 77 | 92 | 92 | 100 | 95 | 98 | 99 | 100 | 98 |
| imazamox (2x) + bentazon (2x) + fertilizer | 40 | 5698 | 88 | 88 | 89 | 94 | 97 | 98 | 100 | 100 | 100 | 100 | 100 | 100 |
| imazamox (1x) | 43 | 3329 | 15 | 15 | 18 | 1 | 33 | 96 | 97 | 88 | 20 | 100 | 100 | 87 |
| bentazon (1x) | 41 | 3269 | 0 | 0 | 83 | 85 | 0 | 0 | 95 | 98 | 0 | 0 | 100 | 99 |
| imazamox (1x) + merge | 40 | 5378 | 64 | 63 | 78 | 73 | 92 | 96 | 100 | 98 | 95 | 100 | 100 | 99 |
| imazamox (2x) + merge | 43 | 5183 | 86 | 86 | 88 | 90 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Weed-free check | 39 | 5956 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| LSD (0.05) | NS[4] | 684 | 14 | 14 | 8 | 8 | 8 | 3 | 6 | 5 | 2 | 1 | - | 9 |
| CV (%) | 7.6 | 9.7 | 17.9 | 17.1 | 7.9 | 7.7 | 7.9 | 3.1 | 4.4 | 4.3 | 2.1 | 0.8 | - | 6.9 |

[1] Very good to excellent = 91-100; Good to very good = 81-90; Suppression = 60-79; Poor < 60.
[2] Days after application
[3] WO = wild oats; GF = green foxtail; RP = redroot pigweed; LQ = lambs' quarters
[4] not significant

Table 38. Treatments, weed control ratings, plant height and yield for the Navy dry bean imazamox + bentazon MURR trial.

| Treatment | Plant height (cm) | Yield (kg/ha) | Weed Control Rating (%) [1] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 7-14 DAA[2] (July 4) | | | | 21-35 DAA (July 18) | | | | 42-56 DAA (August 16) | | | |
| | | | WO[3] | GF | RP | LQ | WO | GF | RP | LQ | WO | GF | RP | LQ |
| Weedy check | 37 | 1836 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| imazamox (1x) + bentazon (1x) | 40 | 2811 | 31 | 35 | 79 | 86 | 41 | 82 | 92 | 97 | 41 | 92 | 96 | 98 |
| imazamox (1x) + bentazon (1x) + fertilizer | 38 | 4006 | 80 | 80 | 88 | 94 | 94 | 96 | 98 | 100 | 94 | 98 | 99 | 100 |
| imazamox (2x) + bentazon (2x) | 37 | 4010 | 85 | 86 | 93 | 84 | 93 | 92 | 99 | 100 | 93 | 97 | 99 | 100 |
| imazamox (2x) + bentazon (2x) + fertilizer | 36 | 4021 | 86 | 88 | 89 | 93 | 96 | 96 | 99 | 98 | 96 | 96 | 99 | 98 |
| imazamox (1x) | 36 | 2330 | 20 | 25 | 50 | 10 | 78 | 84 | 89 | 90 | 15 | 89 | 93 | 92 |
| bentazon (1x) | 41 | 2069 | 0 | 0 | 40 | 40 | 0 | 0 | 96 | 100 | 0 | 0 | 98 | 100 |
| imazamox (1x) + merge | 35 | 3298 | 78 | 76 | 84 | 20 | 84 | 93 | 97 | 92 | 84 | 98 | 98 | 90 |
| imazamox (2x) + merge | 39 | 3344 | 89 | 89 | 88 | 92 | 99 | 99 | 97 | 99 | 99 | 99 | 100 | 100 |
| Weed-free check | 36 | 4108 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| LSD (0.05) | NS[4] | 491 | 7 | 12 | 10 | 12 | 7 | 8 | 7 | 9 | 7 | 8 | 6 | 9 |
| CV (%) | | 10.6 | 8.8 | 14.3 | 10.1 | 13 | 8.1 | 7.4 | 5.4 | 7.2 | 8.2 | 7.4 | 4.3 | 6.8 |

[1] Very good to excellent = 91-100; Good to very good = 81-90; Suppression = 60-79; Poor < 60.
[2] Days after application
[3] WO = wild oats; GF = green foxtail; RP = redroot pigweed; LQ = lambs' quarters
[4] not significant

Table 39. Treatments, weed control ratings, plant height and yield for the Great Northern dry bean imazamox + bentazon MURR trial.

| Treatment | Plant height (cm) | Weed Control Rating (%)[1] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 7-14 DAA[2] (July 4) | | | | 21-35 DAA (July 18) | | | | 42-56 DAA (August 16) | | | |
| | | WO[3] | GF | RP | LQ | WO | GF | RP | LQ | WO | GF | RP | LQ |
| Weedy check | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| imazamox (1x) + bentazon (1x) | 44 | 10 | 10 | 83 | 53 | 83 | 95 | 100 | 99 | 83 | 99 | 100 | 99 |
| imazamox (1x) + bentazon (1x) + fertilizer | 43 | 60 | 66 | 76 | 70 | 93 | 95 | 99 | 100 | 96 | 99 | 100 | 100 |
| imazamox (2x) + bentazon (2x) | 47 | 80 | 80 | 85 | 83 | 95 | 95 | 100 | 100 | 97 | 100 | 100 | 100 |
| imazamox (2x) + bentazon (2x) + fertilizer | 43 | 85 | 85 | 85 | 84 | 96 | 96 | 99 | 100 | 100 | 100 | 100 | 100 |
| imazamox (1x) | 44 | 10 | 13 | 60 | 10 | 18 | 95 | 98 | 93 | 18 | 98 | 100 | 100 |
| bentazon (1x) | 45 | 0 | 0 | 45 | 60 | 0 | 0 | 96 | 97 | 0 | 0 | 96 | 99 |
| imazamox (1x) + merge | 45 | 71 | 71 | 75 | 83 | 93 | 93 | 100 | 100 | 96 | 10 | 100 | 100 |
| imazamox (2x) + merge | 45 | 88 | 88 | 79 | 83 | 98 | 98 | 99 | 100 | 100 | 100 | 100 | 100 |
| Weed-free check | 45 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| LSD (0.05) | NS[4] | 8 | 7 | 13 | 8 | 4 | 3 | 2 | 2 | 3 | 2 | - | 1 |
| CV (%) | 8.6 | 11.6 | 9.4 | 13 | 8.7 | 4.2 | 2.9 | 1.5 | 1.5 | 3.3 | 1.5 | - | 1 |

[1] Very good to excellent = 91-100; Good to very good = 81-90; Suppression = 60-79; Poor < 60.
[2] Days after application
[3] WO = wild oats; GF = green foxtail; RP = redroot pigweed; LQ = lambs' quarters
[4] not significant

Table 40. Crop tolerance ratings for the dry bean imazamox + bentazon MURR trial.

| | Crop Tolerance Rating (%)[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 7-14 DAA[2] (July 4) | | | 21-35 DAA (July 18) | | | 42-56 DAA (August 16) | | |
| Treatment | Cranberry | Navy | Great Northern | Cranberry | Navy | Great Northern | Cranberry | Navy | Great Northern |
| Weedy check | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| imazamox (1x) + bentazon (1x) | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| imazamox (1x) + bentazon (1x) + fertilizer | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| imazamox (2x) + bentazon (2x) | 3 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| imazamox (2x) + bentazon (2x)+ fertilizer | 2 | 4 | 1 | 0 | 2 | 0 | 0 | 0 | 0 |
| imazamox (1x) | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| bentazon (1x) | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| imazamox (1x) + merge | 2 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| imazamox (2x) + merge | 5 | 7 | 3 | 0 | 2 | 0 | 0 | 0 | 0 |
| Weed-free check | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

[1] 0-9 = slight discolouration/stunting; 10 = just acceptable; 11-30 = not acceptable; >30 = severe
[2] Days after application

# Annual Cereal Forage Yield Potential Trials

*Funded by Agriculture and Agri-Food Canada, PFRA and the Irrigation Crop Diversification Corporation*

A spring seeded annual cereal forage trial was established in the spring of 2006 at CSIDC. Treatments consisted of selected barley, oat and triticale varieties. A seeding rate of 250 seeds/$m^2$ was used for all crops. Separate trials were established for each crop. The entire plot area received a pre-seeding broadcast, soil incorporated application of urea (46-0-0) at a rate of 100 kg N/ha. All plots received a side band application of 12-51-0 at a rate of 45 kg $P_2O_5$/ha during the seeding operation. The treatments were arranged in a randomized complete block design and replicated four times. Each treatment measured 1.2 m x 6 m.

The trials were seeded on May 16 and harvested at the early flower growth stage for triticale and the soft dough growth stage for barley and oats. Harvest dates were July 26 (71 days after seeding), July 31 (76 days after seeding) and August 8 (84 days after seeding) for the triticale, barley and oats respectively.

## Barley

Barley treatments consisted of eleven varieties representing three types: malt (3), feed (4) and forage (4). Highest forage dry matter yield was obtained for CDC Cowboy, a 2-row, rough awned, normal height forage barley. The lowest forage yield was obtained for CDC Battleford, a 6-row, smooth awned, normal height malt barley (Table 41). Overall, barley forage dry matter yield for all varieties tested was high ranging from 13,786 to 17,265 kg/ha.

Plant height ranged from a high of 101 cm for CDC Cowboy (forage) to a low of 76 cm for Newdale (normal height malt). There were significant plant height differences between barley varieties; however, the differences did not show any trend in relation to forage yield. Most varieties had plant height in the range of 80-90 cm.

Days to first head emergence varied from 49 to 52 days for the barley varieties tested; while, days to the soft dough growth stage for most varieties were in the range of 73-74 days.

Lodging resistance of the majority of the barley varieties tested was good. AC Hawkeye had the highest lodging rating. Dillon had the lowest lodging score of all varieties tested.

All barley varieties tested showed leaf disease incidence. The greatest extent and severity of leaf disease as indicated by the visual estimations was shown for CDC Copeland, CDC Battleford, Vivar and AC Hawkeye. All other varieties tested had lower disease rating.

Forage quality analysis for the barley varieties tested indicated that the feed barley variety AC Hawkeye and Trochu had the best combination of CP, low ADF and high TDN (forage quality indicators) desirable for feed. The malt barley variety Newdale had a good CP level but had the poorest combination of the other forage quality indicators. Dillon, an awnless/hooded forage, had a low CP, high ADF and low TDN.

## Oat

Oat treatments consisted of five varieties representing three types: general purpose (1), milling/feed (2) and forage (2). Highest forage dry matter yield was produced by AC Morgan (milling/feed type) while the lowest forage yield was produced by CDC Baler (forage type) (Table 42). Overall, oat forage dry matter yield for all varieties tested was high ranging from 14,527 to 18,525 kg/ha.

Days to first head emergence varied from 53 to 62 days for the oat varieties tested while days to the soft dough growth stage ranged from 78 to 84 days.

Forage quality analysis for the oat varieties tested indicated that the forage barley varieties had the best combination of CP, low ADF and high TDN (forage quality indicators) desirable for feed. All other varieties tested had similar CP, slightly higher ADF and lower TDN.

## Triticale

Triticale treatments consisted of five varieties. Highest forage dry matter yield was produced by AC Ultima while the lowest forage yield was produced by Banjo (Table 43). However, dry matter yield differences were small among the triticale varieties tested. Overall, triticale forage dry matter yield for all varieties tested ranged from 13,318 to 14,276 kg/ha. The triticale yields were lower than for the barley and oat forage yields probably due to cutting at the early flower growth stage for triticale compared to the soft dough stage for the barley and oats.

Plant height ranged from a high of 140 cm for Comet to a low of 114 cm for AC Ultima. There were significant plant height differences between triticale varieties.

Days to first head emergence varied from 50 to 53 days for the triticale varieties tested.

Lodging resistance of the majority of the triticale varieties tested was good as indicated by the low lodging rating scores recorded. The low lodging rating scores was probably due to the fact that the varieties were harvested at the early flower growth stage prior to full kernel development.

All triticale varieties tested showed leaf disease incidence; however, the disease was minimal with little distinction between the varieties tested.

Forage quality analysis for the triticale varieties tested indicated that Banjo had the best combination of CP, low ADF and high TDN (forage quality indicators) desirable for feed. Banjo had the highest CP level while Comet had the lowest CP level. Generally, there were only small differences in forage quality among the varieties tested.

Table 41. Agronomic data for the 2006 Irrigated Barley Forage trial.

| Variety | 2 or 6 row | Awn Type[1] | Straw[2] | Dry Matter Yield (kg/ha) | Height (cm) | Head Emergence (days) | Soft Dough (days) | Lodging rating (1=erect; 9=flat) | Disease | | Forage Quality Analysis[3] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Extent (0-5) | Severity (0-5) | CP | ADF | TDN |
| **Malt** | | | | | | | | | | | | | |
| CDC Copeland | 2 | R | N | 16454 | 89 | 52 | 74 | 5 | 4 | 3 | 11.6 | 32.1 | 63.7 |
| Newdale | 2 | R | N | 15579 | 76 | 51 | 73 | 4.8 | 3.3 | 2.3 | 13.1 | 33.9 | 61.8 |
| CDC Battleford | 6 | S | N | 13786 | 88 | 50 | 73 | 6 | 4 | 3 | 12.4 | 31 | 64.8 |
| **Feed** | | | | | | | | | | | | | |
| Trochu | 6 | S | N | 15115 | 80 | 49 | 73 | 6 | 3.3 | 2.3 | 13.4 | 29.9 | 66 |
| Vivar | 6 | 2R | SD | 14816 | 78 | 50 | 71 | 4.8 | 4 | 3 | 11.2 | 30.5 | 65.4 |
| AC Rosser | 6 | S | N | 15043 | 82 | 50 | 73 | 5.8 | 3.3 | 2.3 | 12.9 | 34.6 | 61.1 |
| CDC Bold | 6 | R | SD | 16120 | 79 | 51 | 73 | 4.8 | 3.3 | 2.5 | 12.6 | 31.6 | 64.3 |
| **Forage** | | | | | | | | | | | | | |
| CDC Cowboy | 2 | R | N | 17265 | 101 | 51 | 73 | 4.8 | 3.3 | 2.3 | 12.4 | 31 | 64.8 |
| AC Ranger | 6 | S | N | 15547 | 79 | 50 | 71 | 5.5 | 3.3 | 2.3 | 12.7 | 29.2 | 66.8 |
| AC Hawkeye | 6 | S | N | 15985 | 98 | 51 | 74 | 6.8 | 4 | 3 | 14.1 | 32.7 | 63 |
| Dillon | 6 | A/H | N | 15313 | 89 | 52 | 72 | 4.3 | 3.3 | 2.3 | 11.9 | 36.2 | 59.4 |
| LSD (0.05) | | | | 2186 | 4 | 1 | 1 | 1.5 | 0.6 | 0.6 | NS[4] | NS[4] | NS[4] |
| CV (%) | | | | 9.7 | 3.1 | 1.2 | 1 | 19.2 | 11.2 | 16 | 10.6 | 15.7 | 8.3 |

[1] R = rough; S = smooth; A/H = awnless/hooded
[2] N = normal; SD = semi-dwarf
[3] CP = crude protein; ADF = acid digestible fibre; TDN = total digestible nutrients
[4] not significant

Table 42. Agronomic data for the 2006 irrigated Oat Forage trial.

| Variety | Dry Matter Yield (kg/ha) | Head Emergence (days) | Soft Dough (days) | Forage Quality Analysis[1] | | |
|---|---|---|---|---|---|---|
| | | | | CP | ADF | TDN |
| **General Purpose** | | | | | | |
| Calibre | 17449 | 54 | 80 | 10.5 | 37.2 | 58.3 |
| **Milling/Feed** | | | | | | |
| Pinnacle | 17324 | 54 | 80 | 11 | 37.3 | 58.2 |
| AC Morgan | 18525 | 53 | 78 | 10.5 | 39.9 | 55.5 |
| **Forage** | | | | | | |
| CDC Bell | 14823 | 62 | 81 | 10.7 | 37.9 | 57.6 |
| CDC Baler | 14527 | 62 | 84 | 11.6 | 36.1 | 59.5 |
| LSD (0.05) | 1983 | 1 | 1 | NS[1] | NS[1] | NS[1] |
| CV (%) | 7.8 | 0.6 | 0.8 | 11.7 | 10.3 | 7.1 |

[1] not significant
[2] CP = crude protein; ADF = acid digestible fibre; TDN = total digestible nutrients

| Table 43. Agronomic data for the 2006 Irrigated Triticale Forage trial. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Disease | | Forage Quality Analysis[2] | | |
| Variety | Dry Matter Yield (kg/ha) | Height (cm) | Head Emergence (days) | Lodging rating (1=erect; 9=flat) | Extent (0-5) | Severity (0-5) | CP | ADF | TDN |
| Viking[1] | 13679 | 139 | 50 | 2.8 | 1.3 | 2 | 12.6 | 38.7 | 56.8 |
| Banjo | 13318 | 125 | 53 | 1 | 1 | 1.8 | 14.3 | 37.5 | 58 |
| Comet[1] | 13762 | 140 | 50 | 3.3 | 1 | 2 | 12.1 | 39.8 | 55.6 |
| Pronghorn | 13383 | 130 | 52 | 1 | 1 | 1 | 15 | 41.1 | 54.2 |
| AC Ultima | 14276 | 114 | 51 | 1 | 1 | 1.8 | 12.6 | 36.2 | 59.4 |
| LSD (0.05) | 753 | 4 | 1 | 1 | 0.2 | 0.4 | 1 | NS[3] | NS[3] |
| CV (%) | 7.8 | 2.1 | 0.6 | 79.1 | 21.3 | 16.1 | 4.9 | 5.9 | 4.3 |

[1] Varieties not registered in Canada. Available only for forage or feed production.
[2] CP = crude protein; ADF = acid digestible fibre; TDN = total digestible nutrients
[3] not significant

# Variety Development

## Evaluation of Durum Breeding Lines for Irrigation

*Funded by Agriculture and Agri-Food Canada*
*Plant Breeder: J.M. Clarke, Semiarid Prairie Agricultural Research Centre, Swift Current*

The Durum Central 'A' and 'A2' tests were planted under irrigation at Outlook in 2006, in addition to an irrigated site at Lethbridge, Alberta, and non-irrigated tests at Brandon, Indian Head, Regina and Swift Current. These tests consisted of short and semidwarf durum lines with potential adaptation to irrigated and high rainfall environments. There were a total of 126 experimental lines and five check cultivars, replicated twice, to make a total of 272 plots.

In addition, our irrigated testing at Outlook included a trial of $F_6$ and another of $F_4$ breeding lines, consisting of a total of 616 lines and checks. These experimental lines come from crosses with semidwarf parents, and have potential for improvement of yield, straw strength, disease resistance, and protein content compared to the registered semidwarf varieties AC Navigator and Commander.

No yield data were obtained due to hail damage just prior to harvest maturity. However, maturity, height and lodging were scored and used in selection of lines for advancement.

## Pea Cultivar Preliminary Yield Trials - 2006

*Funded by the Saskatchewan Agriculture Development Fund, the Saskatchewan Pulse Growers and the Crop Development Centre, University of Saskatchewan*

*Plant Breeders: T. Warkentin, A. Vandenberg, B. Tar'an, S. Baniza and K. Bett, Crop Development Centre, University of Saskatchewan, Saskatoon*

Field pea advanced breeding trials conducted at Outlook under irrigated conditions identified several high-yielding yellow, green and specialty field pea lines with improved lodging resistance and resistance to powdery mildew. Five elite (F6) and 16 advanced (F5) two-replicate trials of 24 to 36 entries of mostly green and yellow types were grown. Most lines were resistant to powdery mildew. Green-seeded lines were evaluated for tolerance to bleaching. Lines with the highest yield, best lodging and disease resistance, and above average quality profile were advanced to registration recommendation trials for the 2007 season. Breeder seed of new pea variety CDC Centennial (tested as CDC 728-8) was released for the first time in 2007 by the Saskatchewan Pulse Growers. It has high yield, early maturity and medium-large seed size.

## Dry Bean Cultivar Preliminary Yield Trials - 2006

*Funded by the Saskatchewan Agriculture Development Fund, the Saskatchewan Pulse Growers and the Crop Development Centre, University of Saskatchewan*

*Plant Breeders: A. Vandenberg, K. Bett, B. Tar'an, T. Warkentin and S. Banniza, Crop Development Centre, University of Saskatchewan, Saskatoon*

Dry bean trials were conducted at Outlook under irrigated conditions to identify early-maturing, high yielding breeding lines in the pinto, black, navy, great northern, red, pink and specialty market classes for the narrow row production system. Two co-operative registration trials and the regional trial were grown at Outlook in 2006. Data from these trials were combined with those from other locations to decide which lines to advance to the 2007 registration and regional trials, and which to release as new varieties.

## Fababean Breeding Yield Trials - 2006

*Funded by the Saskatchewan Agriculture Development Fund, the Saskatchewan Pulse Growers and the Crop Development Centre, University of Saskatchewan.*

*Plant Breeders: A. Vandenberg, T. Warkentin, K. Bett, B. Tar'an, and S. Banniza, Crop Development Centre, University of Saskatchewan, Saskatoon*

Fababean trials were conducted at Outlook under irrigated conditions to identify early-maturing, high yielding breeding lines. Two market classes are being developed. Large seed size lines with tan seed coat colour are being developed for the Middle Eastern food markets. In addition, small seed size, low tannin lines are being developed for local feed markets. Fababean has high nitrogen fixation capacity and tolerance to wet soils, thus, it has potential to enhance crop rotations in many parts of western Canada. Nine preliminary (F4), twelve advanced (F5), and one regional trial were grown at Outlook in 2006.

# Forage Crops

*Lead: Bruce Coulman[1], Co-leads: Tim Nelson[2] and Jenna Johnson[2]*
*[1]University of Saskatchewan, [2]Saskatoon Research Centre, AAFC, Saskatoon, Saskatchewan*

## Forage Yield Trials

CSIDC Outlook is one of 12 sites across Saskatchewan, Manitoba and Alberta in the Western Forage Testing (WFT) System. New varieties produced by private companies or public institutions are seeded at the 12 sites and evaluated for yield and winter hardiness for three years following the year of seeding. Following the three years of testing, the varieties that are registered for sale in Canada are included in the CSIDC publication "Crop Varieties for Irrigation" along with their yields relative to check varieties from the Outlook site. Data for all sites can be found on the website:
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/for11184

Table 44. Western Forage Test - Alfalfa, Outlook (re-seeded 2005).

| | 2006 Dry Matter Yield (kg ha$^{-1}$) | | | | |
|---|---|---|---|---|---|
| | Cut 1 | Cut 2 | Cut 3 | | % of |
| Variety | 4 Jul 2006 | 15 Aug 2006 | 3 Oct 2006 | Total | Beaver |
| 55V05 | 9736 | 4330 | 2139 | 16 205 | 116 |
| DS234 | 9316 | 4119 | 2293 | 15 728 | 113 |
| 54Q25 | 9121 | 4034 | 2104 | 15 259 | 110 |
| DS236 | 8689 | 4035 | 2242 | 14 966 | 108 |
| AC Blue J | 9603 | 3594 | 1707 | 14 903 | 107 |
| DS233 | 8916 | 3781 | 2035 | 14 731 | 106 |
| DS235 | 8868 | 3594 | 1961 | 14 422 | 104 |
| LRC01CR | 9225 | 3719 | 1443 | 14 386 | 103 |
| Beaver | 9313 | 3224 | 1377 | 13 914 | **100** |
| NS02CK | 7913 | 3305 | 1547 | 12 765 | 92 |
| Rambler | 8760 | 3310 | 610 | 12 680 | 91 |
| Rangelander | 8556 | 3312 | 685 | 12 553 | 90 |
| Mean | 9001 | 3696 | 1678 | 14 376 | |
| CV (%) | 9.2 | 11.1 | 11.9 | 8.1 | |
| LSD (0.05) | 1198 | 591 | 287 | 1685 | |

| Table 45. Western Forage Test - Cicer Milkvetch, Outlook (re-seeded 2003). | | | | |
|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg $ha^{-1}$) | | | |
| | Cut 1 | Cut 2 | | % of |
| Variety | 5 Jul 2006 | 11 Sep 2006 | Total | Oxley |
| LRC94-1 | 7321 | 1982 | 9303 | 130 |
| Oxley | 5811 | 1323 | 7134 | **100** |
| Mean | 6566 | 1652 | 8218 | |
| CV (%) | 7.4 | 20.2 | 2.5 | |
| LSD (0.05) | 1105 | 751 | 473 | |

| Table 46. Western Forage Test - Timothy, Outlook (re-seeded 2003). | | | | |
|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg $ha^{-1}$) | | | |
| | Cut 1 | Cut 2 | | % of |
| Variety | 5 Jul 2006 | 11 Sep 2006 | Total | Climax |
| Jonaton | 8192 | 288 | 8480 | 101 |
| Climax | 7992 | 406 | 8398 | 100 |
| 45-214 | 7484 | 602 | 8087 | 96 |
| NS2TY | 7435 | 433 | 7869 | 94 |
| Charlton | 7302 | 337 | 7639 | 91 |
| Mean | 7681 | 413 | 8094 | |
| CV (%) | 14.8 | 61.7 | 16.1 | |
| LSD (0.05) | 1757 | 393 | 2010 | |

| Table 47. Western Forage Test - Alfalfa 2003, Outlook | | | | | |
|---|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg ha$^{-1}$) | | | | % of Beaver |
| | Cut 1 | Cut 2 | Cut 3 | | |
| Variety | 5 Jul 2006 | 15 Aug 2006 | 3 Oct 2006 | Total | |
| DS 337 | 8124 | 4258 | 2195 | 14 575 | 126 |
| 3M94 | 8618 | 4007 | 1902 | 14 526 | 126 |
| DS 336 | 7749 | 4443 | 2205 | 14 397 | 125 |
| 54V46 | 7553 | 4089 | 2165 | 13 806 | 120 |
| DS 335 | 6973 | 4247 | 2196 | 13 415 | 116 |
| SW LU8407 | 6945 | 3733 | 1845 | 12 523 | 108 |
| AC Blue J | 7150 | 3585 | 1718 | 12 452 | 108 |
| Beaver | 6870 | 3472 | 1204 | 11 546 | **100** |
| Rambler | 6515 | 3498 | 623 | 10 635 | 92 |
| Rangelander | 6727 | 3045 | 735 | 10 506 | 91 |
| Mean | 7322 | 3838 | 1679 | 12 838 | |
| CV (%) | 13.5 | 13 | 8.7 | 10.5 | |
| LSD (0.05) | 1436 | 728 | 212 | 1960 | |

| Table 48. Western Forage Test - Tall Fescue 2003, Outlook | | | | |
|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg ha$^{-1}$) | | | % of Courtenay |
| | Cut 1 | Cut 2 | | |
| Variety | 5 Jul 2006 | 11 Sep 2006 | Total | |
| UMTF | 12 097 | 2536 | 14 634 | 101 |
| Courtenay | 11 966 | 2583 | 14 549 | **100** |
| TF10111 | 8695 | 1454 | 10 149 | 70 |
| Mean | 10 919 | 2191 | 13 110 | |
| CV (%) | 21.1 | 33.1 | 22.5 | |
| LSD (0.05) | 3996 | 1256 | 5112 | |

| Table 49. Western Forage Test - Alfalfa 2004, Outlook. | | | | | |
|---|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg $ha^{-1}$) | | | | |
| | Cut 1 | Cut 2 | Cut 3 | | % of |
| Variety | 5 Jul 2006 | 15 Aug 2006 | 3 Oct 2006 | Total | Beaver |
| AC Blue J | 9043 | 3628 | 1570 | 14 241 | 117 |
| CW 83021 | 8196 | 4109 | 1919 | 14 223 | 117 |
| FG-4G73 | 8402 | 3751 | 1757 | 13 910 | 114 |
| P435 | 8008 | 3528 | 1627 | 13 163 | 108 |
| MS Sunstra 422 | 7036 | 3483 | 1970 | 12 489 | 103 |
| MS Sunstra 423 | 7158 | 3376 | 1888 | 12 421 | 102 |
| Beaver | 7829 | 3126 | 1211 | 12 166 | **100** |
| CW 52044 | 6540 | 3043 | 1277 | 10 860 | 89 |
| Rangelander | 6977 | 2773 | 504 | 10 257 | 84 |
| SCL30001 | 6400 | 2966 | 834 | 10 200 | 84 |
| SCL39801 | 6842 | 2588 | 618 | 10 047 | 83 |
| Rambler | 6771 | 2606 | 529 | 9906 | 81 |
| Mean | 7433 | 3248 | 1309 | 11 990 | |
| CV (%) | 15.9 | 10 | 18.9 | 11.9 | |
| LSD (0.05) | 1704 | 469 | 356 | 2061 | |

| Table 50. Western Forage Test - Orchardgrass 2004, Outlook | | | | |
|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg $ha^{-1}$) | | | |
| | Cut 1 | Cut 2 | | % of |
| Variety | 4 Jul 2006 | 11 Sep 2006 | Total | Kay |
| 2000ABC | 15 124 | 4660 | 19 784 | 130 |
| Early Arctic | 13 627 | 4536 | 18 163 | 120 |
| Kay | 11 095 | 4099 | 15 194 | **100** |
| 2000DEF | 10 894 | 3408 | 14 302 | 94 |
| Mean | 12 685 | 4176 | 16 861 | |
| CV (%) | 11.3 | 21.1 | 11.6 | |
| LSD (0.05) | 2310 | 1415 | 3130 | |

| Table 51. Western Forage Test - Meadow Fescue 2004, Outlook | | | | |
|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg ha$^{-1}$) | | | |
| | Cut 1 | Cut 2 | | % of |
| Variety | 4 Jul 2006 | 11 Sep 2006 | Total | Mimer |
| Preval | 10 002 | 4887 | 14 888 | 108 |
| Mimer | 9505 | 4280 | 13 785 | **100** |
| Mean | 9753 | 4583 | 14 336 | |
| CV (%) | 13.8 | 10.3 | 11.3 | |
| LSD (0.05) | 3034 | 1072 | 3667 | |

| Table 52. Western Forage Test - Timothy 2004, Outlook | | | | |
|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg ha$^{-1}$) | | | |
| | Cut 1 | Cut 2 | | % of |
| Variety | 4 Jul 2006 | 11 Sep 2006 | Total | Climax |
| Climax | 10 909 | 4111 | 15 020 | **100** |
| SWTT2527 | 9987 | 3471 | 13 458 | 90 |
| Mean | 10 448 | 3791 | 14 239 | |
| CV (%) | 8.2 | 3.5 | 5.4 | |
| LSD (0.05) | 1947 | 306 | 1754 | |

| Table 53. Western Forage Test - Alfalfa 2005, Outlook. | | | | | |
|---|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg ha$^{-1}$) | | | | |
| | Cut 1 | Cut 2 | Cut 3 | | % of |
| Variety | 4 Jul 2006 | 15 Aug 2006 | 3 Oct 2006 | Total | Beaver |
| 1P10 | 9725 | 4568 | 2671 | 16 965 | 114 |
| WL319HQ | 9882 | 3644 | 2490 | 16 016 | 108 |
| AC Blue J | 9331 | 3963 | 2477 | 15 771 | 106 |
| 1P11 | 9484 | 4028 | 1750 | 15 263 | 103 |
| SCA101 | 8898 | 4159 | 1981 | 15 038 | 101 |
| Beaver | 9343 | 3841 | 1693 | 14 877 | **100** |
| 53Q30 | 8935 | 3687 | 2223 | 14 845 | 100 |
| C211-201 | 8816 | 3699 | 2230 | 14 745 | 99 |
| SL-A5001 | 9242 | 3195 | 1785 | 14 222 | 96 |
| PGA8 | 8571 | 3473 | 1487 | 13 531 | 91 |
| KLA100 | 8777 | 3353 | 1056 | 13 185 | 89 |
| Rambler | 8698 | 3332 | 734 | 12 764 | 86 |
| Rangelander | 8279 | 2937 | 893 | 12 110 | 81 |
| Mean | 9075 | 3683 | 1805 | 14 564 | |
| CV (%) | 9.4 | 13.4 | 25 | 8.2 | |
| LSD (0.05) | 1229 | 712 | 648 | 1732 | |

| Table 54. Western Forage Test - Timothy 2005, Outlook. | | | | |
|---|---|---|---|---|
| | 2006 Dry Matter Yield (kg ha$^{-1}$) | | | |
| | Cut 1 | Cut 2 | | % of |
| Variety | 4 Jul 2006 | 11 Sep 2006 | Total | Climax |
| Climax | 13 572 | 3478 | 17 050 | **100** |
| SWTT2503 | 12 438 | 3171 | 15 610 | 92 |
| Mean | 13 005 | 3324 | 16 330 | |
| CV (%) | 11.8 | 10 | 11.1 | |
| LSD (0.05) | 3479 | 750 | 4096 | |

# Horticultural & Medicinal Crops

# Potato Research and Development Program

*Lead: Dr. Jazeem Wahab; Co-lead: Greg Larson, CSIDC*

Potato production is the leading sector in the horticulture industry in Saskatchewan. Saskatchewan is recognized as one of the few remaining areas in North America that can consistently produce high quality potatoes. The phenomenon of 'Northern Vigour™' and disease-free status of seed tubers produced in this province has made Saskatchewan a leader in the seed potato industry in North America. The processing potato industry is also expanding in Western Canada. Multi-year research conducted at the University of Saskatchewan and the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) have shown that high quality processing potato can be grown in Saskatchewan.

Highly competitive markets and increasing production costs has substantially reduced profit margins and forced the potato industry to seek other food and non-food alternatives. Recent health issues, e.g. acrylamide associated with cancer in fried potatoes, with traditional processed potato products has compelled the potato industry to search healthier options. 'Small' potatoes are healthier fresh and a non-fry alternative with economic potential. Small potato markets target tubers between 20 mm and 40 mm in diameter. Growing small potato is somewhat different to growing potatoes in the traditional manner. Cultivars and agronomic recommendations used for standard (larger) potato production cannot be effectively applied for producing small potato.

Saskatchewan is ideally suited to growing 'seed', 'processing', 'table' and 'small potato'. Lower land cost, reduced disease and insect pressures and availability of irrigated land makes Saskatchewan a low cost potato producer with minimal risk. Superior cultivars, suitable production and storage management practices are also essential to produce and market high quality potatoes.

CSIDC has expanded its potato research and development program to support the needs of this expanding industry. The goal is to support the potato industry by developing economically viable and environmentally sustainable production practices for irrigated'seed', 'processing', 'table' and specialty potatoes. The main objective includes:

- identify superior cultivars for the 'seed', 'processing', 'table' and 'small potato' markets,
- develop cost-effective agronomic practices to suit the relatively short and cool growing seasons of Saskatchewan.

These projects are conducted jointly with industry partners, Saskatchewan Seed Potato Growers Association and Dr. Benoit Bizimungu (Lethbridge Research Centre, Agriculture and Agri-Food Canada).

## Field Trials

The studies were conducted in the field plots of the CSIDC. Field trial location consisted of loamy soil with nutrient analysis of 32 kg N/ha, 84 kg $P_2O_5$/ha, and 55 kg $K_2O$/ha at 0-30 cm depth. The growing season received 273 mm of precipitation. Approximately 350 mm of irrigation was applied to maintain soil moisture above 60% Field Capacity for the various tests.

Test plots were established May 23 through May 30, 2006. The crop was raised using standard management practices with treatments applied appropriately as required by the different tests. Eptam 8E was applied as pre-plant herbicide. Seed pieces were spaced 90 cm between-row and 30 cm within-row for all trials except for seed spacing studies. Nitrogen at 200 kg N/ha (half at planting and half at hilling), phosphorus at 120 kg $P_2O_5$/ha and potash at 100 kg $K_2O$/ha (at planting) were given for the crop. Bravo 500, Dithane DG, Tattoo C, and Acrobat MZ fungicides were applied for disease control. Ripcord and Admire were used to control insect pests. The crop was severely damaged by hail on August 23, 2006. The test plots were top-killed with Reglone (2.5 l/ha) at different dates depending on the test. Tubers were harvested after adequate skin set. Commercial potatoes were graded based on tuber diameter according to Canadian Seed Standards. Tuber specific gravity and culinary characteristics (boiled, baked, chip, and french fry) were determined using recommended Prairie Regional Variety Testing protocols. Fry colour categories were based on USDA classification.

Harvest dates for 'little potatoes' were determined by performing test digs in the guard rows for the various cultivars/treatments. Plots were flailed and desiccated with Reglone when approximately two tubers in a hill reached approximately 40 mm in diameter or slightly larger. Growth characteristics were recorded during the growing season. The harvested tubers were graded according to tuber diameter. The size grades included <20 mm, 20-30 mm, 30-40 mm, and >40 mm.

# Conventional Potato Production

## National Advanced Early and Main Adaptation Trial

*Co-Investigator: Dr. Benoit Bizimungu, AAFC*

The performance of 17 potato clones were evaluated in comparison with Russet Burbank and Shepody from East and West seed sources. The crop was grown under irrigated conditions using standard management practices. Test plots contained 25 hills with two replications. Superior clones will be advanced for further evaluation.

## Advanced Adaptation Trial - I

*Co-Investigator: Dr. Benoit Bizimungu, AAFC*

The performance of 22 potato clones were evaluated in comparison with eight commercial cultivars (Russet Burbank, Shepody, Norland, Atlantic, Snowden, NorValley, Russet Norkotah, and Ranger Russet) under irrigated conditions. Test plots contained 12 hills with two replications. Superior clones will be advanced for further evaluation.

## Advanced Adaptation Trial - II

*Co-Investigator: Dr. Benoit Bizimungu, AAFC*

The performance of 21 potato clones were evaluated in comparison with nine commercial cultivars (Russet Burbank, Shepody, Norland, Sangre, Atlantic, Snowden, Ranger Russet, Russet Norkotah, NorValley) under irrigated conditions. Test plots contained 12 hills with four replications. Superior clones will be advanced for further evaluation.

## Prairie Early Replicated Trial

*Co-Investigator: Dr. Benoit Bizimungu and Richard Tarn, AAFC*

The Prairie Early Replicated trial was conducted at CSIDC under irrigation. This test evaluated five advanced generation clones in comparison with six industry standards (Norland, Atlantic, AC Ptarmigan, NorValley, Yukon Gold, and Russet Norkotah. Field plots were flailed at 80 and 95 days after planting. The yield performance and culinary characteristics were determined for the harvested tubers. This information will be used to support registration of new cultivars.

## Prairie Main Replicated Trial

*Co-Investigator: Dr. Benoit Bizimungu and Richard Tarn, AAFC*

The Prairie Main Replicated trial was conducted at CSIDC under irrigation. Fourteen clones and six industry standards (Russet Burbank, Shepody, Snowden, Russet Norkotah, Ranger Russet, and Atlantic) were evaluated under irrigated production. The crop was flailed and desiccated 104 days after planting and harvested 20 days later. The yield performance and culinary characteristics were determined for the harvested tubers. This information will be used to support registration of new cultivars.

## Western Seed Potato Consortium

*Co-Investigator: Dr. Benoit Bizimungu, AAFC*

Promising table, french fry, and chipping clones offered to the Western Seed Potato Consortium and standard industry cultivars were grown in single-row plots under irrigated production. The crop was harvested and displayed to the participants during the Potato Field Day August 10, 2006.

# Little Potato Agronomy

The demand for small potato is increasing very rapidly in Canada, USA and Europe. Considerable acreage of small potato is being grown in the Outlook irrigation area to meet the demand of this expanding market. The success of cost-effectively producing high quality small potato of target size grade, and superior culinary characteristics depends on screening suitable cultivars and developing efficient agronomic practices. Agronomic recommendations used for standard (larger) potato production cannot be effectively applied for producing small potato. Production practices including cultivar selection and agronomic practices should be suitably modified to optimize yields and maximize returns. The differences and challenges in growing small potato compared to conventional potato production include cultivars that produce high yields of small size grades, earlier top-kill and harvest to maximize target size grades, and other production practices to optimize yields of small tubers.

There are several promising potato clones, developed by Agriculture and Agri-Food Canada Lethbridge Research Centre and privately owned, suited for small potato production. Basic information is available on yield potential and quality attributes for these clones. However, information is lacking with respect to their perfomance and agronomic practices for commercial scale production.

This study will develop cost-effective agronomic practices for producing ‘small’ potato under Saskatchewan conditions. Specific projects include: (i) Evaluating suitable potato cultivars for producing ‘small’ potatoes, (ii) Developing optimum plant spacing and harvest timing to maximize tuber yields of target market grades, and (iii) Identifying suitable top-kill dates to maximize target tuber size grades for different cultivars.

It is anticipated that this project will benefit Saskatchewan's agricultural industry by:

- Bringing greater revenue to producers through higher-value small potatoes and by allowing accessibility to more lucrative urban markets,
- Relatively lower production cost to producers and enhanced environmental stewardship as small potatoes are top-killed and harvested earlier than conventional potato crop, thereby, requiring fewer pesticide applications than traditional potatoes,

- Improved food safety attributes increase consumer attraction for small potato, hence, greater demand,
- Saskatchewan's low cost potato production capabilities enable Saskatchewan's potato producers to compete effectively in the highly competitive domestic and export markets,
- Small potato production is a higher-value option, and is labour intensive. This provides direct benefit to the producer and considerable spin-off benefits to the rural economy by generating more employment and to other related agribusinesses.

## Effect of Seed Size on Yield and Tuber Size Distribution for Piccolo, Baby Boomer, and HO-2000 Potatoes

Seed-tuber size and plant spacing are two factors that can significantly affect potato yields and tuber size distribution. Production practices for growing 'little potatoes' are targeted at maximizing yields of relatively small tubers. There is no information available on the optimum seed-piece size or seed piece spacing suited for producing cultivars such as Baby Boomer, HO-2000, or Piccolo.

In this study, yield and tuber size distribution were examined in relation to seed-tuber size and within-row seed spacing for Baby Boomer, Piccolo and HO-2000 potato. Treatments included seven seed sizes (20-25, 25-30, 30-35, 35-40, 40-45, 45-50, >50 mm diameter) and two in-row spacings (15 and 20 cm). The crop was planted in 91 cm rows. Piccolo and Baby Boomer were planted on May 26, and HO-2000 May 29. Based on planting and harvest dates, Piccolo, HO-2000, and Baby Boomer received a total (rainfall + irrigation) of 537, 546, 616 mm respectively during the growing season. As determined by test digs, the crops were flailed and desiccated, i.e. Piccolo on August 11, HO-2000 on August 15 and Baby Boomer on August 21. Piccolo was harvested on September 6, HO-2000 on September 14, and Baby Boomer on September 21.

### Emergence

The effects of seed size and within-in row spacing on 50% emergence is summarized in Table 55. Crops established using large seed-tubers emerged earlier than the crops planted using small seed-tubers. For example, 50% emergence for HO-2000 planted using seed-tubers >50 mm diameter occurred 21 days from planting. Baby Boomer and Piccolo planted using >50 mm seed emerged 23 days from planting. Smaller seed-tubers resulted in delayed emergence for all three cultivars. The late emergence was more marked for HO-2000 than Baby Boomer or Piccolo, i.e. delay of six days for HO-2000, four days for Baby Boomer and two days for Piccolo.

In-row seed-piece spacing had no effect on emergence for HO-2000 and Piccolo. However, it is not clear why significant seed spacing main effects and seed size x seed spacing interaction were significant for Baby Boomer. The data did not show any biological trend.

### Flowering
Seed-piece size and in-row spacing had no effect on days to first flower for all three cultivars except for HO-2000 where the plants from larger seed flowered three to four days earlier than the plants grown from smaller seeds (Table 56).

### Tuber Yield
The tuber yield responses to seed-piece size and within-row seed spacing for Baby Boomer, HO-2000, and Piccolo are summarized in Table 57, Table 58, Table 59 and illustrated in Figure 4, Figure 5, and Figure 6 respectively.

### Baby Boomer Yield
At harvest, Baby Boomer yielded approximately 2.7 t/ha of 20-30 mm size grade, 11.2 t/ha of 30-40 mm size grade, 5.6 t/ha of >40 mm size grade (Table 57). Large seed-tubers produced higher yields of the various size grades than smaller seed (Table 57, Figure 4). The crop grown from largest (>50 mm) seed produced 50% higher yield of 20-30 mm grade tubers than the crop grown from smallest seed. The corresponding yield increases were 56% and 70% for 30-40 mm and >40 mm tuber grades.

There was significant correlation between seed size and tuber yield of the different size grades (Figure 4).

Seed-piece spacing had no effect on tuber yield for the various size grades (Table 57).

### HO-2000 Yield
At harvest, HO-2000 yielded approximately 1.3 t/ha of 20-30 mm size grade, 10.2 t/ha of 30-40 mm size grade, 14.3 t/ha of >40 mm size grade (Table 58). Large seed-tubers produced higher yields of the various size grades than smaller seed (Table 58, Figure 5). The crop grown from largest (>50 mm) seed produced 36% higher yield of 20-30 mm grade tubers than the crop grown from smallest seed. The corresponding yield increases were two-fold and four-fold for 30-40 mm and >40 mm tuber grades.

There was significant correlation between seed size and tuber yield of the different size grades (Figure 5).

Closer (15 cm) seed-piece spacing produced significantly higher 20-30 mm and 30-40 mm tuber grade yields, while planting spacing had no effect on >40 mm tuber yield (Table 58).

### Piccolo Yield
At harvest, Piccolo yielded approximately 1.3 t/ha of 20-30 mm size grade, 12.1 t/ha of 30-40 mm size grade, 15.1 t/ha of >40 mm size grade (Table 59). Large seed-tubers produced higher yields of the various size grades than smaller seed (Table 59, Figure 6). The crop grown from largest (>50 mm) seed produced approximately three-fold 20-30 mm and 30-40 mm grade tuber yields than the crop grown from smallest seed. For >40 mm tuber grade, large seed outyielded small seed by 53%.

There was significant correlation between seed size and tuber yield of the different size grades (Figure 6).

Closer (15 cm) seed-piece spacing produced significantly higher 20-30 mm and 30-40 mm tuber grade yields, while planting spacing had no effect on >40 mm tuber yield (Table 59).

## Yield and Tuber Size Distribution for Piccolo, Baby Boomer, and HO-2000 Potatoes in Response to Timing of Nitrogen Application and Harvest Interval Following Top-kill

The success of 'little potato' production depends on tuber size control. The choice of cultivars and agronomic practices adopted are aimed at maximizing the proportion of smaller tubers. Tuber size control can be achieved through early harvest, i.e. prior to maturity and natural senescence. For small potato production, harvest timing is determined by test harvests. It is likely that tuber bulking can continue following top-kill depending on the maturity characteristics of cultivars. Further, excess nitrogen, particularly late in the growing season, can delay potato maturity. This study is designed to examine the effect of timing of nitrogen application and delaying harvest after top-kill of small potato cultivars for Baby Boomer, Piccolo, and HO-2000.

Nitrogen treatments included application of 150 kg N/ha uniformly at planting and 100 kg N/ha in the following manner (kg N/ha):

1. 100 N - All at planting
2. 100 N - All at first hilling
3. 100 N - 50 N at first hilling and 50 N at second hilling
4. 100 N - All at second hilling

Harvest timing:

1. Immediately after flailing
2. Seven days after flailing
3. Fourteen days after flailing

The crop was planted in 91 cm rows and seed pieces were spaced at 20 cm within the row. Piccolo and Baby Boomer were planted on May 25, and HO-2000 May 26. The crops received a total (rainfall + irrigation) of 497 mm during the growing season. As determined by test digs, the crops were flailed and then desiccated, i.e. Piccolo on August 11, HO-2000 on August 15 and Baby Boomer on August 21. Tubers were harvested immediately after flailing, one week, and two weeks after flailing.

### Tuber Yield

The tuber yield responses to timing of nitrogen application and the interval between flailing and harvest for Baby Boomer, HO-2000, and Piccolo are summarized in Table 60, Table 61, and Table 62 respectively.

**Baby Boomer Yield**
At harvest, Baby Boomer yielded approximately 2.4 t/ha of 20-30 mm size grade, 8.9 t/ha of 30-40 mm size grade, 4.3 t/ha of >40 mm size grade (Table 60).

Nitrogen timing and harvest interval had no effect on tuber yields of the various size grades.

**HO-2000 Yield**
At harvest, HO-2000 yielded approximately 0.9 t/ha of 20-30 mm size grade, 7.6 t/ha of 30-40 mm size grade, 8.8 t/ha of >40 mm size grade (Table 61).

Nitrogen timing had no effect on tuber yields of the various size grades.

All three harvest dates, i.e. immediately after flailing, one week after flailing, and two weeks after flailing produced similar 20-30 mm size grade yield (Table 61). However, delaying harvest produced progressively higher 30-40 mm size grade yield. Harvesting immediately after flailing produced the lowest >40 mm size grade yield. Delaying harvest by one week produced higher >40 mm size grade yield and delaying harvest by another week had no yield advantage.

**Piccolo Yield**
At harvest, Piccolo yielded approximately 1.4 t/ha of 20-30 mm size grade, 11.1 t/ha of 30-40 mm size grade, 11.2 t/ha of >40 mm size grade (Table 62).

Nitrogen timing had no effect on tuber yields of the various size grades.

All three harvest dates, produced similar 20-30 mm and >40 mm size grade yields (Table 62). However, delaying harvest produced progressively higher 30-40 mm size grade yield.

| Table 55. Seed-piece size and within-row seed spacing effects on emergence date for potato cultivars Baby Boomer, HO-2000, and Piccolo grown under irrigation. | | | |
|---|---|---|---|
| Treatment | Days to 50% emergence | | |
| | Baby Boomer | HO-2000 | Piccolo |
| Seed-piece diameter: | | | |
| 20-25 mm | 27 | 27 | 24 |
| 25-30 mm | 26 | 27 | 25 |
| 30-35 mm | 24 | 24 | 25 |
| 35-40 mm | 23 | 25 | 25 |
| 40-45 mm | 23 | 22 | 24 |
| 45-50 mm | 23 | 21 | 24 |
| >50 mm | 23 | 21 | 23 |
| Seed spacing | | | |
| 15 cm | 24 | 24 | 24 |
| 20 cm | 25 | 24 | 25 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Seed size | ***(0.9) | ***(1.6) | ***(1.2) |
| Seed spacing | *(0.7) | ns | ns |
| Seed size x spacing | **(1.2) | ns | ns |
| CV (%) | 3.5 | 6.8 | 4.9 |

*,**, ***, and ns indicate significance at P<0.05, 0.01, 0.001 levels of probability and not significant respectively. Values within parentheses is LSD estimate at 5.0% significance.

Table 56. Seed-piece size and within-row seed spacing effects on flowering date for potato cultivars Baby Boomer, HO-2000, and Piccolo grown under irrigation.

| Treatment | Days to first flower | | |
|---|---|---|---|
| | Baby Boomer | HO-2000 | Piccolo |
| Seed-piece diameter: | | | |
| 20-25 mm | 54 | 56 | 58 |
| 25-30 mm | 54 | 55 | 57 |
| 30-35 mm | 52 | 53 | 58 |
| 35-40 mm | 50 | 53 | 58 |
| 40-45 mm | 51 | 52 | 57 |
| 45-50 mm | 51 | 51 | 56 |
| >50 mm | 52 | 52 | 56 |
| Seed spacing | | | |
| 15 cm | 52 | 53 | 57 |
| 20 cm | 52 | 53 | 57 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Seed size | ns | ***(1.2) | ns |
| Seed spacing | ns | ns | ns |
| Seed size x spacing | ns | ns | ns |
| CV (%) | 5.2 | 2.2 | 3.2 |

*,**, ***, and ns indicate significance at P<0.05, 0.01, 0.001 levels of probability and not significant respectively. Values within parentheses is LSD estimate at 5.0% significance.

Table 57. Seed-piece size and within-row seed spacing effects on yield of different tuber size grades for Baby Boomer potato.

| Treatment | Tuber yield (t/ha) | | |
|---|---|---|---|
| | 20-30 mm | 30-40 mm | >40 mm |
| Seed-piece diameter: | | | |
| 20-25 mm | 2.02 | 8.51 | 4.31 |
| 25-30 mm | 2.33 | 9.47 | 4.27 |
| 30-35 mm | 2.39 | 10.32 | 4.56 |
| 35-40 mm | 2.86 | 11.95 | 5.38 |
| 40-45 mm | 2.94 | 12.26 | 6.97 |
| 45-50 mm | 3.26 | 12.24 | 6.13 |
| >50 mm | 3.04 | 13.27 | 7.27 |
| Seed spacing: | | | |
| 15 cm | 2.71 | 11.07 | 5.46 |
| 20 cm | 2.67 | 11.22 | 5.65 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Seed size | ***(0.44) | ***(1.42) | ***(2.00) |
| Seed spacing | ns | ns | ns |
| Seed size x spacing | ns | ns | ns |
| CV (%) | 16.3 | 12.6 | 24.5 |

***, and ns indicate significance at P< 0.001 level of probability and not significant respectively. Values within parentheses is LSD estimate at 5.0% significance.

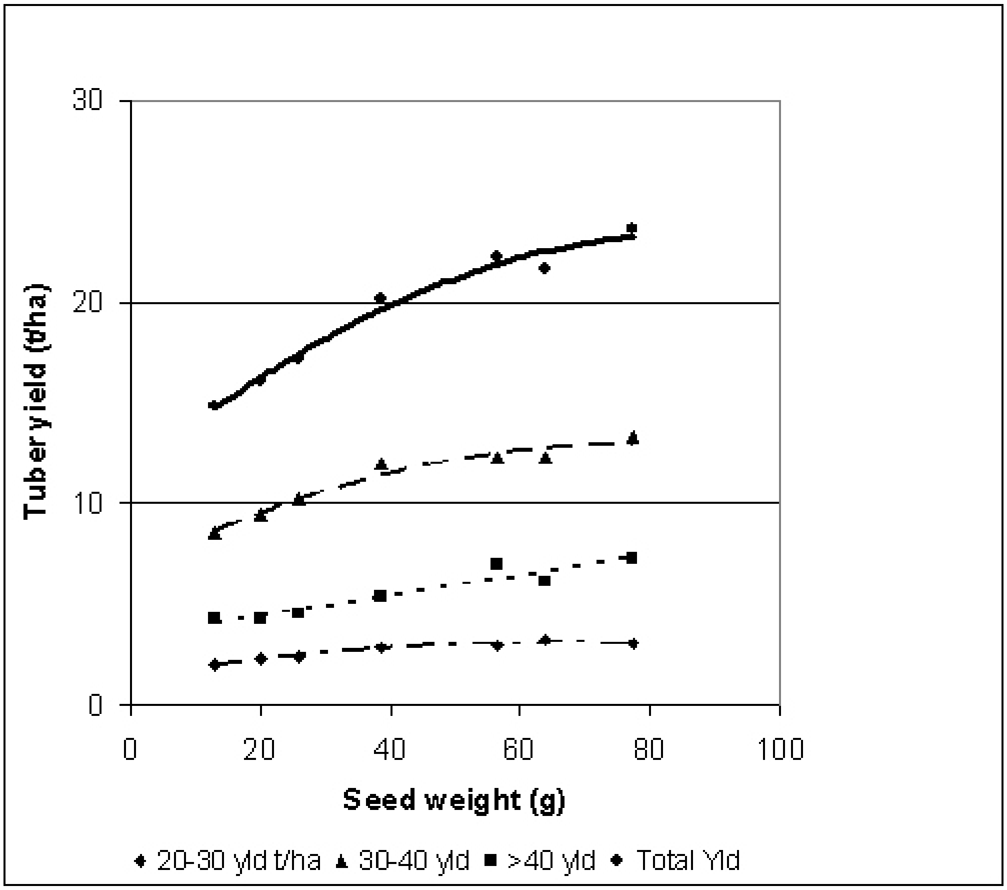



Figure 4. Tuber yields of different size grades in response to seed-tuber size for Baby Boomer potato.

Regression:

20-30 mm grade yield = 1.42 + 0.0502 s - 0.000372 $s^2$ ($R^2$ = 93.5%)
30-40 mm grade yield = 6.70 + 0.162 s - 00105 $s^2$ ($R^2$ = 93.8%)
>40 mm grade yield = 3.47 + 0.0494 s ($r^2$ = 89.1%)
Total yield = 11.40 + 0.271 s - 00153 $s^2$ ($R^2$ = 96.9%)

Table 58. Seed-piece size and within-row seed spacing effects on yield of different tuber size grades for HO-2000 potato.

| Treatment | Tuber yield (t/ha) | | |
|---|---|---|---|
| | 20-30 mm | 30-40 mm | >40 mm |
| Seed-piece diameter: | | | |
| 20-25 mm | 1.18 | 6.17 | 5.58 |
| 25-30 mm | 1.26 | 8.73 | 9.02 |
| 30-35 mm | 1.2 | 9.26 | 11.51 |
| 35-40 mm | 1.25 | 10.66 | 15.66 |
| 40-45 mm | 1.21 | 10.55 | 17.27 |
| 45-50 mm | 1.68 | 13.36 | 18.71 |
| >50 mm | 1.61 | 12.62 | 20.48 |
| Seed spacing: | | | |
| 15 cm | 1.4 | 10.92 | 15.02 |
| 20 cm | 1.28 | 9.46 | 13.04 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Seed size | ***(0.21) | ***(1.66) | ***(2.35) |
| Seed spacing | *(0.18) | *(1.40) | ns |
| Seed size x spacing | ns | ns | ns |
| CV (%) | 16.2 | 16.1 | 16.5 |

*, ***, and ns indicate significance at P<0.05, 0.001 levels of probability and not significant respectively. Values within parentheses is LSD estimate at 5.0% significance.

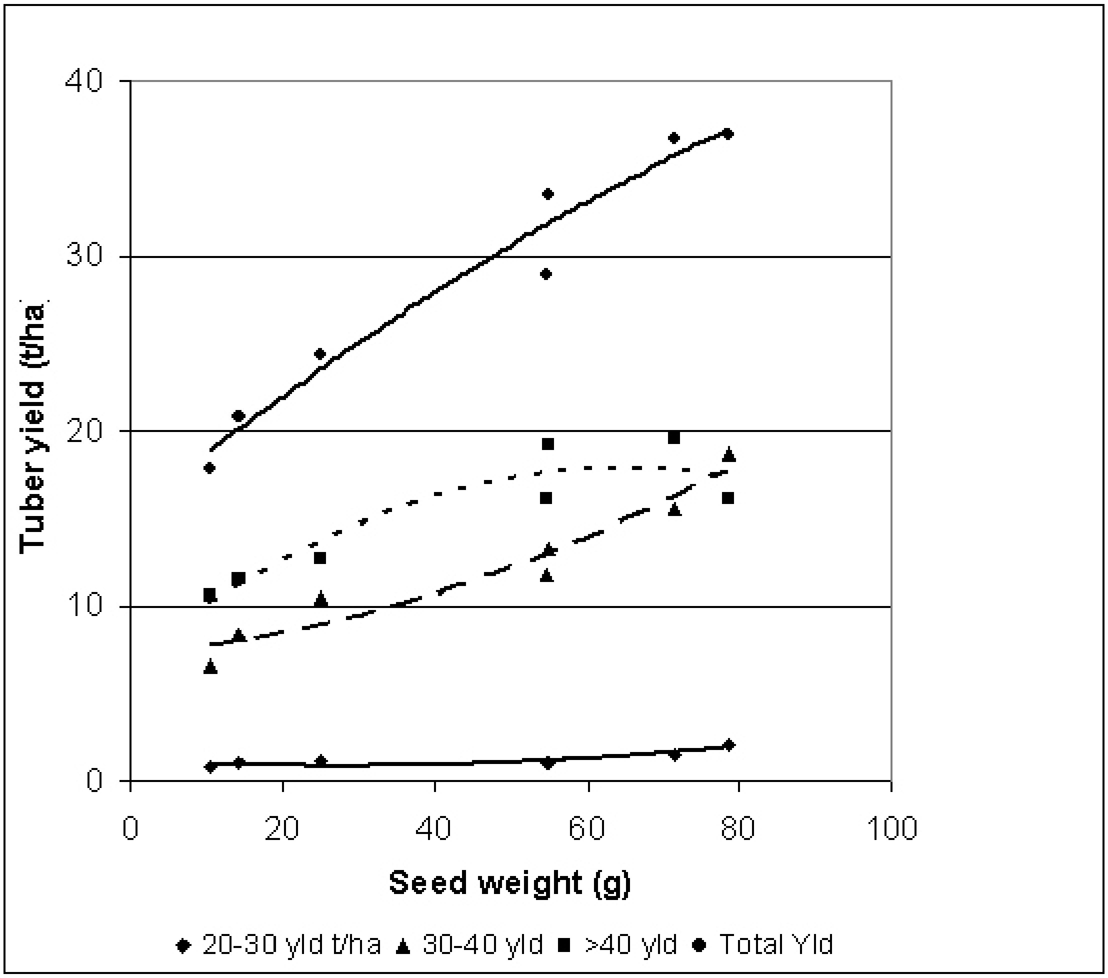



Figure 5. Tuber yields of different size grades in response to seed-tuber size for HO-2000 potato.

Regression:

20-30 mm grade yield = 9.12 + 0.516 s - 00259 $s^2$ ($R^2$ = 96.8%)
30-40 mm grade yield = 5.29 + 0.157 s - 000821 $s^2$ ($R^2$ = 85.5%)
>40 mm grade yield = 2.63 + 0.0.361 s - 000184 $s^2$ ($R^2$ = 97.9%)
Total yield = 9.12 + 0.516 s - 00259 $s^2$ ($R^2$ = 96.8%)

Table 59. Seed-piece size and within-row seed spacing effects on yield of different tuber size grades for Piccolo potato.

| Treatment | Tuber yield (t/ha) | | |
|---|---|---|---|
| | 20-30 mm | 30-40 mm | >40 mm |
| Seed-piece diameter: | | | |
| 20-25 mm | 0.77 | 6.56 | 10.53 |
| 25-30 mm | 1.01 | 8.35 | 11.48 |
| 30-35 mm | 1.17 | 10.5 | 12.73 |
| 35-40 mm | 1.11 | 11.78 | 16.11 |
| 40-45 mm | 1.1 | 13.31 | 19.14 |
| 45-50 mm | 1.56 | 15.55 | 19.58 |
| >50 mm | 2.14 | 18.71 | 16.09 |
| Seed spacing: | | | |
| 15 cm | 1.47 | 13.26 | 14.58 |
| 20 cm | 1.07 | 10.96 | 15.61 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Seed size | ***(0.31) | ***(1.62) | ***(2.87) |
| Seed spacing | *(0.26) | **(1.37) | ns |
| Seed size x spacing | ns | ns | ns |
| CV (%) | 24 | 13.3 | 18.8 |

*,**, ***, and ns indicate significance at P<0.05, 0.01, 0.001 levels of probability and not significant respectively. Values within parentheses is LSD estimate at 5.0% significance.

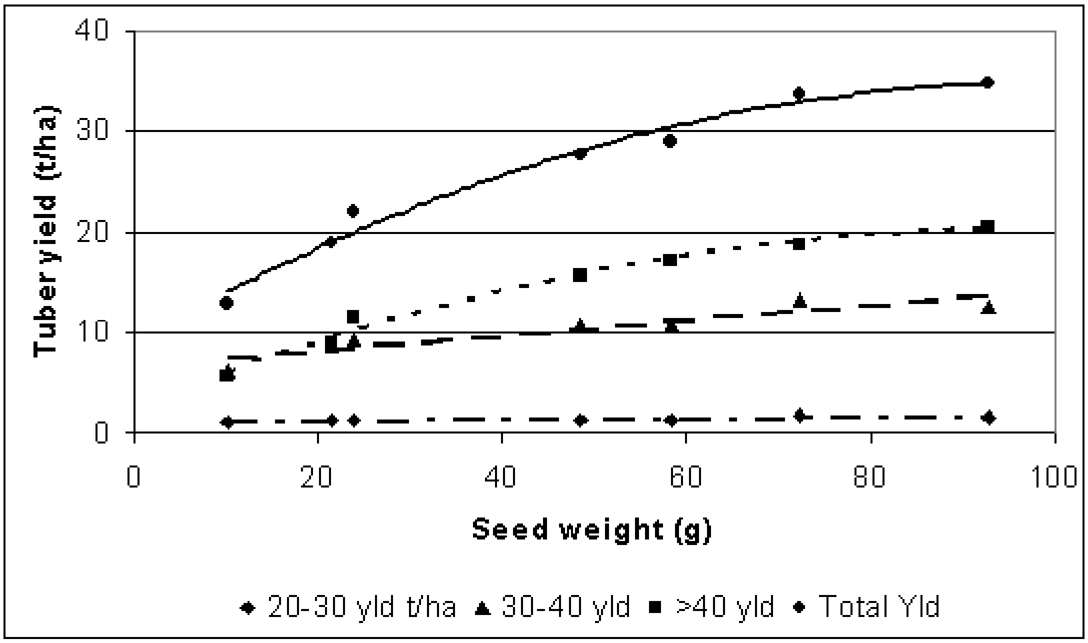



Figure 6. Tuber yields of different size grades in response to seed-tuber size for Piccolo potato.

Regression:

20-30 mm grade yield = 1.18 - 0.0223 s + 000412 $s^2$ ($R^2$ = 75.4%)

30-40 mm grade yield = 5.71 + 0.145 s ($r^2$ = 90.1%)

>40 mm grade yield = 6.92 + 0.338 s - 00259 $s^2$ ($R^2$ = 79.5%)

Total yield = 16.5 + 0.272 s ($r^2$ = 94.9%)

| Table 60. Effects of timing of top-dress nitrogen and the harvest interval after flailing for Baby Boomer potato grown under irrigation. | | | |
|---|---|---|---|
| Treatment | Tuber yield (t/ha) | | |
| | 20-30 mm | 30-40 mm | >40 mm |
| Top-dress nitrogen timing (100 kg N/ha): | | | |
| All basal | 2.29 | 8.76 | 4.44 |
| All @ first hilling | 2.1 | 8.78 | 4.05 |
| 1/2 @ first hill.+1/2 @ second hill. | 2.41 | 9.18 | 4.55 |
| All @ second hilling | 2.16 | 8.51 | 4.12 |
| Post-flailing harvest interval: | | | |
| Immediately after flailing | 2.04 | 8.13 | 3.78 |
| One week after flailing | 2.27 | 8.95 | 4.84 |
| Two weeks after flailing | 2.41 | 9.36 | 4.23 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Nitrogen | ns | ns | ns |
| Harvest | ns | ns | ns |
| Nitrogen x Harvest | ns | ns | ns |
| CV (%) | 12.2 | 10.5 | 27.4 |
| ns indicates non-significant treatment effects. | | | |

| Table 61. Effects of timing of top-dress nitrogen and the harvest interval after flailing for HO-2000 potato grown under irrigation. | | | |
|---|---|---|---|
| Treatment | Tuber yield (t/ha) | | |
| | 20-30 mm | 30-40 mm | >40 mm |
| Top-dress nitrogen timing (100 kg N/ha): | | | |
| All basal | 0.88 | 7.35 | 8.42 |
| All @ first hilling | 0.93 | 7.24 | 9.16 |
| 1/2 @ first hill.+1/2 @ second hill. | 0.87 | 7.96 | 8.8 |
| All @ second hilling | 0.94 | 7.76 | 8.82 |
| Post-flailing harvest interval: | | | |
| Immediately after flailing | 0.8 | 6.52 | 6.21 |
| One week after flailing | 0.93 | 7.62 | 9.98 |
| Two weeks after flailing | 1.02 | 8.6 | 10.2 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Nitrogen | ns | ns | ns |
| Harvest | ns | **(0.91) | *(1.86) |
| Nitrogen x Harvest | ns | ns | ns |
| CV (%) | 25.7 | 13.9 | 24.4 |

*, **, and ns indicate significance at P<0.05, 0.01 levels of probability and not significant respectively. Values within parentheses are LSD estimates at 5.0% significance.

| Table 62. Effects of timing of top-dress nitrogen and the harvest interval after flailing for Piccolo potato grown under irrigation. | | | |
|---|---|---|---|
| Treatment | Tuber yield (t/ha) | | |
| | 20-30 mm | 30-40 mm | >40 mm |
| Top-dress nitrogen timing (100 kg N/ha): | | | |
| All basal | 1.4 | 11.14 | 10.05 |
| All @ first hilling | 1.42 | 11.45 | 11.42 |
| 1/2 @ first hill+1/2 @ second hill | 1.39 | 11.44 | 11.87 |
| All @ second hilling | 1.24 | 10.51 | 11.57 |
| Post-flailing harvest interval: | | | |
| Immediately after flailing | 1.28 | 9.49 | 9.66 |
| One week after flailing: | 1.19 | 11.06 | 12.4 |
| Two weeks after flailing | 1.61 | 12.85 | 11.62 |
| Analyses of Variance | | | |
| **Source:** | | | |
| Nitrogen | ns | ns | ns |
| Harvest | ns | *(1.13) | ns |
| Nitrogen x Harvest | ns | ns | ns |
| CV (%) | 25.6 | 11.7 | 17.6 |
| * and ns indicate significance at P<0.05 level of probability and not significant respectively. Value within parenthesis is LSD estimate at 5.0% significance. | | | |

# Medicinal Plants

*Lead: Dr. Jazeem Wahab; Co-lead: Greg Larson, CSIDC*

Increasing health care costs, and individuals taking more responsibility for their own health, has lead consumers to seek alternate approaches to treat and prevent diseases. Consequently, natural products (nutraceuticals, functional foods, and dermaceuticals) represent one of the most rapidly expanding industries in the developed countries. To meet the demand of this growing industry, the medicinal and aromatic plant production and processing sectors are growing fast in Saskatchewan. Effective agronomic practices are essential to consistently produce superior yields of high quality herbs. Agronomic research for commercially important herbs were carried out at the Canada-Saskatchewan Irrigation Diversification Centre in Outlook. The focus of CSIDC's herb research includes:

- Evaluation of the adaptability of promising medicinal and culinary herbs for Saskatchewan conditions.
- Development of management practices for mechanized commercial production.
- Development of labour saving agronomic practices.
- Comparison of dryland and irrigated production in relation to yield and quality.
- Assessment of the feasibility of direct seeding and transplanting under dryland and irrigated conditions.
- Determination of stage and method of harvesting practices (primary processing) to increase recovery and to maintain quality.

## St. John's Wort

St. John's Wort is a perennial. Flowering tops are harvested for commercial use as the flowers and leaves are found to contain higher levels of hypericin. Success and sustainability of herb production depends on producing a high quality crop consistently and economically. The issues include mechanization to reduce labour cost, agronomics to maximize yield and improve quality as well as to minimize winter-kill. Plant growth characteristics and harvest height can affect yield and quality. Plant growth and flowering habit can be a function of many factors including genotype, population density, winter survival, and growing conditions. This project is designed to develop cost-effective agronomic practices for commercial scale production of St. John's Wort in Saskatchewan. Emphasis is placed on reducing manual labour through mechanization while maximizing yield and improving quality.

The crops were established in 2002 and 2003. The incidence of winter-kill increased progressively over the years. The winter-kill incidence was more severe under dryland than under irrigation. In 2006, all the dryland St. John's Wort trials were abandoned due winter-kill, weak growth, and poor productivity.

## Effect of Nitrogen Application and Straw Mulching on Winter-kill and Productivity for St. John's Wort Biotypes Grown Under Irrigation and Dryland

Proper fertility management is an important criteria for successful crop production. Different crops/cultivars respond differently to the type (e.g. nitrogen, phosphorus, potassium), amount, and timing (crop stage) of fertilizer and this can be influenced by soil, climate, and growing conditions under which the crop is produced. There is no information on fertility management for commercial production of St. John's Wort in Saskatchewan or in Canada. This study examines the response of nitrogen application on the incidence of winter-kill and herb yield for St. John's Wort (Topas, Helos, Elixir, New Stem, and Standard).

Treatments included three nitrogen rates (0, 100 and, 200 kg N/ha) and two mulching treatments (straw mulch and no mulch). Separate irrigated and dryland trials were conducted for biotypes Topas, Helos, Elixir, New Stem, and Standard. The crop was established in 2003 and harvested during the summer of 2004, 2005, and 2006.

The entire dryland crop and irrigated Standard and New Stem crops suffered severe winter-kill, consequently they were abandoned.

The effects of mulching and nitrogen application on dry herb yields for Elixir, Topas, and Helos are summarized in Table 63. On average, Elixir, Topas, and Helos produced 9.1, 8.6, 8.7 t/ha dry herb yield. Mulching and nitrogen application had no effect on herb yields of Elixir, Topas, or Helos.

## Effect of Straw Mulch, Harvest Height and Cutting Frequency on Dry Herb Yield for St. John's Wort Biotypes Grown Under Irrigation and Dryland

St. John's Wort is a perennial. Flowering tops are harvested for commercial use as the flowers and leaves are found to contain higher levels of hypericin. Plant growth characteristics and harvest height can affect yield and quality. Plant growth and flowering habit can be a function of many factors including genotype, population density, winter kill, and growing conditions. This study examines the effects of mulching, harvest height, and harvest frequency on dry herb yield for St. John's Wort biotypes grown under irrigation and dryland.

In this study, St. John's Wort biotypes Topas, Helos, Elixir, New Stem and Standard were examined under irrigated and dryland production. Treatments included two cutting heights (top-1/3, top-2/3), two cutting frequencies (one cut, two cuts), and two mulching treatments (no mulch, straw mulch). Test plots were established in 2003.

The dryland crop suffered severe winter-kill and was abandoned. Only one cut was taken during this growing season. The hail storm experience on August 23rd, 2006 severely damaged the regrowth from the first cut.

Dry herb yields for the different St. John' Wort cultivars averaged between 10 and 11 t/ha (Table 64).

Lower cutting height, i.e. Top 2/3 produced significantly higher yield than the higher cutting height, i.e. Top 1/2 (Table 64).

Mulching had no effect on herb yields for the various cultivars (Table 64).

## Milk Thistle Agronomy

Milk thistle (*Silybum marianum*) has been used since Greco-Roman times as a herbal remedy for a variety of ailments, particularly liver problems. It is believed that active ingredients in milk thistle (silymarin) protects the liver from damage caused by viruses, toxins, alcohol, etc.

Milk thistle is native to the Mediterranean, but is now widespread throughout the world. This stout thistle usually grows in dry, sunny areas. The stem branches at the top, and reaches a height of about 1.5 m to 4 m. The leaves are spiny and wide, with white blotches or veins. The flowers are red-purple. The small, hard-skinned seed is brown, spotted, and shiny. Milk thistle is an easy to grow annual plant. It has an indeterminate growth and flowering habit, resulting in uneven development and maturity of flower heads.

Saskatchewan's relatively short growing season combined with uneven maturity of milk thistle is a major challenge for production and particularly once-over machine harvesting. The crop has to be desiccated to facilitate mechanical harvest. Reglone can be used successfully to desiccate milk thistle. However, the demand for organic milk thistle necessitates organic desiccants for top-kill milk thistle.

Some promising milk thistle selections with early and concentrated maturity have been identified at the Department of Plant Sciences, University of Saskatchewan. This project was designed to field test these new milk thistle selections and develop basic agronomic practices for Saskatchewan growing conditions.

This study evaluated four new milk thistle lines from the University of Saskatchewan in comparison to Richter's line. Six seeding rates (25, 50, 75,100,125, 150 seeds/$m^2$) and two row spacings (20 and 60 cm) were evaluated for the various lines.

The hail incidence on August 23rd, 2006 completely damaged the field trials that resulted in complete crop loss.

| Table 63. Effects of mulching and nitrogen application on herbage yield for St. John's Wort biotypes under irrigated production: 2003 planting and 2006 harvest. | | | |
|---|---|---|---|
| Treatment | Dry herb yield (t/ha) | | |
| | Elixir | Topas | Helos |
| Mulching: | | | |
| No mulch | 9.4 | 8.3 | 8.1 |
| Straw mulch | 8.7 | 8.9 | 9.2 |
| Nitrogen rate (kg N/ha): | | | |
| 0 | 8.9 | 8.8 | 9.7 |
| 100 | 9.5 | 9.4 | 8.4 |
| 200 | 8.8 | 7.5 | 7.9 |
| Analyses of Variance | | | |
| Source: | | | |
| Mulch | ns | ns | ns |
| Nitrogen | ns | ns | ns |
| Mulch x Nitrogen | ns | ns | ns |
| CV (%) | 21.8 | 29.3 | 27.1 |
| ns indicates non-significant treatment effects. | | | |

Table 64. Effects of cutting height and mulching on herbage yield for St. John's Wort cultivars grown under irrigation: 2003 planting and 2006 harvest.

| Treatment | Dry herb yield (t/ha) | | | | |
|---|---|---|---|---|---|
| | Topas | Helos | Elixir | New Stem | Standard |
| Cutting height: | | | | | |
| Top-1/3 | 9 | 10.5 | 10 | 9.9 | 8.5 |
| Top-2/3 | 12.1 | 13.1 | 12.5 | 12.4 | 11.1 |
| Mulching: | | | | | |
| No mulch | 10.5 | 11.4 | 10.9 | 10.6 | 9.4 |
| Straw mulch | 10.6 | 12.2 | 11.6 | 11.7 | 10.2 |
| Analyses of Variance | | | | | |
| Source: | | | | | |
| Cutting height | *** | *** | ** | ** | *** |
| Mulching | ns | ns | ns | ns | ns |
| Cutting height x Mulching | ns | ns | ns | ns | ** |
| CV (%) | 19.5 | 21.1 | 22.6 | 18.9 | 15.1 |

**, *** and ns indicate significance at P<0.01, 0.001 levels of probability and not significant respectively.

# Commercialization of Strawberry Crown Production

*Co-investigators: Dr. Jazeem Wahab and Greg Larson, CSIDC;*
*Clint Ringdal and John Linsley, ICDC;*
*Dr. Karen Tanino and Dr. Jill Thompson, U of S;*
*Dr. Gary Storey and James Lokken, private consultants*

Recent market studies have shown that strawberry crown production is a promising horticultural industry for Saskatchewan. It is reported that the phenomenon of 'Northern Vigour' , similar to that with potato, could exist with strawberry crowns.

This project is an attempt to commercialize strawberry crown production by combining resources of:
- strawberry crown agronomic and economic research and Agri-ARM demonstration experience conducted by the University of Saskatchewan;
- the production experience, regulatory knowledge and market contacts in the Florida and California strawberry fruit industries developed by the operators of a Saskatchewan commercial venture in 2000; and
- a group of interested and capable producers brought together in the winter of 2005/2006 to consider commercial viability and initiate commercial production in Saskatchewan.

In spring 2006, 2/3 acre of three strawberry cultivars (Camarosa, Treasure and Festival) were planted at CSIDC. The plants were raised under irrigation using a linear irrigation system capable of applying low volumes more frequently. This is essential to maintain favorable moisture status on the soil surface to help rooting and runner establishment. The plants were raised without using any chemical weed control measure as demanded by the USA target markets. Arrangements were made with industry-leading Florida and California growers to test these plants at commercial field scale and compare them with plants from other nurseries.

'Moss' a mustard based fumigant was evaluated in half the field.

Untimely hail on August 23$^{rd}$, 2006 caused severe damage to the plants. This necessitated revision of plans for 2007. A small number of healthy plants were sent to Florida and California for evaluation on a research scale. No plants were shipped for commercial production.

In the fall of 2006, strawberry crowns of the same three cultivars were planted for multiplication targeted for commercial evaluation in the USA. Fall planting is likely to produce more crowns than spring planting under the relatively short growing season in Saskatchewan. However, the acceptance of crowns produced from fall-planting have to be tested in the Florida and California markets.

Both the spring (unharvested) and fall planted crowns were covered with straw for winter protection.

It is our goal to capture market opportunities through advanced research of strawberry crowns. The purpose of the project is to supply high quality Saskatchewan crowns to selected commercial fruit producers in Florida and California for comparison with local crowns. Demonstrating superior traits of 'Northern Vigour' for Saskatchewan grown strawberry crowns can be a strong marketing tool.

# Environment

# WATER

## National Agri-Environmental Health Analysis & Reporting Program (NAHARP)

*Lead: Laurie Tollefson, CSIDC*
*Co-leads: Gail Dyck and John Harrington, CSIDC*

Agriculture and Agri-Food Canada has developed a set of agri-environmental indicators (AEIs) specific to the agriculture and agri-food sector in order to: a) assess how well agriculture and agri-food systems manage and conserve natural resources, and b) how compatible they are with the natural systems and processes of the broader environment. These AEIs are a practical means of assessing environmental sustainability by combining current scientific knowledge and understanding with available information on resources and agricultural practices. The intent is to provide an objective, science-based assessment of the overall environmental sustainability of agriculture. Three fundamental questions the indicators attempt to answer are:

1. To what extent do farmers and food processors use environmentally sound management practices?

2. How are environmental conditions and trends within agriculture changing over time?

3. What areas and resources remain at significant environmental risk?

The first set of AEI results was published in 2000 covering a 15-year period (1981-1996). Building on this initial work, and in light of current and future needs for this kind of information, AAFC established NAHARP to strengthen its capacity to develop AEIs and tools to integrate them with policy development.

Development of an indicator focusing on irrigation water use efficiency began in 2003. The agriculture sector faces increasing competition from other water users for water resources. The greatest use of agricultural water is for irrigation. The indicator being developed quantifies the use of freshwater resources for irrigation and to assess the efficiency of this practice. The Water Use Efficiency Indicator for Irrigation is comprised of three sub-indicators: Water Use Intensity, Water Use Technical Efficiency and Water Use Economic Efficiency. These are defined as:

*Water Use Technical Efficiency (WUTE):*

The mass of agricultural production per unit volume of water diverted and extracted for irrigation, in units of $kg/m^3$;

*Water Use Economic Efficiency (WUEE):*

The value of agricultural production per unit volume of water diverted and extracted for irrigation, in units of $\$/m^3$; and *Water Use Intensity (WUI):*

The annual abstraction for irrigation relative to renewable fresh water resources, given as a percentage.

A preliminary step in the indicator proposal was an examination of data availability, specifically for the pilot project on the South Saskatchewan River Irrigation District (SSRID). This was undertaken during 2005. For comparison, calculations were also made with data from other jurisdictions in Saskatchewan, Manitoba, and Alberta.

During 2006 irrigation data was collected from the three largest irrigation districts surrounding Lake Diefenbaker, including SSRID, Riverhurst and Luck Lake. A consultant was hired to conduct a crop survey of these districts. Irrigation data, including crop yields, irrigation water volumes, and irrigated acres were collected from CSIDC and from the irrigation centres located in Carberry, Manitoba and Lethbridge, Alberta.

## Solar Pivot

*Co-Investigators: Evan Derdall, M.Sc. graduate student, and*
*Terrance A. Fonstad, Ph.D., University of Saskatchewan, Dept. of Ag. Bio. Engineering*

The introduction of solar-powered irrigation systems in recent years has opened the door for the irrigation of land located near a viable water source, but lacking single- or three-phase power system to operate. In cases of electrical isolation, combustion generators are utilized as the alternative source of power. Rising petroleum prices and concerns about the environment make solar-powered irrigation systems an attractive alternative. Solar-powered irrigation systems are relatively new in the irrigation industry of Canada. Best Management Practices were developed to aid producers adequately utilize this technology.

During the 2005 growing season two irrigation management practices were developed for cabbage production utilizing a two-tower Greenfield solar-powered miniature pivot, located at the CSIDC, which irrigates 1.5 hectares. The management practices included a low-flow, 94 litres per minutes (LPM) schedule with irrigation events occurring in the evening and night periods, and a high-flow, 370 LPM schedule with irrigation events occurring during daytime hours. In each management practice the soil moisture content was maintained above 65% of field capacity, optimal as defined by Saskatchewan Agriculture and Food (2005).

Over the 2006 growing season, testing was conducted to evaluate the performance of each management practice; performance was dependent upon application uniformity, water use efficiency and energy use efficiency. Water use efficiency, for this project, was defined as the produced marketable weight of cabbage per unit depth of water consumed or lost from the crop system, in units of kg/m, while energy use efficiency was identified as the produced marketable weight of cabbage per unit of energy used by the pivot and pumping system, in units of kg/kJ. In addition to performance evaluation, tests were conducted to determine operational characteristics of this relatively new irrigation technology to identify potential use for agricultural production in Canada.

**Results**
The uniformity coefficient varied considerably; with a high-flow management practice value of 77.0% compared to the low-flow management practice value of 58.6%. A uniformity coefficient value of 100% refers to a system that will apply an equal depth of water along the length of the center pivot system with each application; values below 100% will have a noticeable variation in depth along the length of the system. This difference in observed uniformity was a result of nozzle selection and layout of each application system, determined by the manufacturer. The availability of nozzles creates problems for low flow systems, at decreased flow rates nozzle availability is constrained creating problems associated with meeting required application rates; this constraint on nozzle availability is required as the reduction in nozzle orifice diameter may result in the increased occurrence of nozzles plugging with debris.

Water use efficiency, which is a primary environmental concern as water sources are becoming increasingly monitored, increased significantly when converting from a high-flow management practice to a low-flow management practice, with average observed values of 5.6 kg/m and 6.8 kg/m respectively (Figure 7). This variation is a result of elevated water loss due to increased ponding and misting observed during high-flow system operation. This water loss is not beneficial to plant growth and results in higher operating costs with little to no improvement in production.

Energy use efficiency, due to differences in water use efficiency and friction loss in the piping system, also increased from 0.31 kg/kJ for a high-flow management practice to 0.42 kg/kJ for the low-flow management practice (Figure 8). Although the primary reasoning for this difference is a result of increased pumping volumes to compensate for the decrease in water use efficiency, increased energy requirements as a result of increased friction loss at higher flow rates was also a contributing factor. In general, converting this type of system from a high-flow management practice to a low-flow management practice will help conserve water and energy resulting in savings in operating and capital costs.

Testing to determine the operating characteristics of the pivot and power systems was completed during the 2006 growing season. It was concluded that these systems have potential use on high-value crops. As consumer awareness shifts toward environmentally friendly products, investigation into determining if consumers would pay a premium for high-value crops produced with ‘green’ power should be the next step. Although these systems currently have a high associated capital costs, escalating petroleum prices and panel efficiency increases could make these systems economical in a broader range of applications in the near future.

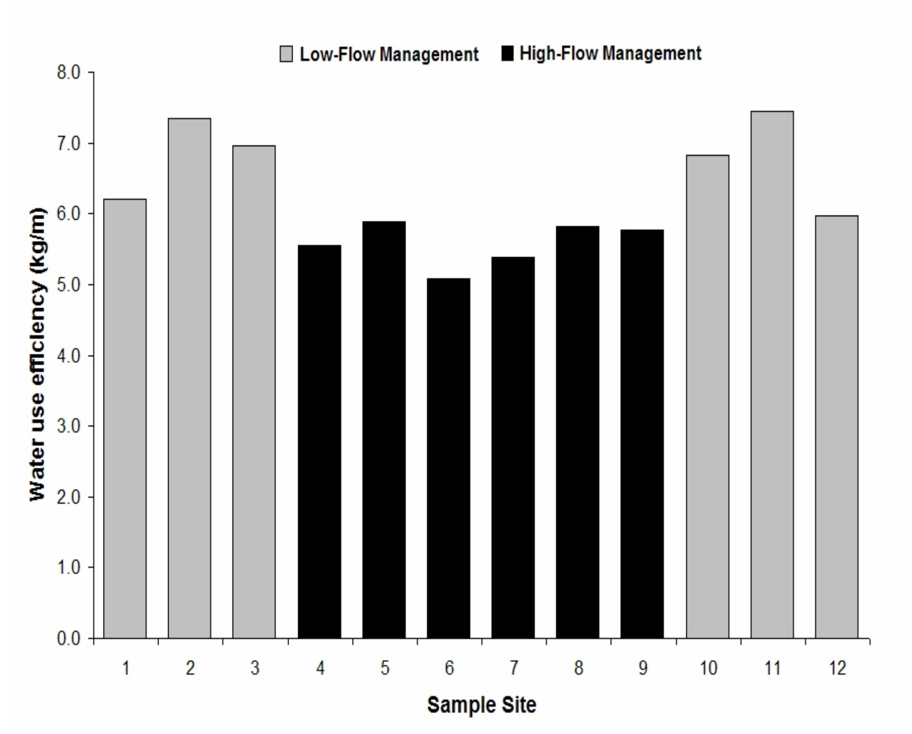



Figure 7. Water Use Efficiency of Irrigation Management Practices for Cabbage Production, CSIDC 2006

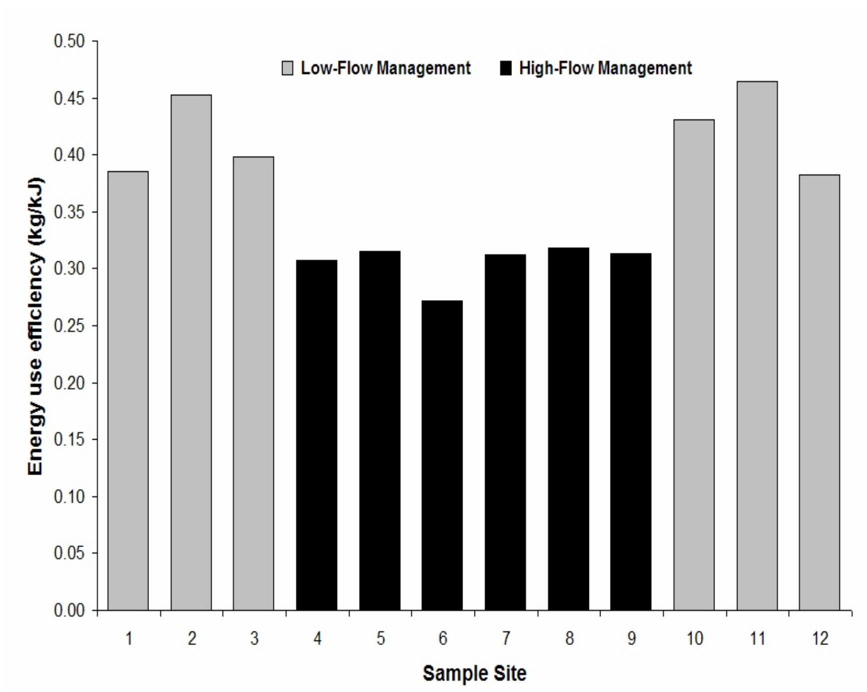



Figure 8. Energy Use Efficiency of Irrigation Management Practices for Cabbage Production, CSIDC, 2006

# SOIL

## The Long-term Effects of Subsurface Drainage on Soil Salinity

*Co-investigators: Jacques Millette, CSIDC and*
*Garth Weiterman, SAF, Irrigation Development Branch*

Irrigation in Saskatchewan has played an important role in diversifying and stabilizing crop production and will continue to do so. However, poor water management can lead to or exacerbate soil salinity and waterlogging problems in certain types of soils. In 1986, following a detailed study of a 9 ha field (hereafter referred to as Field 11), subsurface drainage was installed to reclaim the high soil saline area at CSIDC. Leaching of the field started in the fall of 1988. Initially, it had not been possible to crop this field because of high soil salinity. Since 1986, changes in soil salinity were monitored using an EM38 conductivity meter on a 15-m grid and also using selected detailed soil samples collected at permanently located benchmark sites.

In the fall of 2006, soil salinity was monitored again with an EM38 meter and soil samples collected at the benchmark sites in Field 11 (the same locations as in 1986). The last detailed monitoring was conducted in1997 and leaching of Field 11 ceased in 1995. At that time, it was discovered that the soil salinity remained low (ECe <2 dS/m) and continued to decrease between 1995 and 1997. The first objective of this investigation was to determine whether the soil salinity conditions in Field 11 had changed over the past nine years (1997 – 2006) because this area is being used for crop testing. The second objective was to calibrate the EM38 vertical and horizontal measurements with actual soil testing results and to use the relationship to map the soil salinity of the whole farm. Preliminary results from the 2006 monitoring showed that the EM38 measurements in the horizontal direction (0.0 - 0.5m soil depth) and the actual soil salinity test values were not correlated ($r^2$=0.08). However, in the vertical direction (0.0 -1.5 m) the correlation was significant with an $r^2$= 0.35. The EM38 values can thus be converted to ECe using the developed regression equation and then a soil salinity contour map for the whole farm can be produced. A further analysis was done on fifteen sites for each layer of the soil profile to compare the 2006 values to the values in 1997. A significant decrease in soil salinity occurred between 1997 and 2006 in the 0.0 - 0.3 m layer, no change in the layers 0.3 to 0.6 m and 0.6 -0.9 m and an increase in soil salinity in the 0.9 - 1.2 m layer. It would appear that the salinity has moved down the soil profile during the past nine years due to irrigation. The results of this monitoring can determine whether this field is suitable for cropping experiments and whether leaching of the soil profile should continue to keep the salinity level under control.

# Quantification of Soil Erosion Associated with Irrigated Land Management and Texture

*Leads: Murray Lewis, PFRA Lethbridge and Kimberly Phipps, PFRA, Saskatoon*
*Co-leads: Jacques Millette and Barry Vestre, CSIDC*

Soil erosion is often thought to be an issue of the past as the frequency of severe wind erosion events is low and production technologies have advanced. Recent erosion events of 1989, 2001 and 2002 are reminders that given the right conditions many soils are still at risk to wind erosion. Some producers face a greater soil conservation challenge in irrigation districts due to a combination of factors such as low residue crop rotations, late harvest timing, associated tillage practices and soil texture.

A range of practical and cost effective Beneficial Management Practices (BMPs) need to be evaluated so we can better understand their effectiveness and appropriate application for irrigated production systems. It has been difficult to evaluate the performance of current land management practices in recent years as little wind erosion monitoring has taken place. In addition, many innovative producers are actively developing their own erosion BMPs to manage soil health and wind erosion risks. The PFRA/CSIDC Erosion Monitoring Project provides a unique opportunity to quantify and validate various land management practices at field scale.

In 2004/05 PFRA and CSIDC initiated a pilot project to assess the erosion potential for land located within the South Saskatchewan River Irrigation District (SSRID) located near Outlook. As a result of the pilot project findings and producer interest, a second year of erosion monitoring was implemented for fall of 2006 to spring 2007.

| 2004/05 Monitored Fields: | Texture: |
|---|---|
| Field 1: Potato Field with rows running East/West | Silt Loam |
| Field 2: Bean Field with rows running North/South | Silt Loam |
| Field 3: Potato Field with fall rye cover crop | Silt Loam-Loam |
| Field 4: Potato Field cultivated East/West | Silt Loam-Loam |
| Field 5: Potato Field with rows running East/West | Loamy Sand |

| 2006/07 Monitored Fields: | Texture: |
|---|---|
| Field 1: Potato Field, Cultivated & Packed, P/C/C* | Loam |
| Field 2: Potato Field with Forage in rotation | Sandy Loam |
| Field 3: Potato Field with Forage in rotation | Loamy Sand |
| Field 4: Potato Field, P/C/C* | Silt Loam |
| Field 5: Potato Field, Cultivated & Packed, P/C/C* | Silt Loam |

* *P/C/C = Potato/Canola/Cereal Rotation*

**Data Collection**

1) Dry Aggregate Stability, 2) Surface Texture, 3) % Residue Cover, 4) Dust Collection, 5) Weather Data

With continued local support, PFRA and CSIDC plan to continue monitoring fields within the SSRID as part of a multi-year project.

**Related Research**
A second erosion project has been initiated in the Bow Island area of Alberta (PFRA in partnership with Alberta Agriculture). Moderate winter temperatures, high winds and the freeze/thaw action of Chinooks put much of Southern Alberta at high risk of wind erosion on a yearly basis. As a result of the challenging climatic conditions in Southern Alberta producers are currently implementing various erosion protection measures. Although climatic conditions are not directly comparable between the Outlook area and Southern Alberta there is an additional opportunity for producers to share information between regions.

# ICDC Activities

# Objectives and Purpose

## The Irrigation Act, 1996

The objectives and purpose of the Irrigation Crop Diversification Corporation (ICDC) are the following:

1. to research and demonstrate to producers and irrigation districts profitable agronomic practices for irrigated crops;

2. to develop or assist in developing varieties of crops suitable for irrigated conditions;

3. 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;

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

## Vision

Through innovation, ICDC stimulates and services the development and expansion of sustainable irrigation in Saskatchewan.

**Objective 1:** Strengthen the linkages in profitability and risk between production capacity, processing and market opportunities.

**Objective 2:** Enhance the production of profitable, sustainable irrigation based crop and livestock products.

**Objective 3:** Create a public awareness of the economic, social and environmental returns to investment in irrigation.

# Strengthen Linkages

## Prairie Irrigated Crop Diversification Group

Irrigation has many common interests in the three Prairie provinces. Research and demonstration (R&D) resources are limited and collaboration between provinces will help to avoid duplication of studies.

ICDC has been instrumental in keeping the Prairie Irrigated Crop Diversification Group (PICDG) active. A new Memorandum of Understanding (MOU) was signed in 2005. Parties to this MOU are:

- The Canada-Manitoba Crop Diversification Centre
- The Canada-Saskatchewan Irrigation Diversification Centre
- The Canada-Alberta Crop Development Initiative and the Crop Diversification Centre South

The purpose of the MOU is to assist the irrigation industry across the prairies to address economic and environmental issues through:

- the sharing of information on research and development initiatives
- the identification and development of joint projects
- the exploration of joint funding opportunities
- the enhancement of joint visibility through a shared communications plan
- the provision of a mechanism for addressing operational issues that impact on cooperation
- the coordination of prairie-wide conferences, seminars and workshops

ICDC, CSIDC and SAF contribute to this sharing of information through their respective websites. You will find access to irrigation information from all three prairie provinces on ICDC's website www.irrigationsaskatchewan.com and one of the priority items for this group is to make sure that all irrigation-relevant information is made accessible. This is an on-going technology transfer effort.

Some PICDG priorities for the near future include:

- Continuing the existing inter-provincial projects
- More closely linking irrigators and their field support staff to market analysts and trade representatives to more efficiently explore market opportunities and ensuring that the relevant information is readily available to prospective processors.

## Strawberry Crowns

The concept of Northern Vigor™ that made Saskatchewan a leading seed potato producer in North America has proven to be true with strawberry crowns (nursery plants). Strawberry crowns produced in Saskatchewan outperformed Californian stock in commercial fields in California. ICDC, AgriARM, CSIDC, the University of Saskatchewan and two consultants, who have grown and marketed the product, have joined hands in a project aimed at commercializing the production of strawberry crowns under irrigation in Saskatchewan. This project takes advantage of the concept of Northern Vigor™ and favorable soil, water, and climatic conditions in Saskatchewan. ICDC wanted to find out if strawberry crown production is a profitable, new market opportunity for irrigators and, if so, to facilitate its commercialization. For further details on this project, please read the Horticultural section of this annual review.

## ICDC Industry Co-chair

ICDC has brought the irrigators voice to the Executive Management Committee of CSIDC, a Federal, Provincial, Industry partnership since 1998. CSIDC operates a world class irrigation R&D facility at Outlook and ICDC is part of it.

The partnership is at a critical point in its history as the 1998 Canada Saskatchewan Industry Agreement on Irrigation Development and Crop Diversification is nearing the end of its ten-year term. A new agreement has been drafted and is in the process of review by the partners.

ICDC is a major contributor to the R&D work at CSIDC notably in:

- the development of the *Crop Varieties for Irrigation* publication
- corn production and variety testing in partnership with the Alberta Corn Committee
- timothy varieties in collaboration with Dr. Bruce Coulman
- strawberry crown commercialization in collaboration with the U of S and marketing consultants
- Field Day organization.

CSIDC offers ICDC a facility and proven staff expertise to carry out irrigation R&D work. A CSIDC publications committee is working on the development of farmer-friendly fact sheets for posting on the websites with relevant recommendations from the research work.

ICDC is administering nine Research Support Agreements for work at CSIDC in 2006.

Most significant to this year's achievements was the adoption of ProGrid® Evaluation Solutions as a method of prioritizing work at CSIDC. Implementation of this system is underway in the winter of 2006/07. ICDC is committed to using this system to prioritize its R&D program (within the ICDC Strategic Plan) as part of the CSIDC partnership.

## Investment Attraction

The opportunity for irrigation expansion exists in Saskatchewan with underutilized infrastructure (i.e. the Gardiner Dam), untapped water and adjacent irrigable land, and an aging generation of farmers looking to retire in the next ten years. Furthermore, ICDC understands that irrigation water on the North American continent is depleting and pumping costs are becoming more expensive, in the case of groundwater; water is being bid away from agriculture by urban and environmental interests in the case of both ground and surface water. The opportunity to attract investment and immigration to new irrigated areas with reliable and relatively inexpensive land and water is increasing.

SAF has been involved in immigration attraction to the hog and dairy industry and to farming in Saskatchewan through the Saskatchewan Immigrant Nominee Program. ICDC has been able to add irrigation to the province's immigration attraction portfolio. Real estate companies and consultants are active in immigration attraction to Saskatchewan. The Last Cattle Frontier initiative in the Yorkton area has targeted immigration from Alberta. See www.lastcattlefrontier.com.

ICDC is working with SAF, the Saskatchewan Immigrant Nominee Program and with Mid Sask REDA around Lake Diefenbaker to align its resources for investment attraction and immigration. SIPA's and ICDC's website www.irrigationsaskatchewan.com is being upgraded and redesigned to provide the information required by prospective investors and immigrants. The website now includes irrigated land listings among other upgrades. Discussions are held regularly with prospective immigrants and with immigrant agencies.

The Mid Sask REDA is working on the development of a Lake Diefenbaker regional plan, its WaterWolf project (http://www.waterwolf.org/) including a GIS database of resources and opportunities around tourism, irrigation, subdivisions and others. SAF's Irrigation Development Branch participates in this initiative.

Since 2000 approximately 5% of the irrigated land around Lake Diefenbaker has been purchased by people moving from Alberta. This trend will continue and grow if irrigation "infill" and expansion plans currently being studied under The Canada-Saskatchewan Water Supply Expansion Program (CSWSEP) are implemented. Five CSWSEP studies are underway, including:

- Westside Irrigation Project
- Qu'Appelle South Irrigation Project
- South Saskatchewan River Irrigation District
- Luck Lake Irrigation District
- Riverhurst Irrigation District

ICDC and SIPA irrigators participated in federal consultations on February 8th in Outlook. The Brace Centre for Water Resources Management from McGill University organized and facilitated the workshop for PFRA. Phase I in 2005 of the project identified constraints to sustainable irrigation. Phase II consisted of eight workshops across Canada to validate these constraints and identify potential roles for governments, producers and other industry partners to address these constraints. Top constraints discussed were:

- inadequate infrastructure to create a critical mass of irrigators (water, roads, three phase power, transportation, community infrastructure, etc.)
- low current farm-level economic returns from many irrigated production alternatives
- shortage of available investment capital at reasonable interest rates
- others including: limited market development and value-added opportunities; apparent inconsistency in the commitment of federal and provincial governments to a long-term integrated irrigation water strategy for Saskatchewan; shortages of labor skilled in irrigated agriculture; barriers to entry and expansion for producers.

Workshop results showed considerable variation across Canada. The report will assist PFRA to develop an irrigation-based economic development partnership strategy for Canada.

## Irrigation Economics and Agronomics Saskatchewan

In order to strengthen the linkages in profitability and risk between production capacity, processing and marketing opportunities, the costs of production and probable returns to labour and management must be known. Each year ICDC updates its irrigated crop budget guidelines. They are used by irrigation farmers for crop planning and by economists for irrigation economic studies.

Six cereal crops, five oilseeds, six pulses, eleven forages and two potato budgets are included in the publication. The budgets are posted on the website www.irrigationsaskatchewan.com.

# Enhance Production

## Irrigation Scheduling with your Computer (IMCIN)

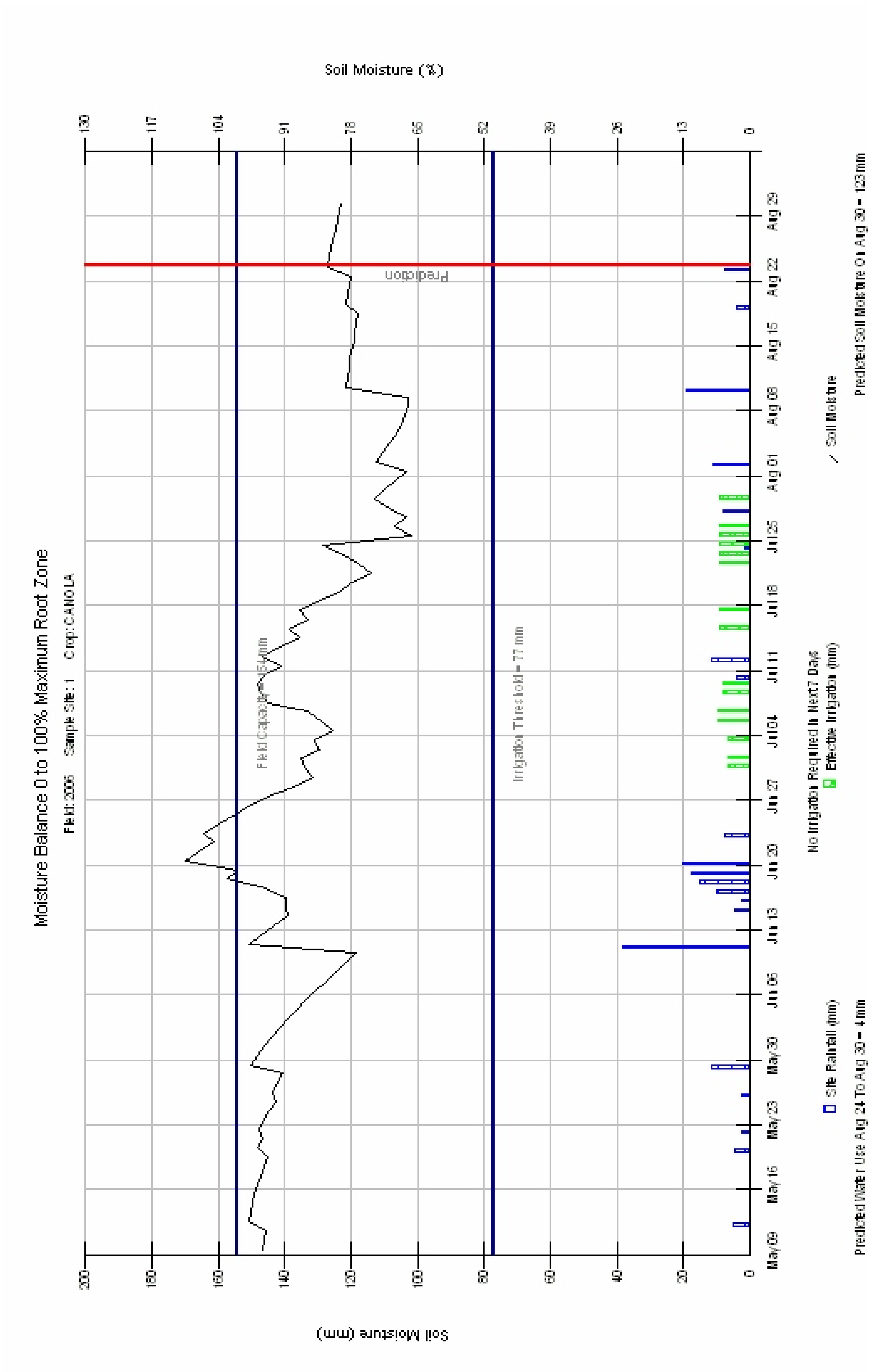
*Co-investigators: Garth Weiterman, Irrigation Development Branch, SAF, and Terry Hogg, CSIDC*

ICDC worked 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 meteorological station data to assist with irrigation scheduling. The meteorological (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 initial soil moisture content. Moisture use is then tracked based on the met data. The moisture use curve can be corrected to measured values if desired throughout the season. AIMM will also predict moisture use for an upcoming period based on historic record for the selected met site. This allows a producer to forecast an irrigation requirement.

Irrigated crops were monitored for moisture use utilizing tensiometers, rain gauges, gravimetric soil moisture, and in-field "feel method" moisture determination. Irrigation timing and volumes were controlled by the co-operator and the water use tracked with the model. A number of crops were monitored, including cereals, canola, flax and peas.

Moisture use from a co-operator's canola field is depicted below. As can be seen, rainfall amounts were substantial in June. Irrigation amounted to 155 mm and kept the crop within the mid-range of soil moisture storage, with irrigation ceasing July 30. Rainfall in early to mid August and again in September (not shown) provided the crop with adequate moisture to mature. The program predicted crop use reasonably well when compared to the gravimetric data.

Evapotranspiration total for this crop was calculated to be 321 mm to August 23. The site received 227 mm of rainfall and irrigation amounted to the additional 155 mm mentioned above. Yields were very good, which should be expected as the moisture level in the field did not fall below 65%.


Moisture Balance 0 to 100% Maximum Root Zone
Field: 2006 Sample Site: 1 Crop: CANOLA
Soil Moisture (%)
Soil Moisture (mm)
Field Capacity = 154 mm
Irrigation Threshold = 77 mm
Prediction
Site Rainfall (mm)
No Irrigation Required In Next 7 Days
Effective Irrigation (mm)
Soil Moisture
Predicted Water Use Aug 24 To Aug 30 = 4 mm
Predicted Soil Moisture On Aug 30 = 123 mm

Overall the AIMM program provided reasonable agreement with what was observed for consumptive use in the field. Take the time to check out the IMCIN web site located at www.agric.gov.ab/app49/imcin/index.jsp to learn more about this powerful tool.

## Irrigated Corn Survey

*Lead: Korvin Olfert, Irrigation Development Branch, SAF*

Significant corn heat units (CHUs) accumulated in 2006. None of the 21 weather stations insured by Saskatchewan Crop Insurance fell below the threshold of 2100 CHUs in this third year of the corn heat unit pilot project. ICDC's corn demonstration included forty-two sampling sites with twenty-three varieties ranging from early 2000 CHU to full season 2650 CHU varieties. Most of the 2006 corn focussed on 2200 CHU varieties for silage production. The objective in Saskatchewan is to reach the silking stage by August 1st, which was achieved on all fields sampled. In addition, an extended frost-free period extended until September 19th. All sites were ended by frost by the first week in October. Normally, most producers ensile their corn the same week, which is sometime after that first hard frost. This year, however, the plants had dried down sufficiently to silage before the frost. Several producers ensiled their corn at a lower than optimum moisture content because it dried sooner and quicker than expected.

During the first week of August, the corn leaf tissue analysis and field observations were taken (Tables 65 and 66). This information is summarized to describe each of the ten grower's experiences. Silk stage was achieved in all of the corn fields by this time. At this time the corn field height ranged from seven and a half feet for the shortest variety to over ten feet. Some of the fields were below the target of 30-32,000 plants per acre. The desirable concentration of 2.75% nitrogen in the leaf tissue after silk was demonstrated in 68% of the samples. The micronutrient tissue concentration in the corn leaf was higher where soil organic matter is higher and especially where manure is regularly incorporated. A single annual large manure application is not a sufficient source of nitrogen for corn because it is not immediately available. Additional nitrogen fertilizer needs to be applied. Consistent perennial manure applications will reduce the need for commercial fertilizer. Potash, copper, zinc and boron continue to raise nutrient management questions.

Table 65. Corn Leaf Tissue Levels August 2-4, 2006.

| | Macro Nutrients | | | | | | Micronutrients | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | P | K | S | Ca | Mg | Cu | Fe | Mn | Zn | B |
| Cypress HC | 2.72 | 0.38 | 1.86 | 0.21 | 0.57 | 0.18 | 10.7 | 125.3 | 75.2 | 42.8 | 21.7 |
| Downie Lake HC | 2.71 | 0.32 | 2.02 | 0.30 | 0.56 | 0.34 | 14.0 | 151.3 | 56.0 | 24.4 | 12.2 |
| Estuary HC | 2.85 | 0.27 | 2.23 | 0.20 | 0.54 | 0.18 | 14.7 | 100.5 | 35.2 | 34.2 | 10.2 |
| Kim Watts | 2.45 | 0.26 | 2.05 | 0.19 | 0.54 | 0.30 | 13.5 | 105.3 | 46.5 | 30.4 | 9.1 |
| Rick Swenson | 3.26 | 0.38 | 2.33 | 0.23 | 0.56 | 0.29 | 10.0 | 140.6 | 56.0 | 18.0 | 7.1 |
| G & T Follick | 2.96 | 0.31 | 1.89 | 0.24 | 0.82 | 0.51 | 16.5 | 91.8 | 93.5 | 25.1 | 8.8 |
| C & R Nadeau | 2.89 | 0.30 | 2.63 | 0.22 | 0.50 | 0.34 | 13.7 | 112.3 | 61.2 | 24.2 | 7.1 |
| Ian Phillips* | 2.36 | 0.25 | 2.26 | 0.17 | 0.63 | 0.50 | 10.3 | 104.2 | 57.4 | 24.4 | 7.1 |
| P,R & J Ens | 3.12 | 0.34 | 1.93 | 0.23 | 0.71 | 0.53 | 7.6 | 196.4 | 84.6 | 21.1 | 5.9 |
| Sufficient | 2.75 | 0.24 | 1.75 | 0.20 | 0.20 | 0.20 | 8.0 | 20.0 | 25.0 | 25.0 | 6.0 |
| Marginal | 2.25 | 0.14 | 1.25 | 0.10 | 0.10 | 0.10 | 2.0 | 20.0 | 15.0 | 12.5 | 2.5 |

* Fertilized with only manure

Table 66. Corn Field Observations August 2-4, 2006.

| | CHU Rating | Stage | Height (inches) | Population (#/acre) | Soil Texture |
|---|---|---|---|---|---|
| Cypress HC | 2450 | Blister | 102 | 27,250 | Fine Sandy Loam |
| Downie Lake HC | 2350 | Blister | 103 | 30,500 | Fine Sandy Loam |
| Estuary HC | 2450 | Pollen Dropped | 113 | 31,500 | V. Fine Sandy Loam |
| Kim Watts* | 2450 | Pollen Dropped | 106 | 36,000 | Light Loam |
| Rick Swenson* | 2150 | Pollen Dropping | 102 | 31,143 | Loamy Sand |
| Ryan Gibson | 2150 | Pollen Dropping | 92 | 32,000 | Loamy Sand |
| G & T Follick | 2200 | Silk | 111 | 27,750 | Sandy Loam |
| C & R Nadeau | 2200 | Silk | 111 | 28,250 | Clay Loam |
| Ian Phillips | 2200 | Silk | 97 | 30,000 | Sandy Loam |
| P,R & J Ens* | 2150 | Starting to Silk | 98 | 36,583 | Sandy Loam |

* Represents an average of several fields

The corn silage results are shown in Table 67. Most of the corn grown in the province is intended for silage and competes well with cereal silage. Great corn cob development propels corn silage well past the optimum cereal silage in total digestible nutrients. On a dry matter basis, our corn silage objective is to deliver over 70% TDN. Corn silage in 2006 averaged 67% TDN similar to 2005 which compares to about 62% for barley. However yields were higher than barley. Yields ranged from 11 to 22 tons per acre with an average yield of 18 tons per acre at 65% moisture. The lower yielding ones were the ones that received hail. There was a severe hail storm that went through Outlook on August 23rd and damaged not only the Alberta Corn Committee plot at CSIDC but also several of our cooperator fields as well. It stripped all of the leaves off and left impressions on the cob. This allowed a number of diseases in the cobs and opening up a cob a couple weeks later was an interesting experience. However, in spite of all the visual damage, the corn yielded surprisingly well. The lesson learned was not the yield lost, but rather the yield that was kept. All of the surrounding crops were flattened (zero yield) and yet the corn still yielded 11-13 t/a.

Table 67. Corn Silage Quality Summary 2006.

| | | Moisture | CP | | Mineral (%) | | | | NDF | ADF | TDN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CHU | (%) | (%) | Na | P | K | Ca | Mg | (%) | (%) | (%) |
| Cypress HC | 2450 | 70.7 | 8.2 | 0.02 | 0.33 | 1.49 | 0.26 | 0.15 | 45.5 | 27.9 | 69.3 |
| Downie Lake HC | 2350 | 61.2 | 8.0 | 0.02 | 0.24 | 1.44 | 0.28 | 0.25 | 51.8 | 30.3 | 68.1 |
| Estuary HC | 2450 | 67.7 | 8.5 | <0.01 | 0.18 | 1.30 | 0.28 | 0.18 | 45.7 | 27.5 | 69.5 |
| Kim Watts | 2450 | 50.8 | 7.2 | 0.02 | 0.19 | 1.17 | 0.25 | 0.23 | 59.0 | 35.3 | 65.8 |
| Rick Swenson | 2150 | 64.1 | 9.0 | 0.01 | 0.36 | 1.58 | 0.22 | 0.23 | 54.8 | 33.6 | 66.6 |
| G & T Follick* | 2200 | 51.2 | 7.5 | <0.01 | 0.25 | 1.12 | 0.15 | 0.22 | 58.9 | 36.1 | 65.4 |
| C & R Nadeau* | 2200 | 63.4 | 8.4 | <0.01 | 0.21 | 1.59 | 0.39 | 0.31 | 56.2 | 35.9 | 65.5 |
| Ian Phillips | 2200 | 59.2 | 7.5 | <0.01 | 0.19 | 0.90 | 0.19 | 0.26 | 61.0 | 38.4 | 64.4 |
| P,R & J Ens | 2150 | 63.6 | 8.1 | n/a | n/a | n/a | n/a | n/a | 48.3 | 23.0 | 69.3 |
| **Typical Corn Silage** | **2006** | **61.3** | **8.0** | **0.02** | **0.24** | **1.32** | **0.3** | **0.2** | **53.5** | **32.0** | **67.4** |
| | 2005 | 66.5 | 8.1 | 0.01 | 0.23 | 1.12 | 0.2 | 0.2 | 53.4 | 29.9 | 66.8 |
| | 2004 | 66.5 | 9.0 | 0.01 | 0.25 | 1.37 | 0.2 | 0.2 | 57 | 33 | 63.4 |
| | 2003 | 67.0 | 8.6 | 0.01 | 0.23 | 1.24 | 0.2 | 0.2 | 44.4 | 26 | 71 |
| | 2002 | 64.3 | 8.0 | 0.02 | 0.21 | 1.01 | 0.1 | 0.2 | 52.4 | 28.9 | 68 |
| | 2001 | 64.0 | 7.9 | 0.03 | 0.24 | 1.42 | 0.2 | 0.3 | 48.2 | 26.3 | 71.0 |
| | 2000 | 65.0 | 8.3 | 0.02 | 0.22 | 1.16 | 0.2 | 0.2 | 47 | 27 | 70 |

* Received significant hail

Corn grain samples were collected, shelled and analyzed in the first week of September indicating that 54 pounds per bushel was typical at that date (Table 68). There was sufficient time until the first hard frost to bring this up even higher. The average grain yield estimate of 104 bushels per acre increased from 80 bu/a in 2003 but was much improved over 38 bu/a in 2004.

Table 68. Corn Grain Summary 2006.

| | CHU | Bu Wt (lbs/bu) | Kernels (#/cob) | 10 Cob Grain (g) | Est Yield (bu/a) | Stalk Hgt (inches) |
|---|---|---|---|---|---|---|
| Cypress HC | 2450 | 60.1 | 506 | 1169 | 114 | 102 |
| Downie Lake HC | 2350 | 59.6 | 492 | 1228 | 128 | 99 |
| Estuary HC | 2450 | 53.5 | 533 | 952 | 119 | 114 |
| Kim Watts | 2450 | 54.9 | 518 | 927 | 125 | 103 |
| Rick Swenson | 2150 | 52.9 | 469 | 780 | 98 | 109 |
| Ryan Gibson | 2150 | 59.5 | 447 | 1153 | 149 | 95 |
| G & T Follick | 2200 | 50.5 | 457 | 655 | 87 | 99 |
| C & R Nadeau | 2200 | 43.3 | 493 | 592 | 83 | 107 |
| Ian Phillips | 2200 | 57.9 | 394 | 653 | 64 | 105 |
| P,R & J Ens | 2150 | 43.9 | 397 | 409 | 71 | 106 |
| | Average | 53.6 | 471 | 852 | 104 | 104 |

ICDC worked with Monsanto, Keg Agro and producers to compare varieties. Table 69 shows the variety comparisons trials sampled. Comparisons should not be made between the locations since they received different amounts of heat, but rather compare within the locations. The CHUs given are those from the closest weather station on September 8$^{th}$ and may not reflect microclimate conditions. These numbers were based on ten cobs taken the first week in September. The cob circumference is an average of ten cobs. There is always an even number of kernels in the circumference of any one cob. The cob length was estimated in those cobs with bird damage. Some of the fields around Outlook had significant bird damage. It was suggested that the cores of the cobs of some varieties were larger than others and so ICDC started measuring the core diameters once the kernels had been taken off. Again these are averages of ten cobs. The best variety comparison is the randomized replicated Alberta Corn Committee plots and these should be used for varietal recommendations.

For the fourth year the Alberta Corn Committee (ACC) tested both grain and silage corn varieties at CSIDC in Outlook (2363 CHU). These tests are also located at Bow Island (2543 CHU), Vauxhall (2359 CHU), Brooks (2353 CHU), Lethbridge (2326 CHU) and Lacombe (1850). Silage entries were harvested for whole plant yield and moisture content. Grain varieties were harvested for grain yield, moisture content and test weight. In both cases, great cob development is required to deliver top results. The corn heat unit rating of the 37 silage and 11 grain corn entries was from 2000 to 2700 CHU. This range brackets the coolest to warmest summers experienced at Outlook in the last forty years. Brian Beres, heads the Agronomy Unit, Lethbridge Research Centre, and is the Corn Hybrid Trial Coordinator for the Alberta Corn Committee and Terry Hogg supervised the corn trials at CSIDC in Outlook.

CSIDC topped all the ACC corn test sites in 2003, but had the lowest yields of all the test sites in 2006 because of damage received from a severe hail storm on August 23, 2006. The silage plots averaged 15 tons per acre (65% moisture) and the grain plots averaged 120 bu/a. The ACC website at www.albertacorn.com displays the detailed corn variety comparisons. ICDC supports the independent irrigated variety testing at CSIDC and in Alberta.

The list of herbicide resistant corn varieties adapted to Saskatchewan increased again in 2006. The Roundup Ready Corn is also now marketed by several Canadian corn companies. Hybrid corn selection requires comparison of yield potential, plus attention to maturity, agronomic traits, reliability and cost. Sweet corn and corn maze development may be opportunity crop for any irrigated corn grower.

Table 69. Corn Variety Comparison.

| Location | Variety | CHU Rating | CHU Rc'd | Cob Circum (Kernels) | Cob Length (Kernels) | Kernels (#) | Est Grain Yield (bu/a) | Bu Wt (lbs/bu) | Core Diam. (mm) | Stage | Stalk Height (Inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Kim Watts | Maizex 850 RR | 2650 | 2311 | 16 | 39 | 590 | 114 | 53.3 | 26 | 10% Milk Line | 105 |
| | Maizex LF755RR | 2350 | 2311 | 16 | 29 | 441 | 122 | 57.1 | 27 | 50% Milk Line | 101 |
| | PH 39H83 RR | 2450 | 2311 | 16 | 34 | 523 | 140 | 54.3 | 25 | 33% Milk Line | 102 |
| Estuary HC | DKC 33-10 | 2450 | 2311 | 14 | 37 | 511 | 115 | 52.1 | 26 | Dented, 25% Milk Line | 111 |
| | PH 39H86 | 2450 | 2311 | 16 | 36 | 554 | 123 | 54.9 | 26 | Dented, 25% Milk Line | 116 |
| R. Swenson Monsanto FACT Plot | DKC 26-78 | 2150 | 2239 | 16 | 29 | 442 | 106 | 51.9 | 29 | Dented, 10% Milk Line | 103 |
| | NC 2701NRR1 | 2375 | 2239 | 16 | 32 | 528 | 104 | 52.8 | 25 | Dented, 25% Milk Line | 99 |
| | DKC 27-12 | 2250 | 2239 | 14 | 34 | 451 | 92 | 56.9 | 24 | No Dent, 10% Milk Line | 110 |
| | DKC 27-15 | 2300 | 2239 | 14 | 33 | 469 | 99 | 55.1 | 25 | No Dent, 10% Milk Line | 111 |
| | DKC 30-02 | 2375 | 2239 | 14 | 35 | 473 | 84 | 49.3 | 25 | Dented, 10% Milk Line | 107 |
| | HL 27-44 | 2300 | 2239 | 12 | 35 | 439 | 111 | 54.3 | 24 | Dented, 10% Milk Line | 113 |
| | PH 39T67 | 2200 | 2239 | 16 | 31 | 477 | 91 | 50.0 | 30 | No Dent, Firm Dough | 118 |
| Keg Agro Demo Plot | PH 39P78 | 2050 | 2360 | 14 | 20 | 293 | 83 | 53.4 | 23 | Dented, 20% Milk Line | 105 |
| | PH 39T71 | 2250 | 2360 | 14 | 19 | 264 | 63 | 52.0 | 27 | Starting to Dent | 120 |
| | PH 39B93 | 2150 | 2360 | 16 | 20 | 309 | 86 | 47.2 | 27 | Starting to Dent | 118 |
| | PH 39J26 | 2500 | 2360 | 14 | 25 | 334 | 111 | 52.6 | 27 | No Dent, 10% Milk Line | 115 |
| | PH 39T67 | 2200 | 2360 | 14 | 29 | 409 | 70 | 48.6 | 27 | Starting to Dent | 125 |
| | PH 39T66 | 2250 | 2360 | 14 | 24 | 357 | 82 | 50.3 | 26 | Starting to Dent | 119 |
| | PH 39F59 | 2200 | 2360 | 16 | 18 | 270 | 75 | 50.3 | 25 | Dented, 20% Milk Line | 126 |
| | PH 39M27 | 2150 | 2360 | 14 | 17 | 249 | 84 | 56.8 | 26 | Dented 25% Milk Line | 120 |
| | X4V217T | ? | 2360 | 14 | 17 | 230 | 127 | 52.2 | 22 | Starting to Dent | 107 |
| | PH 39F45 | 2000 | 2360 | 14 | 19 | 245 | 111 | 57.8 | 27 | No Dent, 25% Milk Line | 110 |
| | X4T962 | ? | 2360 | 16 | 20 | 301 | 104 | 47.1 | 24 | Starting to Dent | 119 |
| | PH 39H83 RR | 2450 | 2360 | 16 | 25 | 394 | 118 | 45.4 | 24 | Starting to Dent | 123 |
| | PH 39M26 | 2100 | 2360 | 16 | 27 | 446 | 84 | 55.2 | 27 | Starting to Dent | 118 |
| P,R & J Ens Monsanto FACT Plot | DKC 26-78 | 2150 | 2230 | 16 | 26 | 404 | 87 | 46.3 | 28 | Starting to Dent | 104 |
| | DKC 30-02 | 2375 | 2230 | 14 | 32 | 417 | 66 | 37.6 | 26 | Firm Dough | 108 |
| | PH 39T67 | 2200 | 2230 | 14 | 28 | 380 | 72 | 39.6 | 28 | Starting to Dent | 113 |
| | DKC 27-12 | 2250 | 2230 | 14 | 29 | 372 | 59 | 50.1 | 25 | Firm Dough | 103 |
| | NC 2701NRR1 | 2200 | 2230 | 16 | 25 | 382 | 70 | 39.2 | 24 | Starting to Dent | 98 |
| | HL 27-44 | 2300 | 2230 | 14 | 32 | 428 | 74 | 50.5 | 24 | Starting to Dent | 108 |

## Osler Dairy Forage Centre

In the spring of 2003, a randomized replicated trail was established at Osler with 14 different varieties of alfalfa and 14 different species and varieties of grasses. The purpose of this trial was to highlight the potential production of forages under irrigation with an intensively managed system and to compare how the varieties responded to this intensive management. Much of the forage information currently available is collected from plots with less intensive management (1 or 2 cuts) while what the dairy producers typically utilize is three cuts. This plot was to form a linkage between the dairy industry and the missing forage information. The soil texture at this site was a sandy loam under irrigation. The site was cut three times during 2004 (June 22, August 5 and October 6), three times during 2005 (June 24, August 10 and October 6), and three times during 2006 (June 14, July 20 and September 8). No data was collected from the third cuts in 2005 and 2006. Yields for the alfalfa were assumed to be 1.3 t/a for all varieties for these cuts. Fertility started in the spring with 100 lbs actual N on the grasses, and 50 lbs actual P over the whole plot. The alfalfa also received 23 lbs actual N from the P application. After first cut and second cut, the grass were fertilized again with 100 lbs actual N. The yield results from 2006 for the alfalfa are shown in Table 70, and the grasses in Table 71. The quality analysis is shown on Table 72 for the alfalfa and Table 73 for the grass.

Table 70. Alfalfa yields (t/a) for 2006.

| Alfalfa | Cut 1 | Cut 2 | Total 2006 | 3 Yr Total* | % of Beaver |
|---|---|---|---|---|---|
| AC Nordica | 2.1 | 2.3 | 4.4 | 16.1 | 112% |
| PS8925MF | 2.0 | 2.6 | 4.6 | 15.0 | 104% |
| 54V54 | 2.1 | 2.1 | 4.2 | 14.9 | 103% |
| AC Longview | 1.8 | 2.5 | 4.3 | 14.8 | 103% |
| Ameristand | 2.0 | 2.4 | 4.4 | 14.8 | 103% |
| Hornet | 1.7 | 2.5 | 4.2 | 14.7 | 102% |
| Gala | 2.0 | 2.2 | 4.2 | 14.6 | 101% |
| PS2065MF | 1.7 | 2.3 | 4 | 14.6 | 101% |
| 53Q60 | 2.1 | 2.4 | 4.5 | 14.5 | 101% |
| Geneva | 1.7 | 2.3 | 4.0 | 14.4 | 100% |
| Beaver | 2.1 | 2.5 | 4.6 | 14.4 | 100% |
| Stockwell | 2.0 | 2.2 | 4.2 | 14.4 | 100% |
| AC Grazeland | 2.0 | 2.1 | 4.1 | 14.3 | 99% |
| LSD | n/a | n/a | n/a | n/a | |
| CV | n/a | n/a | n/a | n/a | |

* Values are rounded to one decimal place. Third cut was assumed to be 1.3 t/a for all varieties. There was also a significant block interaction in the statistics

| Table 71. Grass yields (t/a) for 2005. | | | | | | |
|---|---|---|---|---|---|---|
| Grass | Cut 1 | Cut 2 | Total 2006 | 3 Yr Total | % of Bravo | |
| Common Tall Wheat Grass | 4.3 | 2.1 | 6.4 | 19.8 | 116% | a |
| Paddock Meadow Brome Grass | 4.7 | 2.4 | 7.1 | 18.8 | 111% | ab |
| AC Parkland Crested Wheat Grass | 4.5 | 2.4 | 7.0 | 18.2 | 107% | ab |
| AC Knowles Hybrid Brome Grass | 4.1 | 1.9 | 6.0 | 18.1 | 106% | ab |
| Chief Intermediate Wheat Grass | 4.0 | 1.9 | 5.9 | 17.1 | 101% | bc |
| Bravo Smooth Brome Grass | 3.9 | 2.4 | 6.4 | 17.0 | 100% | bc |
| Garrison Creeping Foxtail | 4.9 | 2.0 | 6.9 | 16.9 | 99% | bc |
| Revenue Slender Wheat Grass | 3.1 | 1.1 | 4.2 | 15.3 | 90% | cd |
| Joliette Timothy | 2.6 | 1.9 | 4.5 | 13.8 | 81% | d |
| Aurora Timothy | 2.9 | 1.7 | 4.6 | 13.6 | 80% | d |
| Arthur Dahurian Wild Rye | 2.5 | 1.4 | 3.9 | 13.3 | 78% | d |
| Arctic Orchard Grass | 2.8 | 2.1 | 4.9 | 13.2 | 78% | d |
| Kay Orchard Grass | 2.9 | 1.9 | 4.7 | 9.4 | 55% | e |
| Courtney Tall Fescue | 3.0 | 1.7 | 4.7 | 8.3 | 49% | e |
| LSD | 0.9 | 1.0 | 1.2 | 2.67 | | |
| CV | 16.7 | 36 | 15.2 | 12.3 | | |

| Table 72. Quality analysis for the Alfalfa plots for first cut. | | | | |
|---|---|---|---|---|
| Alfalfa | CP | ADF | NDF | RFV |
| PS2065MF | 23.9 | 27.2 | 34.4 | 184 |
| 53Q60 | 23.4 | 28.6 | 33.9 | 183 |
| Geneva | 23.2 | 28.2 | 35.1 | 179 |
| AC Nordica | 23.7 | 29.3 | 35.7 | 175 |
| Ameristand | 23.4 | 29.4 | 36.1 | 171 |
| AC Longview | 22.4 | 30.8 | 36.7 | 166 |
| Gala | 21.8 | 30.8 | 36.9 | 165 |
| 54V54 | 22.2 | 30.1 | 37.6 | 163 |
| Beaver | 22.4 | 30.8 | 38.0 | 162 |
| Stockwell | 21.6 | 30.1 | 37.8 | 162 |
| Hornet | 22.7 | 30.8 | 37.9 | 161 |
| PS8925MF | 21.0 | 31.6 | 38.8 | 154 |
| AC Grazeland | 21.4 | 31.7 | 39.7 | 151 |
| LSD | n/a | n/a | n/a | n/a |
| CV | n/a | n/a | n/a | n/a |

Table 73. Quality analysis for the Grass plots for first cut.

| Grass | CP | ADF | NDF |
|---|---|---|---|
| Aurora Timothy | 21.5 bcde | 29.3 ab | 55.4 a |
| Joliette Timothy | 23.5 abc | 28.9 a | 55.4 a |
| Arctic Orchard Grass | 25.2 a | 30.2 abc | 56.3 a |
| Courtney Tall Fescue | 22.1 bcde | 31.8 cde | 57.2 ab |
| Kay Orchard Grass | 22.7 abcd | 32.6 cdef | 59.0 bc |
| Garrison Creeping Foxtail | 21.5 bcde | 33.2 def | 59.4 bc |
| Bravo Smooth Brome Grass | 23.8 ab | 33.4 def | 59.5 bc |
| Chief Intermediate Wheat Grass | 23.5 abc | 31.6 bcd | 59.6 bcd |
| Arthur Dahurian Wild Rye | 21.0 cde | 31.4 bcd | 59.9 cd |
| Paddock Meadow Brome Grass | 20.0 e | 34.7 f | 60.2 cd |
| AC Knowles Hybrid Brome Grass | 20.1 de | 34.2 ef | 61.0 cd |
| Common Tall Wheat Grass | 21.7 bcde | 34.8 f | 61.1 cd |
| Revenue Slender Wheat Grass | 22.0 bcde | 32.6 cdef | 62.1 d |
| AC Parkland Crested Wheat Grass | 21.8 bcde | 34.0 ef | 62.1 d |
| LSD | 2.64 | 2.39 | 2.61 |
| CV | 8.3 | 3.1 | 5.2 |

## Alfalfa Results

All of these are tap rooted varieties, which generally out yield creeping rooted varieties under hay production, although there are a few varieties with a branched tap root. Creeping rooted varieties are better suited for pasture as they tolerate trampling better. There was no significant difference between the alfalfa yields since there was a significant block interaction. These include the top varieties of a number of seed companies and all are quite acceptable. As a group they are all high yielding (over 4 t/a) and regrow rapidly.

In the first cut each of the plots were individually sampled for quality (CP, NDF, and ADF). Again there was no significant difference between the varieties with a significant block effect. The average RFV for first cut was 167, with second cut lower at 157. Third cut would have been similar to the first cut.

**Beaver** was included in the trial as a standard to compare the others to. It is an old variety that has been used as a standard for many years and this year did very well. Beaver is quite winterhardy and winterkill was noticed in some of the plots. This site is located north of Saskatoon near Osler and can experience cold conditions.

Right at the top for yield was **AC Nordica**. AC Nordica is a SeCan variety distributed by Prairie Seeds. It has a branched tap root, and is supposed to be very winterhardy.

**Geneva** and **Gala** are two Proven Seed multi-foliate tap rooted varieties. Both did quite well; however, Gala out yielded Geneva. **Ameristand** has a deep set crown and is supposed to tolerate heavy traffic better than the others. Ameristand had very high quality with the highest average RFV and CP for the two cuts in 2006.

**PS8925MF** and **PS2065MF** are two multi-foliate (MF) varieties that regrowing quickly. The PS8925MF out yielding PS2065MF in 2006. PS8925MF has a slightly higher fall dormancy rating (3.7 vs. 3) and so over time winterkill could be expected to lower the yield potential. PS8925MF had the lowest quality with the lowest average RFV and CP, whereas PS2065MF had the highest RFV in first cut. **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 successfully grazed. This also shows up in that AC Grazeland had the highest NDF in first cut which made it the lowest RFV.

**54V54** out yielded **53Q60** in spite of 54V54 has a higher fall dormancy rating (4 vs. 3) which would suggest that 53Q60 is more winterhardy. 53Q60 had the lowest NDF on first cut.

**AC Longview** comes from Lethbridge, AB, while **Hornet** was bred in Wisconsin. Both had average quality and yield.

**Stockwell** has a branched tap root and yielded slightly less than AC Nordica, but not statistically different.

Overall the alfalfa performed well. The average 2006 yield (5.59 t/a) was higher than 2005 (3.87 t/a) and 2004 (5.24 t/a). There was some evidence of winterkill, with some winter annual weeds showing up in the empty spaces where winterkill took out the alfalfa.

### Grass Results

In the past, grass has not usually been recommended under intensive irrigation. This was because it is generally lower yielding, has lower quality, and requires more nitrogen fertilization compared to alfalfa. Recommendations usually included it in a mix with alfalfa to lengthen the life expectancy of the stand. However, in these plots, several grasses out yielded the alfalfa. With the grass, there was a statistical difference in the plots, both in the yield and quality without any block interactions.

**Paddock** Meadow Brome was the highest yielding grass this year. Meadow Brome grass has mostly basal growth with the leaves initiating from the ground. Smooth Brome grass has alternating leaves all the way up the stem. As such, Meadow Brome is more suited to pasture situations while Smooth Brome is more suited to making hay. 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 intermediate in most growth characteristics. It regrows slower than Meadow Brome, but faster than Smooth Brome. On the three-year total, AC Knowles yielded less than Meadow Brome and more than Smooth Brome, although not statistically different. In all the grasses, Paddock had the lowest NDF in second cut. Of these three Paddock had the highest overall quality (lowest ADF, NDF, highest CP over two cuts) with AC Knowles intermediate and **Bravo** the lowest. Bravo had statistically higher CP levels than the other two in first cut.

**Tall wheat grass** is known for its tolerance to salinity. It also likes water and is tolerant to some flooding but not drought. It is the top yielding grass of the three-year total. The problem with Tall wheat grass is that the quality drops off quite quickly. It had the highest ADF in both cuts.

**Chief Intermediate wheat grass** is not a long lived grass under intensive management; however, it still continued to yield almost 6 t/a this year. It is slowly maturing and combines well with alfalfa.

**AC Parkland Crested wheat grass** is the only crested wheat grass in this trial. Crested wheat grass is known for its early growth in the spring and very long life span. It is very drought tolerant, but not flood tolerant. It tied for the top second cut yield. 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. However it still had the highest NDF in first cut.

**Garrison Creeping Foxtail** is well suited to flooding areas as it has excellent flood tolerance. It also is long lived and strongly creeping rooted. Garrison Creeping Foxtail had the highest yield in first cut.

**Orchard grass** is a highly palatable bunchgrass with excellent regrowth and midseason production. **Arctic Orchard grass** had the highest average protein of the grasses. Unfortunately, it is not very winter hardy. **Arctic** is a variety bred to have more winterhardiness, which is very evident in our trials. **Kay** died out after the first winter with virtually no production the next year. Arctic did not produce much, but still survived.

**Timothy** used to be one of the more profitable crops to grow under irrigation. Although the two timothy varieties included here did not yield as much as some of the top yielding species, over four and a half tons/acre is a good yield, especially with a high selling price. This year **Aurora** yielded higher than **Joliette** although not statistically different. These two had the lowest fibre levels of the grasses in the first cut and were even comparable to lower quality alfalfa.

**Revenue Slender wheat grass** is the only native grass that was included in this trial. It is a short lived, but quite a productive native species. Under irrigation and intensive management, it out yielded the alfalfa in 2005. This year, being near the end of its life, yield dropped off, particularly in second cut.

**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 was the lowest yielding grass as it nears the end of its lifespan.

**Courtenay Tall Fescue** also suffered winterkill. Tall fescue is a pasture grass tolerant to saline, acidic and alkaline soils. It is also drought tolerant, but not winter hardy. Some varieties have high alkaloids which can cause animal health problems.

### Conclusion

The results obtained were from a randomized replicated small plot near Osler, SK. It shows some of the high quality and yield that can be obtained from alfalfa under an intensive three-cut system. Because these numbers are site-specific, they should not be used for variety recommendations. For variety recommendations, please consult with the *Crop Varieties for Irrigation* publication.

## Alfalfa Demonstration

*Lead: Korvin Olfert, Irrigation Development Branch, SAF*

The purpose of this demonstration was to highlight the production capability of alfalfa under a two-cut system destined for the beef market. It is an excellent example of the interdependence of the beef industry on the crops/forage industry and irrigation as a tool to enhance production. It is located at the north-east outskirts of Swift Current. This field scale demonstration was established in the spring of 2003 with seven of the top varieties from two seed companies seeded at 12 lbs/acre. The plots were 36' wide and are a total of 0.7 acres each. Phosphorus was added at 50 lbs per year with no additional nitrogen added. Quarter-meter swards were taken on June 26$^{th}$ and August 5$^{th}$ to get a measure of the maturity at each cut. Bales were counted, weighed, and samples were taken for quality analysis. First cut was harvested July 7$^{th}$, late due to continuing rain, and second cut was taken August 16$^{th}$. These were not randomized or replicated, but rather a demonstration of the varieties and so the information presented here should be considered accordingly.

Table 74. Yield Results in tons/acre.

| | Cut 1 | Cut 2 | Total 2006 | Total 2005 | Total 2004 | 3 year Total |
|---|---|---|---|---|---|---|
| Geneva | 2.23 | 1.16 | 3.39 | 3.40 | 4.51 | 11.3 |
| Ameristand | 2.31 | 1.24 | 3.55 | 3.75 | 3.84 | 11.14 |
| Spreador 3 | 2.23 | 1.20 | 3.43 | 3.51 | 4.18 | 11.12 |
| 54V54 | 2.19 | 1.29 | 3.48 | 3.43 | 3.81 | 10.72 |
| 53Q60 | 1.93 | 1.29 | 3.22 | 3.39 | 3.77 | 10.38 |
| Absolute | 2.27 | 1.24 | 3.51 | 3.02 | 3.49 | 10.02 |
| Gala | 1.93 | 1.16 | 3.09 | 3.25 | 3.58 | 9.92 |

Table 75. Quality Results from 2006.

| | Cut 1 | | | | Cut 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | MSC | Height (cm) | % CP | RFV | MSC | Height (cm) | % CP | RFV |
| Geneva | 3.81 | 96 | 16.4 | 122 | 4.02 | 73 | 19.8 | 124 |
| Spreador 3 | 3.50 | 90 | 17.3 | 118 | 4.27 | 73 | 21.0 | 125 |
| Ameristand | 3.61 | 92 | 19.5 | 168 | 3.57 | 75 | 22.1 | 144 |
| 54V54 | 3.00 | 98 | 16.8 | 125 | 3.97 | 69 | 19.3 | 119 |
| 53Q60 | 3.55 | 95 | 20.1 | 157 | 4.24 | 77 | 20.2 | 116 |
| Gala | 3.83 | 91 | 18.5 | 141 | 4.24 | 64 | 22.2 | 141 |
| Absolute | 3.11 | 90 | 18.4 | 134 | 3.96 | 65 | 20.8 | 117 |

## Results

The average RFV for first cut was 138 with second cut at 126. Both are easily sufficient for maintaining beef cows over winter. **Geneva** topped out the demonstration with the highest three-year yield. It had the lowest yield and CP in first cut. Geneva yields appear to be decreasing, although the huge first year still keeps it in the top spot in this trial. Geneva has a fall dormancy rating of 4 which may explain some of the winterkill yield losses.

**Ameristand** is a variety with a sunken crown. This makes it more tolerant of heavy traffic or trampling. It has a fall dormancy rating of 2 which makes it very winter hardy. It was the highest yielding in the first cut and overall in 2006.

**Spreador 3** was the only creeping rooted variety in this trial, which usually yield less than tap rooted under a hay situation. However, in this case, Spreador 3 did very well and came in third in the three-year yield. Spreador 3 was also the shortest and had the lowest RFV in first cut which are usually opposites.

**54V54** continued to yield more than **53Q60**. 54V54 was the tallest at first cut and 53Q60 stood above the rest at second cut. 53Q60 has a lower fall dormancy rating (3 vs 4) which should make it more winter hardy. Although the yields still appear to be decreasing. Quality wise 53Q60 had the top CP in first cut. It showed its regrowth potential by being the tallest and had the lowest RFV in second cut.

**Gala** yielded the lowest in 2006, even below that of the check, Absolute. This was not due to a lack of maturity as Gala had the highest MSC in first cut and second in second cut. Gala has a fall dormancy rating of 2 which suggests that it should be the most winter hardy variety in the demonstration.

**Absolute** was included as a check and to compare to previous years. Since it was the highest yielding in the previous demonstration and almost the lowest yielding in this demonstration, it shows how the varieties have improved in the last five years. Absolute does not appear to regrow as well as some of the other varieties since it was the shortest on second cut and the second youngest.

## Conclusion

This demonstration shows the high yields that can be achieved under irrigation. With a two-cut system, you can get similar yields to three cuts, although the quality is more suited for a beef cow rather than a dairy cow. With some conflicting results, it also shows the limitations of demonstrations, compared to randomized and replicated research trials. However, it does verify the yield estimations from research trials on a large field scale.

# Timothy Phosphorus Trial

*Lead: Korvin Olfert, Irrigation Development Branch, SAF*

This project was initiated by ICDC to determine the amount and timing of phosphorous required for optimum timothy production. Timothy is a grass hay, high in digestible fiber desirable in dairy rations for several Pacific Rim countries. In the past timothy has been quite profitable, although increases in shipping rates, the cost of nitrogen, and the Canadian dollar have decreased the profit margin in recent years. As a grass, it does not fix its own nitrogen and requires high nitrogen fertilization (around 180 lbs actual N per acre). Phosphorus recommendations have traditionally been around 50 lbs per year based on nutrient removal. Nutrient removal of phosphorus is around 10 lbs of phosphate ($P_2O_5$) per ton, which means a five t/a hay crop removes 50 lbs of phosphorus from the soil.

However, earlier demonstrations by ICDC showed no yield difference, this blanket recommendation was questioned. In order to determine the precise timing and amounts required this three-year trial was seeded at the Canada-Saskatchewan Irrigation Diversification Center (CSIDC) in Outlook on May 20th of 2004. It was seeded 5 lbs/acre with the variety Colt. The plots were 8' by 20' with 10 treatments replicated four times in a randomized complete block design. The initial soil test reported an average of 61 lbs of nitrogen, 32 lbs phosphorus, 515 lbs potassium, 1.8 lbs copper, 12.4 lbs manganese, 3.1 lbs zinc, 2.9 lbs boron and 35 lbs iron from two subsamples of a composite of 30 cores from the 0.25 acre site. The treatments are listed in Table 76. The phosphorus was broadcast as 11-51-0 with each individual plot being brought up to 100 lbs of actual N per acre per cut with 34-0-0.

Table 76. Phosphorus applied (lbs/a) for each treatment.

| Treatment | At Seeding | Second Year | Third Year |
|---|---|---|---|
| 1 | 300 | 0 | 0 |
| 2 | 200 | 0 | 0 |
| 3 | 100 | 0 | 0 |
| 4 | 0 | 0 | 0 |
| 5 | 100 | 100 | 100 |
| 6 | 200 | 200 | 200 |
| 7 | 300 | 300 | 300 |
| 8 | 300 | 100 | 100 |
| 9 | 300 | 200 | 200 |
| 10 | 200 | 100 | 100 |

Harvests were taken August 27th in 2004, July 8th and September 20th in 2005, and July 6th and October 5th in 2006. A 4' swath was taken from the center of the plot to measure total bulk weights. A subsample was taken from each plot to determine the moisture content. The plot was sprayed out October 6th, 2006.

## Results

While there was no significant difference (p = 0.2690) and a significant block interaction (p = 0.0340) at the 95% confidence level in the cumulative dry matter yields, some trends can be noticed. Table 77 shows the dry matter yields of each of the years and the cumulative total. The higher fertilized plots did yield higher. Also there was a significant difference between the highest fertilized plots and the check.

Since there was no significant difference in the timothy yields, the soil P levels were checked at the end of the trial to verify that the soil P levels had indeed been impacted by the fertilization. Table 76 also shows the soil phosphorus levels at the beginning and end of the trial. There was a significant difference ($p < 0.001$) in the soil test of each treatment with also a significant block interaction (P = 0.0057). This means that the treatments did indeed cause the soil levels to change and explained a significant portion of the change ($R^2 = 0.85$).

Table 77. Dry matter yields of timothy and soil phosphorus amounts for various treatments of phosphorus applied in the spring of three successive years.

| Phosphorus treatment (lbs P/a) | | | | Soil P (lbs P/a) | | | Dry matter yields (t/a) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | 2005 | 2006 | Total P applied | Spring 2004 | Fall 2006 | | 2004 | 2005 | 2006 | Total |
| 0 | 0 | 0 | 0 | 32 | 18.0 | e | 2.8 | 6.8 | 7.1 | 16.7 |
| 100 | 0 | 0 | 100 | 32 | 19.0 | de | 3.0 | 7.1 | 7.4 | 17.5 |
| 200 | 0 | 0 | 200 | 32 | 33.0 | cde | 2.7 | 7.7 | 8.0 | 18.4 |
| 300 | 0 | 0 | 300 | 32 | 41.6 | cde | 2.6 | 7.3 | 7.8 | 17.6 |
| 100 | 100 | 100 | 300 | 32 | 57.0 | bc | 2.5 | 7.3 | 7.6 | 17.4 |
| 200 | 100 | 100 | 400 | 32 | 49.0 | cd | 2.9 | 7.7 | 8.2 | 18.8 |
| 200 | 200 | 200 | 600 | 32 | 80.0 | b | 2.7 | 6.7 | 8.6 | 18.0 |
| 300 | 100 | 100 | 500 | 32 | 62.0 | bc | 2.6 | 7.7 | 7.8 | 18.1 |
| 300 | 200 | 200 | 700 | 32 | 116.6 | a | 2.5 | 8.0 | 8.4 | 18.9 |
| 300 | 300 | 300 | 900 | 32 | 143.6 | a | 2.6 | 8.1 | 8.6 | 19.2 |
| | | | Mean | | 62.0 | | 2.7 | 7.4 | 8.0 | 18.1 |
| | | | LSD (p=0.05) | | 15.2 | | NS | NS | NS | NS |

## Conclusions

Applying phosphorus to timothy does not result in a large change in yield. Only by applying large amounts of phosphorus (over 700 lbs per 3 years) was the yield significantly different than the check of no phosphorus. Applying phosphorus to timothy will probably not result in a significant change in yield. It certainly does not show the same response to yield that nitrogen does.

It took 200 lbs of phosphorus over three years to maintain the P soil levels at the initial rate. This is slightly higher (66 lbs/year) than the standard recommendation of 50 lbs per year based on nutrient removal.

In spite of showing no significant yield increase, timothy producers should continue to apply phosphorus at 50 lbs/acre to replace what is removed in the crop. To maintain soil phosphorus levels this perhaps should be increased slightly. However, if economics dictate, this could be postponed for a short time without a large yield loss.

## Estimating Alfalfa's Drying Rate

*Lead: Korvin Olfert, Irrigation Development Branch, SAF*

### Background

The most risk associated with growing hay is the drying process. Will it dry enough to bale before that next shower comes? Anything that will help speed up this process would reduce the risk associated with unstable weather patterns. There are several different methods of doing this and one simple one is to make a wider swath. In order to determine the magnitude of this effect, ICDC initiated a project with Greg Oldhaver of Miry Creek.

### Data Collection

A field of alfalfa was chosen at Miry Creek and evaluated for two cuts. There were extremely good drying conditions during both harvests. First cut took a record two days (about 56 hours) to dry, while second cut took about five days to dry. Each swath was sampled periodically from time of first cut until the field was baled. At each sampling measurements included the hay moisture (twice), the soil moisture (twice), temperature, relative humidity, and wind speed. Any missing weather information was substituted with hourly data from the Environment Canada weather station located at Swift Current (45 miles from the field). Moisture values were determined in the field using the microwave method and were taken from the bottom of the swath. Soil moisture samples were taken from underneath the swath with any organic matter removed.

### Results

The ideal drying conditions of first cut limited the effect of the swath width. Both swaths dried extremely fast (56 hours). If you take the equations from the linear regression lines and extrapolate how many hours it would have taken to dry to 16% moisture, there is a slight difference (about 45 minutes) between the two swaths. Second cut took longer to dry (about 120 hours). There was a slight shower (1 cm) the first evening after it was cut. This had minimal impact on the quality of the alfalfa since the moisture content was still over 70%, but did increase the moisture content of the hay (about 6%). Again if you extrapolate the two linear regression lines to 16% there was a difference between the drying rates. Due to the slower dry down, this difference between the swaths was more pronounced with about five hours difference. Caution should be used when examining these numbers. The regression lines were not perfect and the differences were small in comparison. There was also a large variation in the moisture contents.

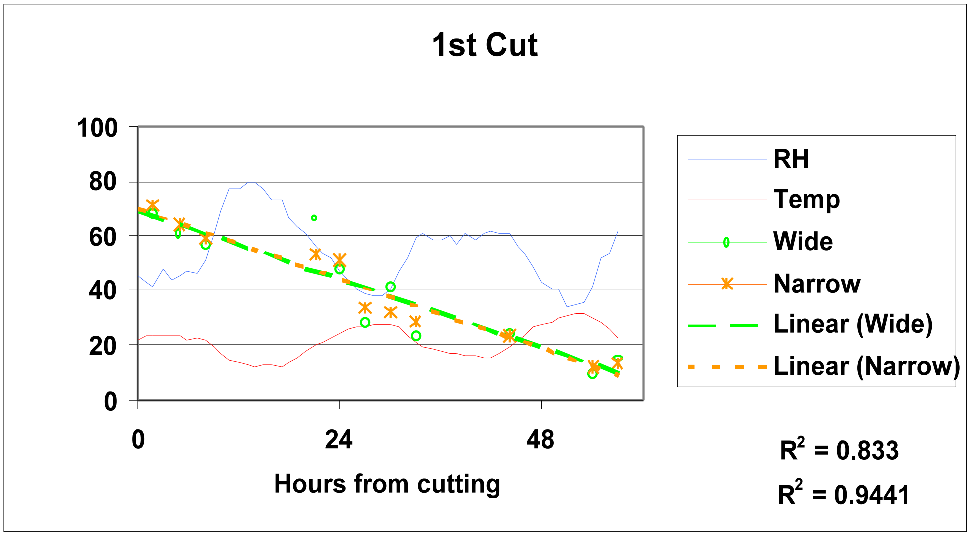



Figure 9. The difference in drying times between a wide swath and a narrow swath in first cut.

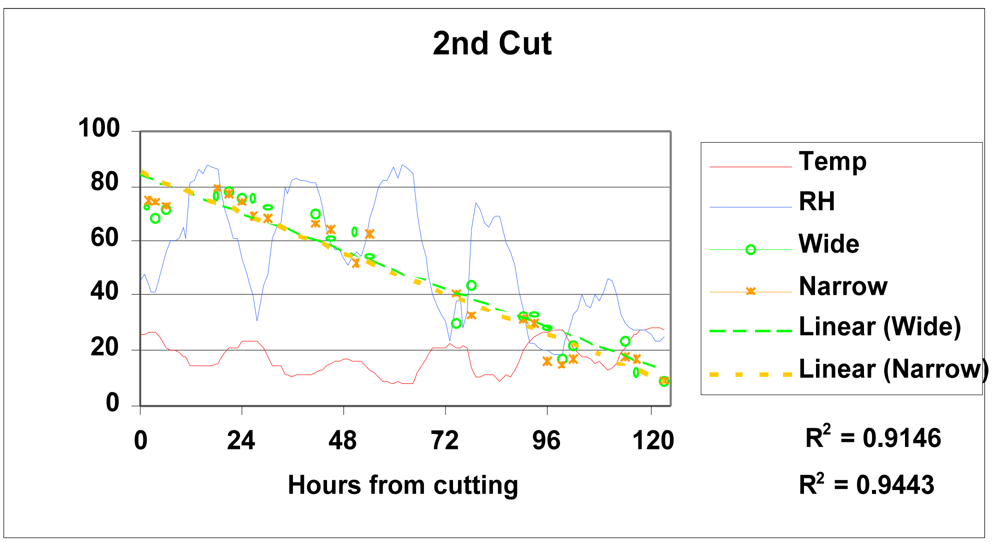



Figure 10. The difference in drying times between a wide swath and a narrow swath in second cut.

## Conclusions

First cut happened very quickly, with ideal drying conditions. Second cut took slightly longer. There was a small difference between the wide and narrow swaths in first cut and a larger difference in the second cut. Extending the width of the swath even six inches can result in a shorter drying time.

## Irrigated Variety Testing

*Lead: Terry Hogg, CSIDC*

In 2006, ICDC continued funding CSIDC for conducting irrigated variety evaluation trials. Four ICDC funded sites for wheat, canola, pea and flax were undertaken. However, a hailstorm on August 23 passed through the Outlook area damaging some of the ICDC variety evaluation trials limiting the amount of useful data that could be collected. This limited amount of data was added to the CSIDC variety database and used to update the annual *Crop Varieties for Irrigation* publication.

## Silage Cereal Varieties

*Co-Investigators: Korvin Olfert, Irrigation Development Branch, SAF, and Terry Hogg, CSIDC*

As usual, CSIDC hosts a set of annual cereal forage trials to determine the best cereals to grow for silage or greenfeed. This year ICDC provided funding to measure the qualities as well as the yields. The following are results to be included in the much larger dataset for the *Crop Varieties for Irrigation*. Table 78 shows the qualities from the barley variety trial at CSIDC for 2006. Table 79 shows the qualities from the oat variety trial, and Table 80 shows the qualities from the triticale variety trial.

Table 78. Barley variety qualities for 2006.

| Barley | CP | ADF | TDN |
|---|---|---|---|
| Cowboy | 12.4 | 31.0 | 64.8 |
| Battleford | 12.4 | 31.0 | 64.8 |
| Trochu | 13.4 | 29.9 | 66.0 |
| Newdale | 13.1 | 33.9 | 61.8 |
| Dillon | 11.9 | 36.2 | 59.4 |
| Bold | 12.6 | 31.6 | 64.3 |
| Copeland | 11.6 | 32.1 | 63.7 |
| Rosser | 12.9 | 34.6 | 61.1 |
| Hawkeye | 14.1 | 32.7 | 63.0 |
| Vivar | 11.2 | 30.5 | 65.4 |
| Ranger | 12.7 | 29.2 | 66.8 |
| Average | 12.6 | 32.1 | 63.7 |
| LSD | NS | NS | NS |

* In this plot there was significant block interaction

| Table 79. Oat variety qualities for 2006. | | | |
|---|---|---|---|
| Oats | CP | ADF | TDN |
| Bell | 11.8 | 38.2 | 57.2 |
| Morgan | 10.8 | 35.5 | 60.1 |
| Calibre | 10.9 | 40.5 | 54.8 |
| Baler | 10.7 | 38.4 | 57.0 |
| Pinnacle | 10.1 | 35.7 | 59.9 |
| Average | 11.6 | 34.8 | 60.9 |
| LSD | NS | NS | NS |

* In this plot there was significant block interaction

| Table 80. Triticale variety qualities for 2006. | | | |
|---|---|---|---|
| Triticale | CP | ADF | TDN |
| Banjo | 14.3 a | 37.5 ab | 58.0 ab |
| Ultima | 12.6 b | 36.2 a | 59.3 a |
| Viking | 12.6 b | 38.7 abc | 56.8 abc |
| Comet | 12.1 b | 39.8 bc | 55.6 bc |
| Pronghorn | 15.0 a | 41.1 c | 54.2 c |
| Average | 12.2 | 38.1 | 57.4 |
| LSD | 0.99 | 3.53 | 3.74 |

### Results

As usual, barley had higher quality than the oats or triticale. There was no significant difference in quality between the barley varieties or the oat varieties. Pronghorn and Banjo were both significantly higher in CP than the other triticales. This is just one site years data and should not be used for variety recommendations. Consult the *Crop Varieties for Irrigation*.

## Fusarium and Leaf Disease Survey

*Co-investigators: Penny Pearse, Disease Specialist, SAF, Grant Holzgang, Crop Protection Lab, SAF, and Korvin Olfert, Irrigation Development Branch, SAF*

### Fusarium Head Blight (FHB) Survey

Saskatchewan Agriculture and Food provincial disease specialists co-ordinate and produce the Fusarium and Cereal Leaf Disease surveys. Agrologists from across the province collect heads at random from commercial wheat, durum, barley and oat fields during the early dough stages of development. These head samples are then sent to the provincial Crop Protection Laboratory in Regina where they are visually inspected for FHB symptoms. A severity rating is determined for each field. The kernels showing visible FHB symptoms are then plated onto a growth medium to determine the causal Fusarium species.

Over the past few years, the survey has indicated that FHB is prevalent across most of Saskatchewan, although predominantly at low levels. The highest values are typically found in the south-east and east-central regions, where environmental conditions are often conducive for disease development. Severity is highly dependent on weather. In the 2001 survey, severity values ranged from 2 to 5%, but in 2002 values were less than 1% due to dry conditions during cereal flowering. In 2003, FHB severity was negligible for most of the province and the irrigation areas (0.2%). In 2004, the samples ranged from 0% to 1.6%, due to cool temperatures during cereal flowering. In 2005, the average for irrigation was 0.2% which was very similar to the provincial average.

In 2006, 22 cereal fields were sampled from irrigated fields. This included three fields of durum, five fields of barley (3 six rows, 2 two rows), 13 fields of HRSW and one field of CPS. Of the 22 fields 14 had some level of infection. Only four species of Fusarium were detected with only two *F. graminearum* positive. The first was from a wheat field just south of Birsay and included three kernels with *F. graminearum*. There was no *F. graminearum* found in another wheat field three miles away. The second was from a wheat field near Blackstrap Reservoir where one kernel was found to be positive. All the other samples were either *F. avenecum, F. sporotrichoides*, or *F. poae*, which are not considered highly toxigenic species. *F. graminareum* has also been identified in irrigation districts over the past few years and is expected to increase and spread in any of the areas it is found. Remember that Fusarium levels can spread through the heads and be higher in grain harvested in wet or humid conditions. It is imperative to store the grain at less than 12-14% moisture content to prevent molding in the bin.

This was also the first year in which corn samples were taken as part of the FHB survey. Being the first year we had to determine proper protocols as to sampling and so results may not be representative.

# Create Public Awareness

## Technology Transfer

| | |
|---|---|
| January 9-12 | Crop Production Week, Saskatoon |
| January 19 | Prairie Seeds Corn Production, Beechy |
| January 25 | Strawberry Crown Production, Outlook |
| January 26-27 | Western Canadian Forage Summit, Red Deer |
| January 27-29 | Saskatchewan Cattle Feeders Association Conference, Saskatoon |
| February 9 | Fusarium Head Blight Management, Belle Plaine |
| February 28 | Gopher Control at Coop Agronomy School, Swift Current |
| March 10 | Irrigated Grazing, Outlook |
| May 10 | Timothy Insect Update, Birsay |
| May 11 | Ambassador Tour, Swift Current |
| June 10-13 | Saskatchewan Stockgrowers Association Convention, Estavan |
| June 29 | 4-H Regional Judging Competition, Swift Current |
| July 11 | Treasure Valley Market Garden Tour, Cadillac |
| July 13 | CSIDC Field Day, Outlook |
| August 13 | 4-H Provincial Judging Competition, Swift Current |
| October 10 | Nutri-Gain Corn Field Day, Hodgeville |
| November 2 | U of S Agriculture Career Fair, Saskatoon |
| December 5-6 | 11th Annual ICDC SIPA Irrigation Conference, Moose Jaw |

## Irrigation Website

*Co-Leads: Lana Shaw and Janice Bennett, Irrigation Development Branch, SAF*

The website www.irrigationsaskatchewan.com experienced a busy year since its launch in November 2005. Interactive mapping is finding a number of uses on the website besides the original irrigation district maps.

An interactive Corn Heat Unit map of the province was completed and posted on the website. One of 152 weather stations can be selected from a map or an alphabetical list leading to the CHU data for every available year between 1980 and 2005. Average CHUs are also provided for that location, as well as the average 90% probability CHUs (historical minimum 9 of 10 years). With this tool, irrigators and other producers will have specific data for their location so they can make informed decisions about corn production and variety selection.

Progress has been made with the Saskatchewan Vegetable Growers Association to provide an interactive map of their members on the irrigation website, along with other vegetable-related topics and events.

Under the Irrigation Districts section, interactive maps can be found on the irrigation development areas and districts. This exciting feature has been popular on our website and can serves as a virtual tour of irrigation for Saskatchewan.

The Production and Processing section has information and links for irrigation crops including vegetables, pulses, corn, alfalfa hay, grass forage, oilseeds, cereals, fruits, herbs and spices.

The Irrigation and the Environment section is a recent addition, with information and presentations on soil and water compatibility for irrigation. Also available are presentations from a national “Sustainable Irrigation for the Prairies Workshop” held on March 22nd and 23rd, 2006.

Website usage in 2006 has been fairly steady at around 200 individual visitors each month.

# Technology Transfer

# Activities

Knowledge and information, relating to sustainable irrigation, is developed at CSIDC through applied research programs. This information is transferred to industry partners, producers and the general public through on-site and off-site activities including tours, field days, conference presentations and readily available factsheets. These activities are important in promoting and educating producers on irrigation in Saskatchewan.

## Tours

Local, regional and international groups toured the Centre from spring through fall. In 2006, these tours included:

- Chilean delegation - April 26th
- Korean and AAFC delegates, NAHARP indicators - May 18th
- Johanne Boisvert, Director Science Cooperations - May 18th
- Canadian International Development Agency (CIDA) officials - May 21st and May 23rd
- National Water Research Institute (NWRI) representatives - June 1st
- Lutheran Collegiate Bible Institute agriculture class - June 19th
- Rob Hyde, Western Australian farmer - June 26th
- Associate Deputy Minister Christiane Ouimet and PFRA Director General Harley Olsen- July 19th
- Communities in Bloom judging committee - July 31st
- Canterra Seeds Ltd. tour of cereal and oilseed trials - August 1st
- U of S Aboriginal Land Managers, Lead - Terry Tollefson - August 17th
- Mongolia delegation - September 1st
- Associate Deputy Minister Andrew Marsland - September 21st
- U of S Agriculture and Bioresource Engineers- September 28th
- Chinese delegation - October 3rd

## Field Days

### Annual Field Day

Nearly 300 visitors contributed to a successful CSIDC annual field day on July 13th centred around the theme “Growing with Water”. Tour highlights included 1) vegetable production under a solar centre pivot and marketing vegetables in Saskatchewan; 2) CSIDC crop varieties focussing on the potential use in ethanol and biodiesel production; 3) advances in the small potato industry; 4) strawberry crown production; 5) corn variety development; 6) haying demonstration. The trade show displayed booths from industry, government agencies and local entrepreneurs. Speakers representing the federal, provincial and industry sectors included Mr. Stephen Locke (AAFC/PFRA), Honourable Mark Wartman (Saskatchewan’s Minister of Agriculture) and Mr. Roger Pederson (chairman of SIPA).

## Potato Field Day

Potato Field Day occurred on August 10th with about 30 people in attendance. Guest speakers on the field tour included Dr. Bizimungu ( AAFC Lethbridge), Jazeem Wahab (CSIDC), Doug Waterer (University of Saskatchewan), Connie Achtymichuk (SAF), and Jacob Vanderschaff (Little Potato Co). Topics covered on the field tours included new potato cultivars, small potato agronomy and equipment demonstration. The Saskatchewan Seed Potato Growers Association (SSPGA) held their semi-annual meeting in conjunction with the field tour overviewing CFIA update, late blight monitoring, update on new chemicals, IPM/Environmental farm planning, and SSPGA business for 2006.

## Fruit Crop Pruning Demonstration

Clarence Peters, Fruit Specialist with Saskatchewan Agriculture and Food, conducted a course on principles and practices on pruning and training of fruit crops on April 21 at the CSIDC orchard. Producers and industry personnel attended this event.

# Conferences, Presentations & Meetings

CSIDC staff were active in presenting at and attending conferences and workshops throughout the year involving topics related to irrigation, including:

**<u>2006</u>**

- Canadian Water Resources Association (CWRA), Toronto - June 5th - 9th
- Saskatchewan Regional Retreat, Saskatoon - October 20th
- Leadership Conference, Ottawa - October 24th & 25th
- AAFC Lethbridge research station open house - October 26th
- Presentation to Department of Western Economic Diversification, Saskatoon - October 27th
- 6th Canadian Pulse Research Workshop, Saskatoon - November 1st - 3rd
- Lecture to Ag & Bioresource Engineering Irrigation class at University of Saskatchewan, Saskatoon - November 21st
- Ag Water directorate retreat, Regina - November 28th & 29th
- Saskatchewan Seed Potato Growers Association annual meeting, Saskatoon - November 29th - 30th
- Branch executive retreat, Moose Jaw - December 11th & 12th

**<u>2007</u>**

- Herb and Spice conference - January 12th
- NAHARP Annual Conference, Ottawa - January 30th & 31st
- Prairie Grain Development Committee Meetings, Saskatoon - February 20th - 22nd
- PFRA Technology and Innovation Symposium, Regina - February 21st & 22nd
- PFRA Business Development Committee work planning, Regina - March 7th & 8th
- Irrigation strategy workshop, Regina - March 13th & 14th

- NAHARP producer meeting, Outlook - March 19th
- Branch executive retreat, Saskatoon - March 19th & 20th
- Organic vegetable meetings, Outlook - March 21st

Other important meetings attended included:

**2006**

- Innovation and Renewal Team meetings, Toronto - April 5th - 7th
- CSIDC Executive Management Committee - April 12th, July 12th, March 28th
- Beneficial Management Practice discussion, Calgary - April 18th
- Westside Irrigation Project, Conquest - April 19th
- PFRA strategic planning - June 13th & 14th
- Strawberry Crown Production Commercialization working group - Meetings on various dates, and field meeting - September 8th
- Organic Vegetable Production - Meetings on various dates
- Saskatchewan Seed Potato Association Board of Directors - Meeting on various dates
- Saskatchewan Herb and Spice Association, Board of Directors - Meeting on various dates

## Booth Display

Although the majority of information transfer to producers occurs at the Centre, the CSIDC booth is displayed at numerous trade shows and conferences. The display allows staff to interact with the general public offering expertise and to promote effective irrigation in Saskatchewan. These events are important in raising awareness of the work conducted at the Centre to individuals located outside the Outlook area.

**2006**

- SIPA/ICDC Annual Conference, Moose Jaw - December 5th & 6th

**2007**

- Western Canadian Crop Production Show, Saskatoon - January 8th - 11th
- Alberta Irrigation Projects Association Conference, Calgary - March 5th & 6th

## International

AAFC/PFRA and CSIDC has a continued commitment to be involved in international development projects. CSIDC staff provided their expertise in irrigation, agronomics and management to educate representatives and ensure project success in underdeveloped countries.

**2006**

- Presentation to PFRA Branch Executive Committee, Cairo, Egypt - April 21st
- Planning meetings, Cairo, Egypt - May 1st - 10th
- CIDA discussions, Ottawa - May 25th & 26th

- Presentation to CIDA on Egypt & Canada, Ottawa - June 2nd
- CWRA post-conference tour of the Niagara and Holland Marsh areas of Ontario with Egyptian delegation - June 8th & 9th
- Seed Potato Production Course, Wuchuan, Inner Mongolia, China - August 20th - September 1st
- Egypt meetings, Cairo, Egypt - December 13th - 20th
- Chilean water project meetings, Outlook - January 25th
- National Water Quality and Availability Management (NAWQAM) wrap-up conference, Sharm El-Sheikh, Egypt - February 11th - 20th
- Agricultural Research Methodology Training, WHIST Project, Mekelle, Ethiopia - February 22nd - March 5th

# Factsheets

The following factsheets are available from CSIDC. Please contact the Centre at (306) 867-5400 for copies, or visit the website at www.agr.gc.ca/pfra/csidc/csidc.htm.

**Cereals:**
Decision Guide for Foliar Disease Control in Irrigated Wheat
Early Seeding of Irrigated Cereals

**Forages:**
Alfalfa Establishment under Irrigated Conditions
Alfalfa Seed Production under Irrigation

**Herbs:**
Production Practices for *Echinacea angustifolia*
Production Practices for Feverfew

**Oilseeds:**
Crop Management for Sclerotinia Control in Canola
Date of Seeding, Seed Rate, and Row Spacing of Irrigated Flax
Seeding Rate and Row Spacing for Irrigated Canola

**Potatoes:**
Cultivar Specific Fertility Management
Irrigation Scheduling for Potatoes
Micronutrients in Potato Production
Processing Potato in Saskatchewan: Potential and Opportunities
Northern Vigor™ in Seed Potato

**Pulse Crops:**

Applying Starter Fertilizer to Dry Bean
Does Applying Extra Micronutrients to Dry Beans Pay?
Dry Bean - Fertility Management under Irrigation
Dry Bean - Optimum Seeding Rate and Row Spacing
Evaluation of the Keho Bean Sweep Lifter Brush
Nitrogen Management of CDC Pintium
How effective are Granular Inoculants for Dry Bean?
Potassium fertilizer on Dry Bean
Post-emergent nitrogen application on dry bean
Field Pea - Optimum Seeding Rates
Do Field Peas Respond to Micronutrient Fertilizer?
Field Pea - Rate & Placement Effects of Phosphorus & Potassium Fertilizer
How Effective are Granular Inoculants on Irrigated Pea?
Starter Potassium on Irrigated Field Pea
Management of Field Pea under Irrigation
Irrigated Chickpea Trials at CSIDC
Management of Irrigated Lentil
Faba Bean Trials at CSIDC

**Soils and Fertilizers:**

Agrochemical in Soil & Groundwater
Canola Fertilization Trials at CSIDC
Reclamation of Saline Field using Subsurface Drains

**Vegetables:**

Cabbage: Post-harvest handling and storage
Cabbage Storage
Carrots: Post-harvest handling and storage
Melons: Post-harvest handling and storage
Onions: Post-harvest handling and storage
Peppers: Post-harvest handling and storage
Pumpkin Irrigation Scheduling
Pumpkin Production
Vegetables: A Growing Industry
Demonstration of Improved Vegetable Production Techniques in Saskatchewan

**Other:**

CSIDC Annual Review
CSIDC Brochure
Prairie Province Trickle Irrigation Manual