Overview of crop health issues and survey results in 2017

IRRIGATED CROP PRODUCTION UPDATE

Lethbridge, AB January 16, 2018

Michael Harding, Alberta Agriculture and Forestry
Jie Feng, Krista Zuzak, Yalong Yang (APHL)
Kequan Xi, Krishan Kumar (FCDC)
K. Turkington, S. Chatterton, R. Aboukhaddour (AAFC)
S. Strelkov, V. Manolii (University of Alberta)

ACKNOWLEDGEMENTS

CLUBROOT SURVEY

- Stephen Strelkov and Victor Manolii (Univ of AB)
- Municipal Agricultural Fieldmen

BLACKLEG SURVEY

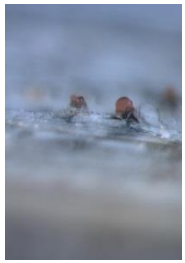
- Janette MacDonald and ARECA
- Municipal Agricultural Fieldmen

SPONSORS

- ACIDF and GF2
- ABC, ACPC, APGC, AWC, WGRF
- AAF and AAFC

AAF and AAFC

- Technicians, Admin support, Management



OUTLINE

CANOLA DISEASE SURVEY RESULTS

- Stem rot
- Blackleg
- Clubroot

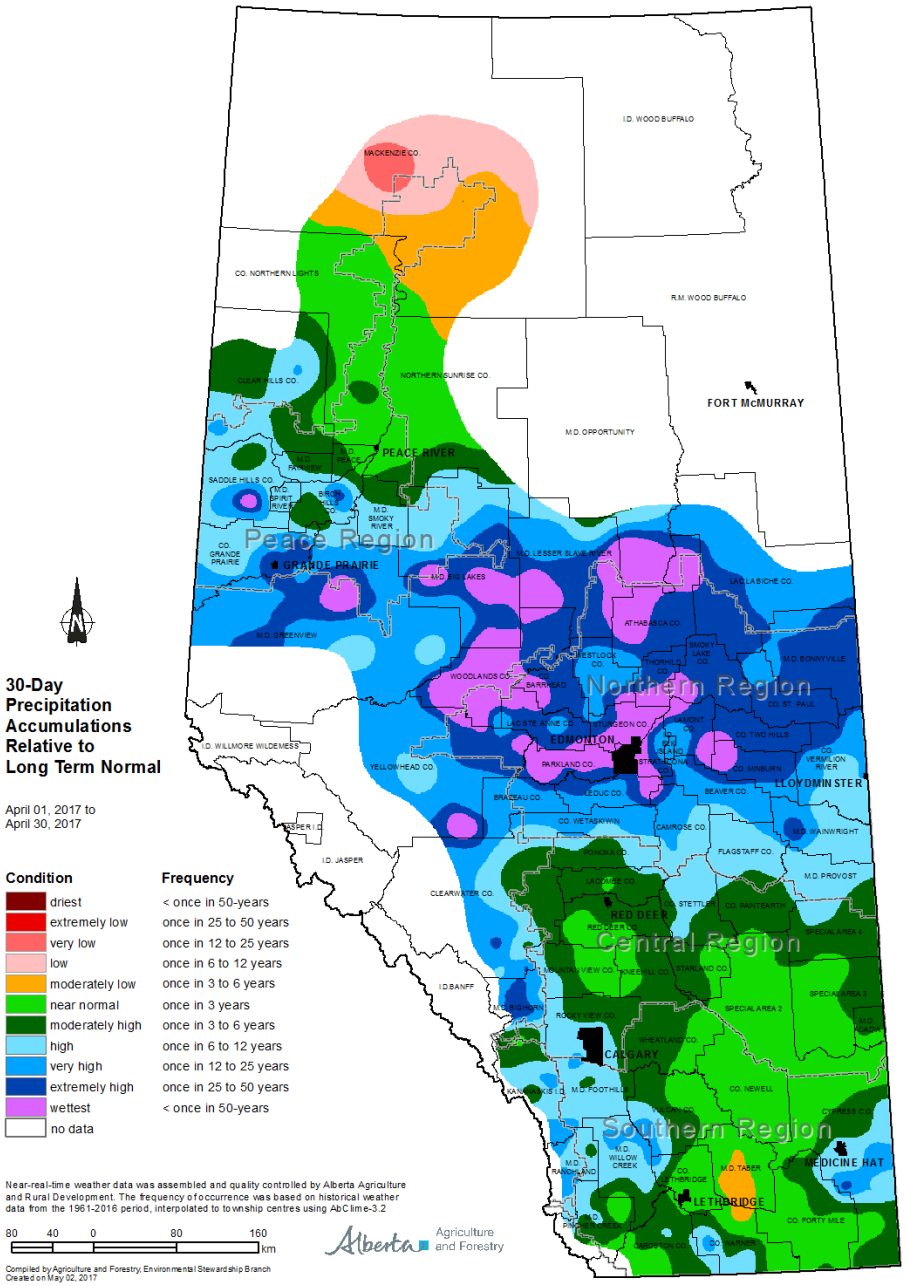
WHEAT DISEASE SURVEY RESULTS

- Leaf spots/root rots
- Fusarium head blight

PULSE DISEASE SURVEY RESULTS

- Root rots on pulses
- Mycosphaerella on pea

Alberta Government



30-Day Precipitation Accumulations Relative to Long Term Normal

April 01, 2017 to
April 30, 2017

Condition	Frequency
driest	< once in 50-years
extremely low	once in 25 to 50 years
very low	once in 12 to 25 years
low	once in 6 to 12 years
moderately low	once in 3 to 6 years
near normal	once in 3 years
moderately high	once in 3 to 6 years
high	once in 6 to 12 years
very high	once in 12 to 25 years
extremely high	once in 25 to 50 years
wettest	< once in 50-years
no data	

Near-real-time weather data was assembled and quality controlled by Alberta Agriculture and Rural Development. The frequency of occurrence was based on historical weather data from the 1961-2016 period, interpolated to township centres using AbClime-3.2

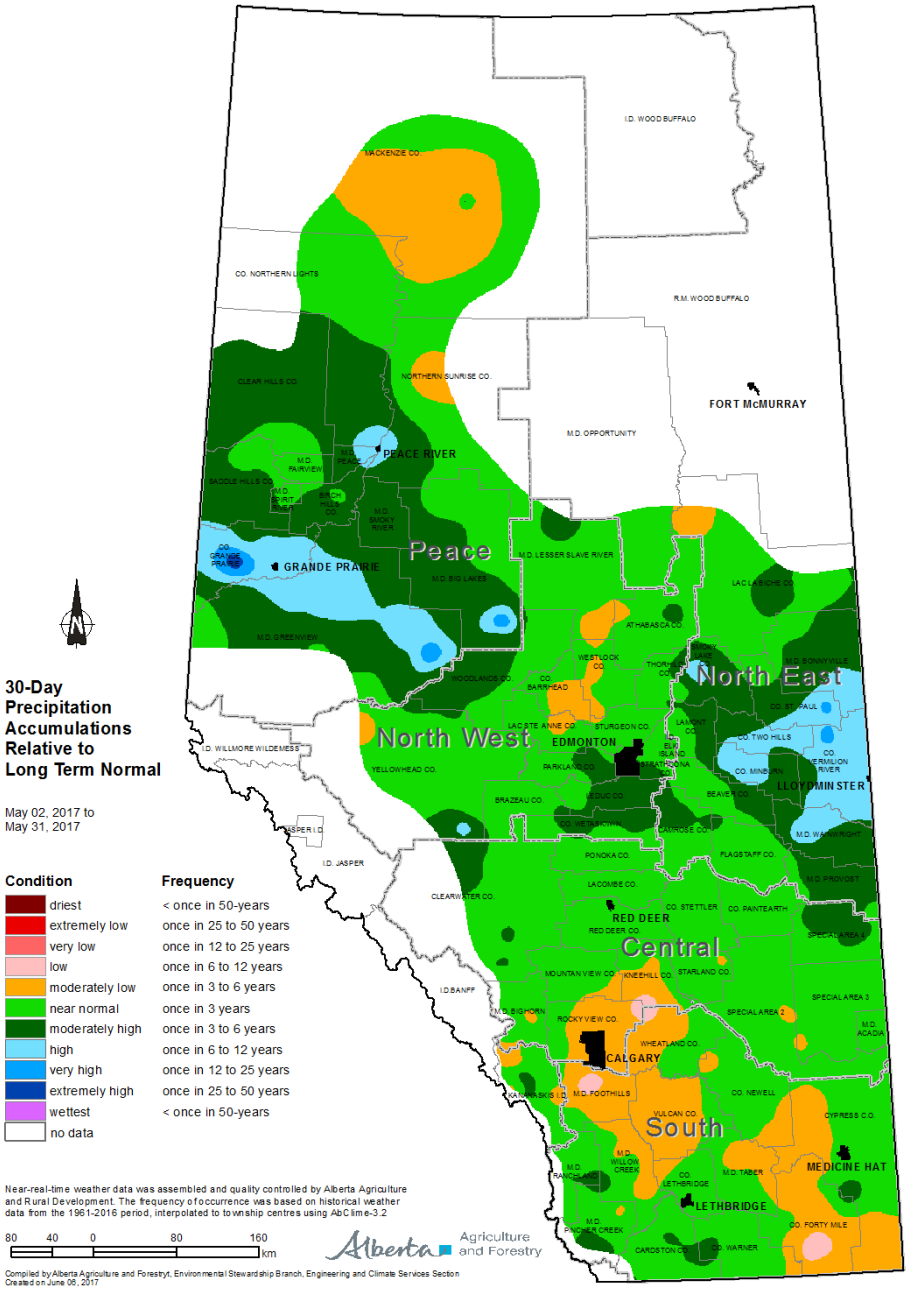
80 40 0 80 160 km

Alberta Agriculture and Forestry

Compiled by Agriculture and Forestry, Environmental Stewardship Branch
Created on May 02, 2017

Visit weatherdata.ca for additional maps and meteorological data

Alberta Government



30-Day Precipitation Accumulations Relative to Long Term Normal

May 02, 2017 to
May 31, 2017

Condition	Frequency
driest	< once in 50-years
extremely low	once in 25 to 50 years
very low	once in 12 to 25 years
low	once in 6 to 12 years
moderately low	once in 3 to 6 years
near normal	once in 3 years
moderately high	once in 3 to 6 years
high	once in 6 to 12 years
very high	once in 12 to 25 years
extremely high	once in 25 to 50 years
wettest	< once in 50-years
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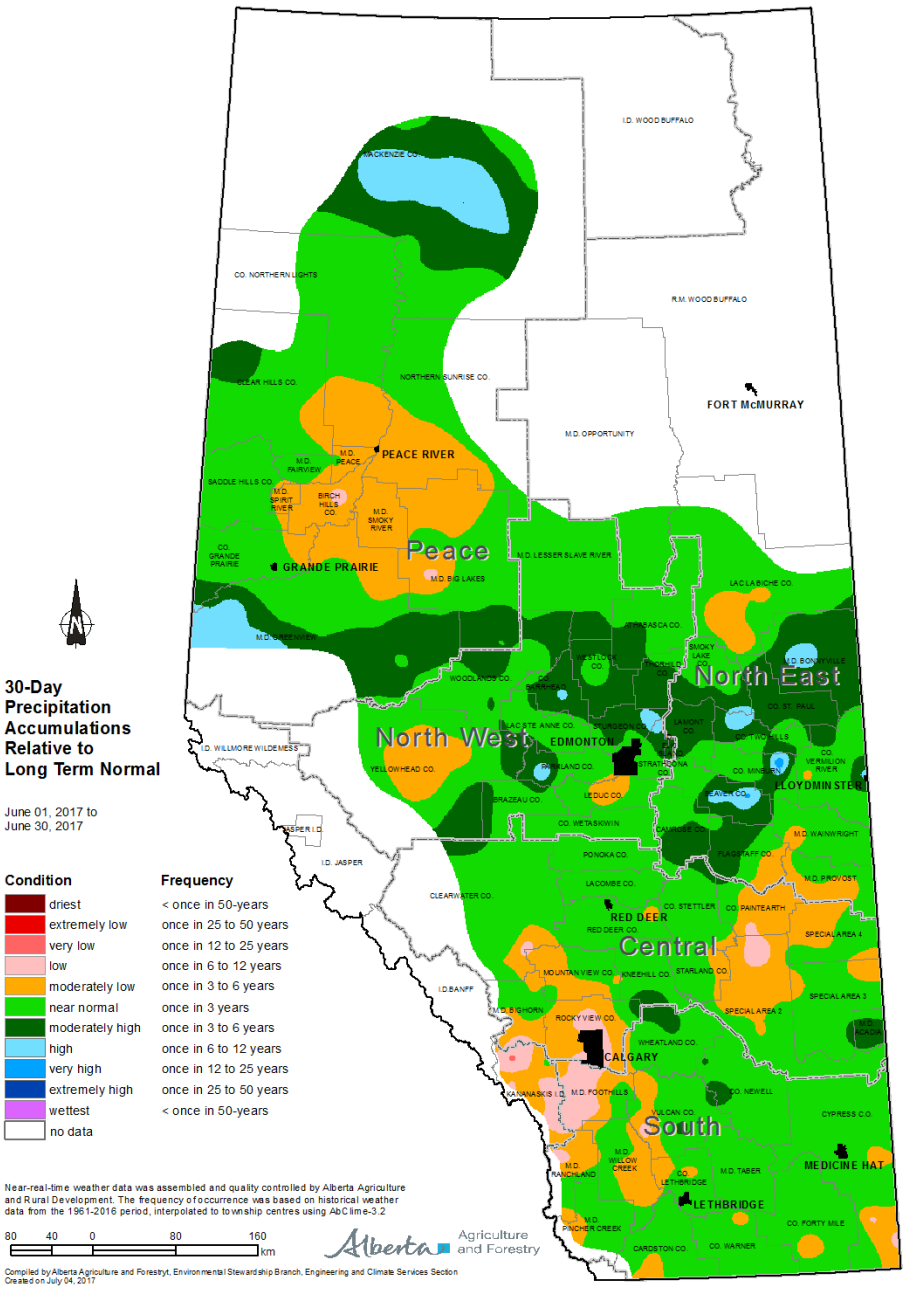
80 40 0 80 160 km

Alberta Agriculture and Forestry

Compiled by Alberta Agriculture and Forestry, Environmental Stewardship Branch, Engineering and Climate Services Section
Created on June 08, 2017

Visit weatherdata.ca for additional maps and meteorological data

Alberta Government



30-Day Precipitation Accumulations Relative to Long Term Normal

June 01, 2017 to
June 30, 2017

Condition	Frequency
driest	< once in 50-years
extremely low	once in 25 to 50 years
very low	once in 12 to 25 years
low	once in 6 to 12 years
moderately low	once in 3 to 6 years
near normal	once in 3 years
moderately high	once in 3 to 6 years
high	once in 6 to 12 years
very high	once in 12 to 25 years
extremely high	once in 25 to 50 years
wettest	< once in 50-years
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80 40 0 80 160 km

Alberta Agriculture and Forestry

Compiled by Alberta Agriculture and Forestry, Environmental Stewardship Branch, Engineering and Climate Services Section
Created on July 04, 2017

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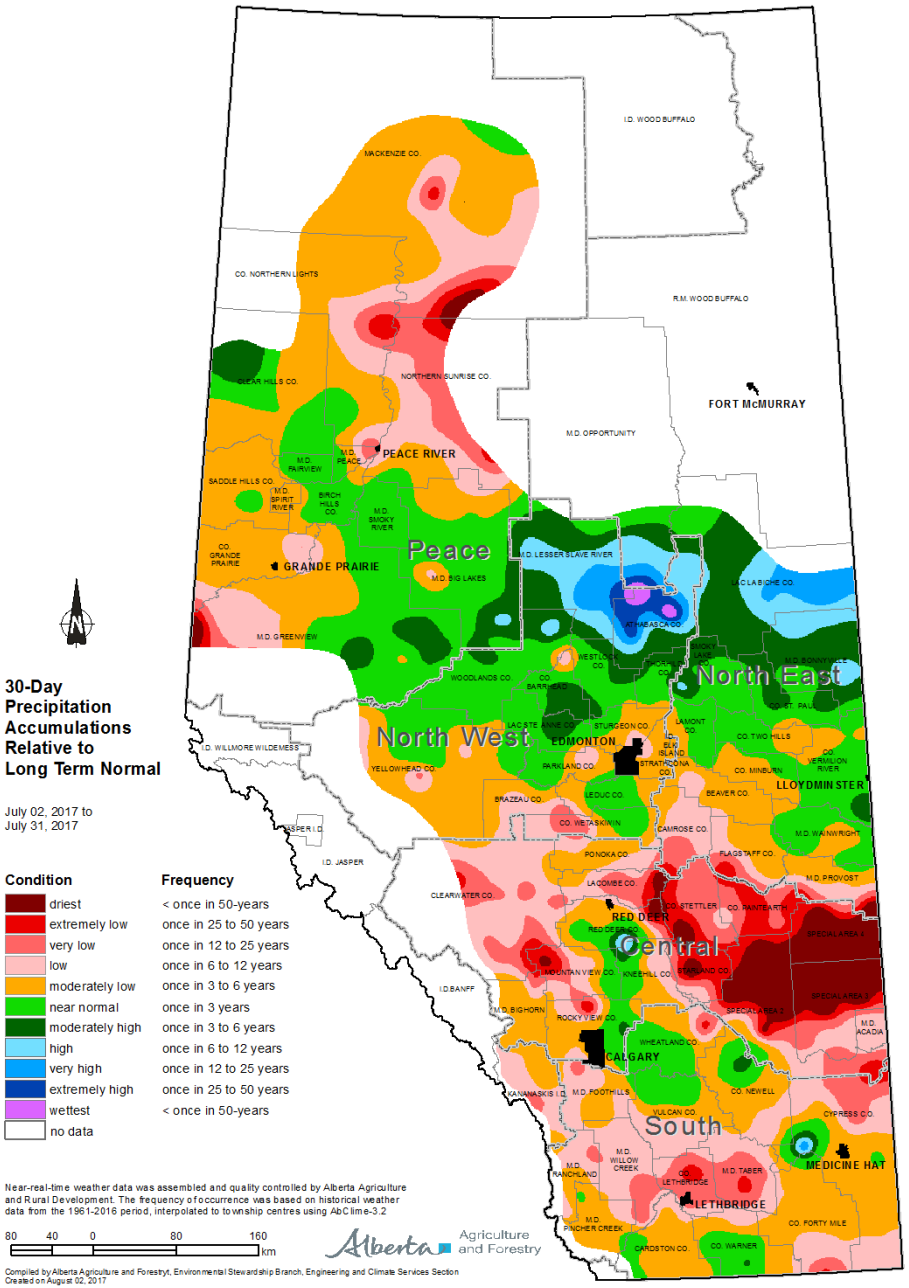
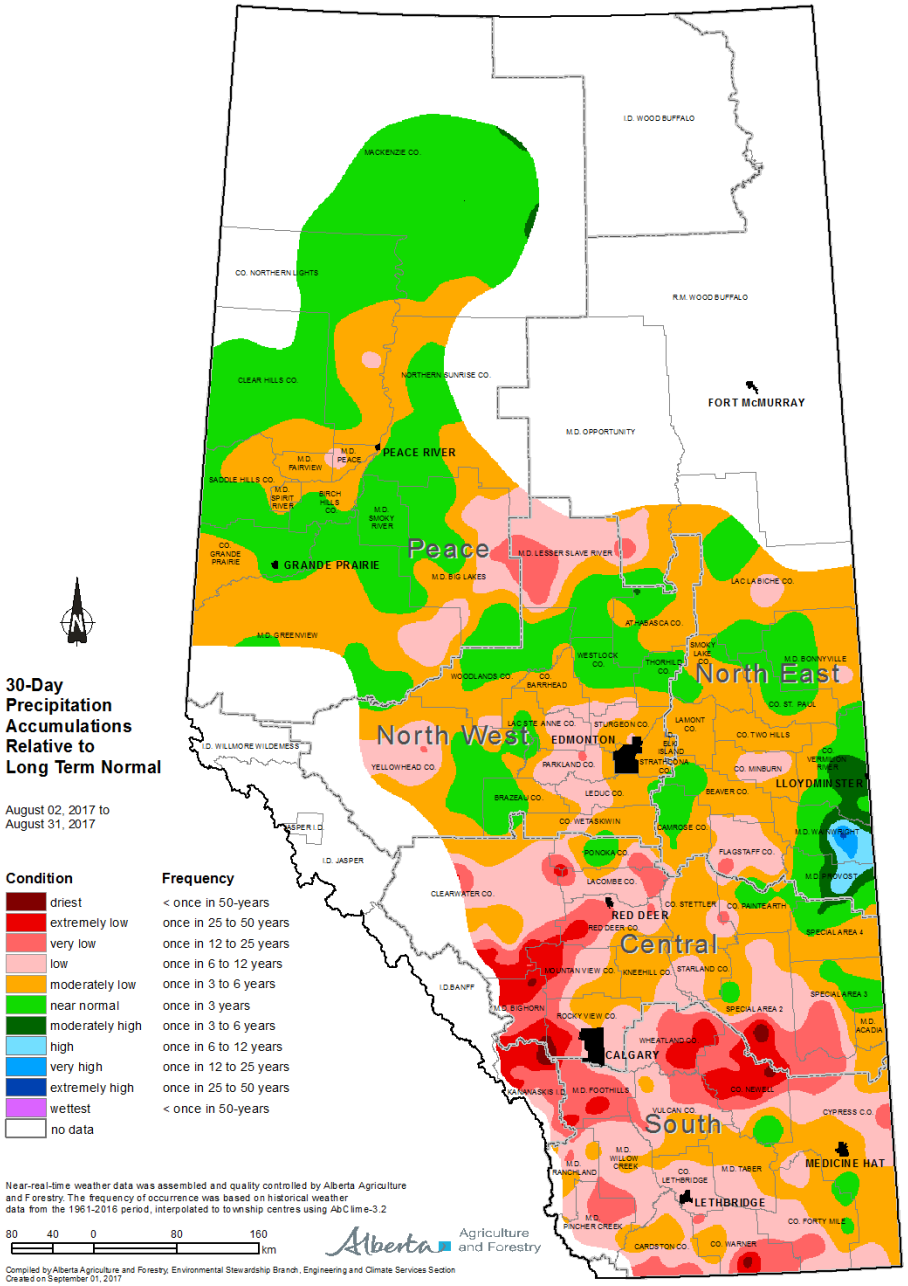
Alberta Government



Visit weatherdata.ca for additional maps and meteorological data

Alberta Government



30-Day Precipitation Accumulations Relative to Long Term Normal

August 02, 2017 to August 31, 2017

Condition	Frequency
driest	< once in 50-years
extremely low	once in 25 to 50 years
very low	once in 12 to 25 years
low	once in 6 to 12 years
moderately low	once in 3 to 6 years
near normal	once in 3 years
moderately high	once in 3 to 6 years
high	once in 6 to 12 years
very high	once in 12 to 25 years
extremely high	once in 25 to 50 years
wettest	< once in 50-years
no data	

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80 40 0 80 160 km

Alberta Agriculture and Forestry

Compiled by Alberta Agriculture and Forestry, Environmental Stewardship Branch, Engineering and Climate Services Section
Created on September 01, 2017

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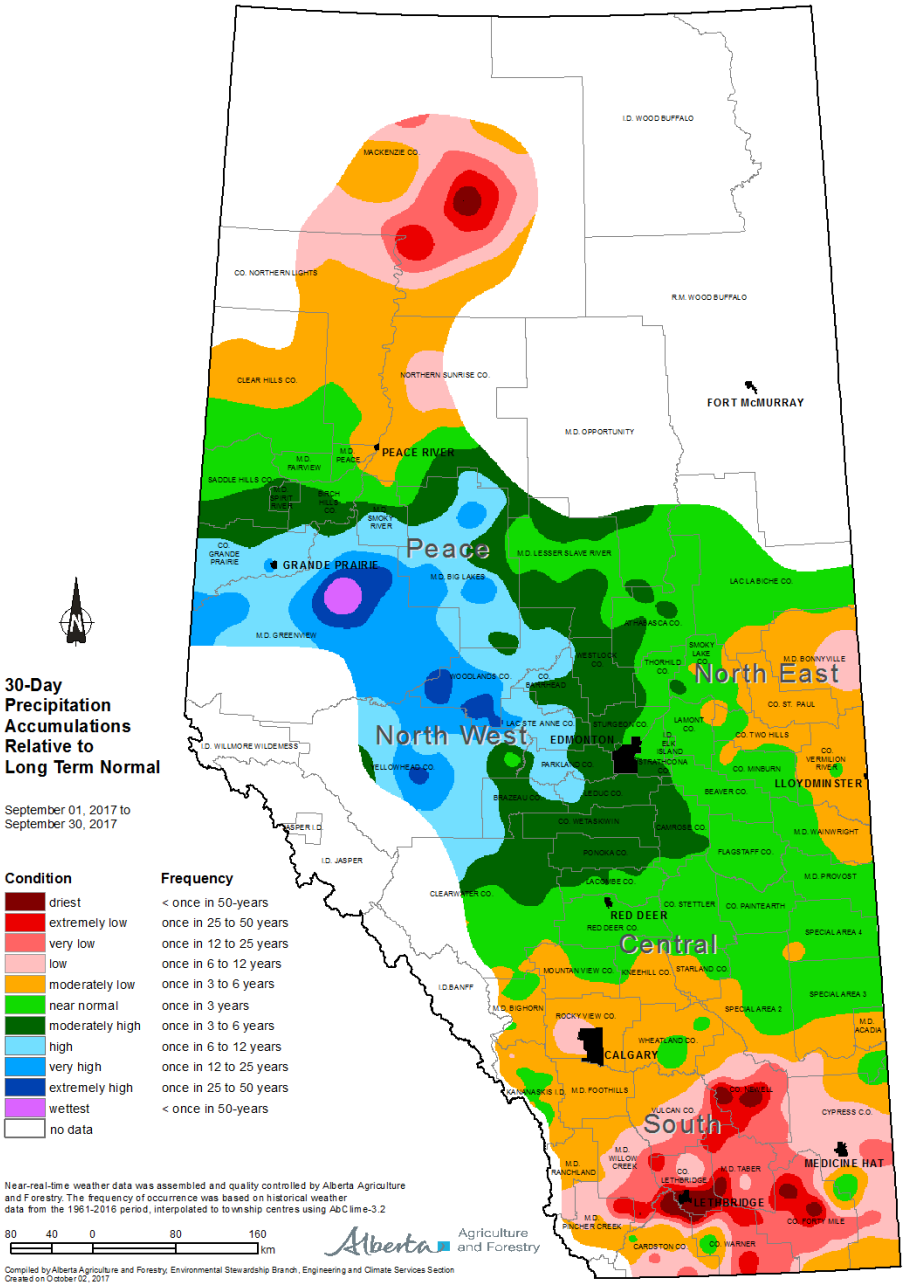
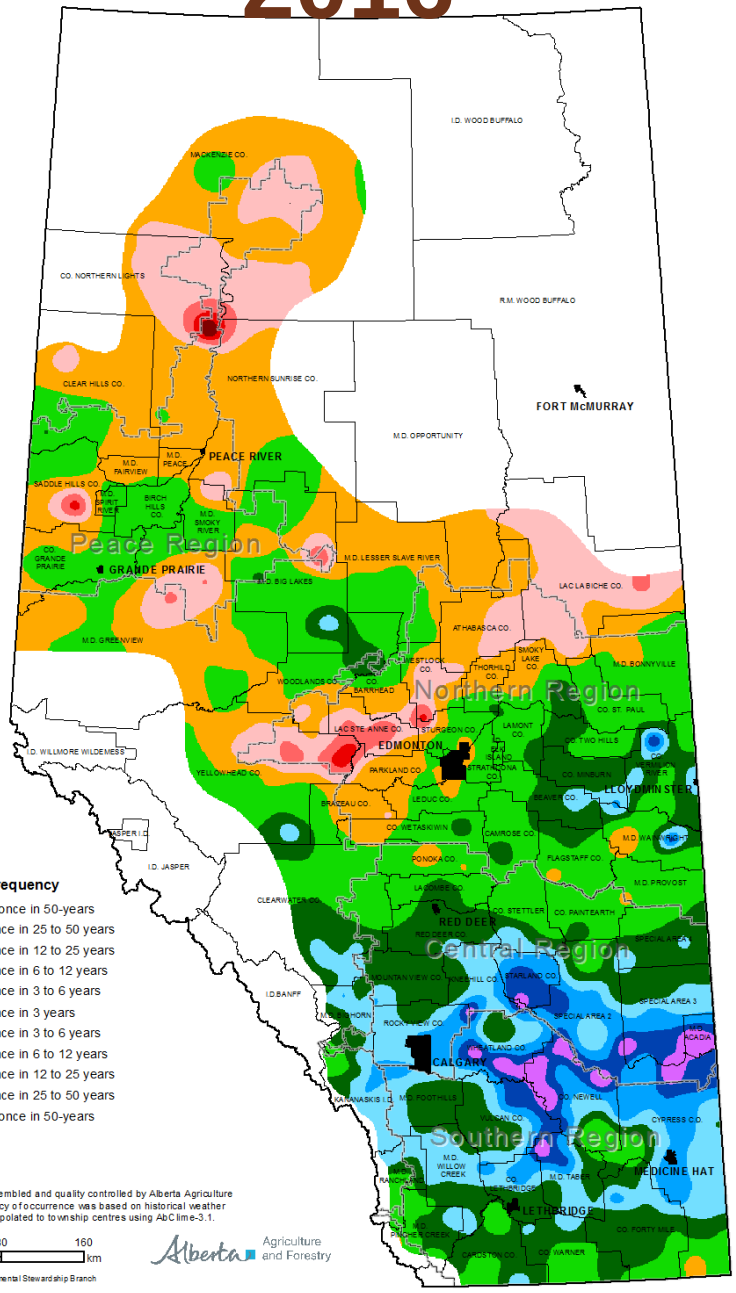
Alberta Government



Visit weatherdata.ca for additional maps and meteorological data

2016



30-Day Precipitation Accumulations Relative to Long Term Normal

June 26, 2016 to July 25, 2016

Condition	Frequency
driest	< once in 50-years
extremely low	once in 25 to 50 years
very low	once in 12 to 25 years
low	once in 6 to 12 years
moderately low	once in 3 to 6 years
near normal	once in 3 years
moderately high	once in 3 to 6 years
high	once in 6 to 12 years
very high	once in 12 to 25 years
extremely high	once in 25 to 50 years
wettest	< once in 50-years
no data	

Near-real-time weather data was assembled and quality controlled by Alberta Agriculture and Rural Development. The frequency of occurrence was based on historical weather data from the 1961-2015 period, interpolated to township centres using AbClime-3.1.

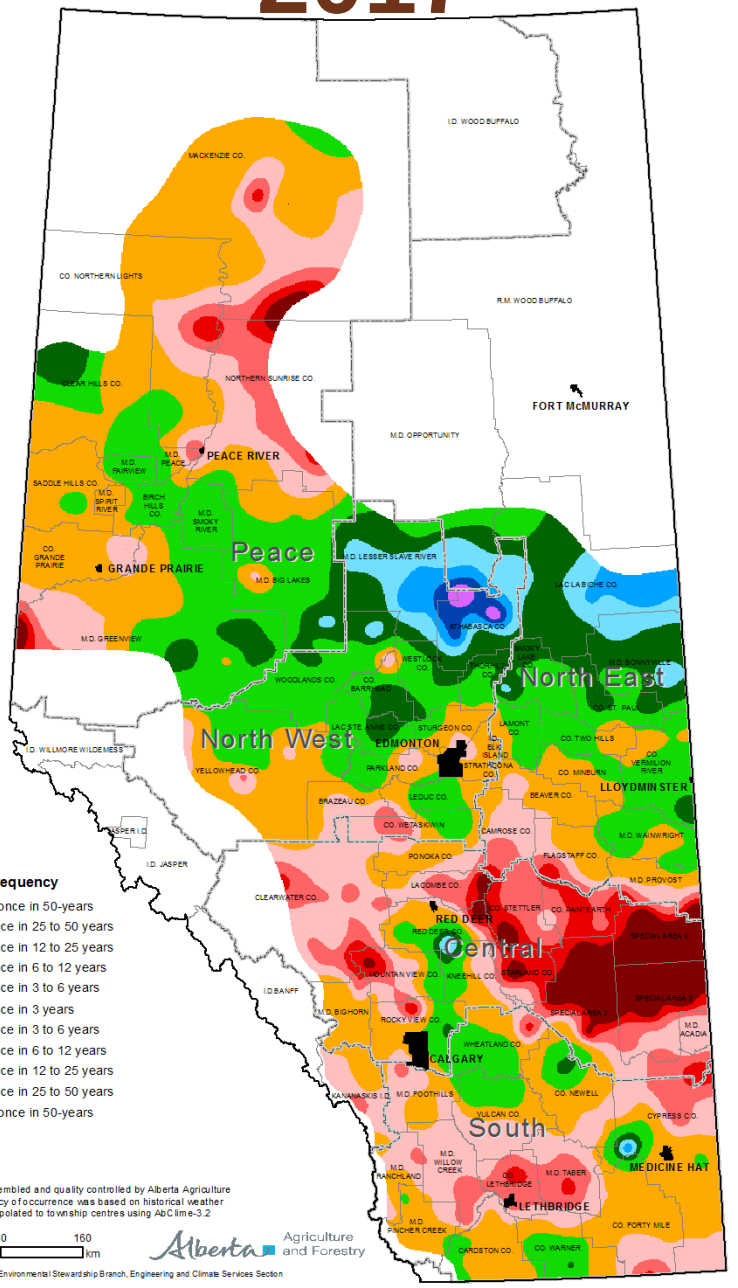
80 40 0 80 160 km

Alberta Agriculture and Forestry

Compiled by Agriculture and Forestry, Environmental Stewardship Branch
Created on July 27, 2016

Visit weatherdata.ca for additional maps and meteorological data

2017



30-Day Precipitation Accumulations Relative to Long Term Normal

July 02, 2017 to July 31, 2017

Condition	Frequency
driest	< once in 50-years
extremely low	once in 25 to 50 years
very low	once in 12 to 25 years
low	once in 6 to 12 years
moderately low	once in 3 to 6 years
near normal	once in 3 years
moderately high	once in 3 to 6 years
high	once in 6 to 12 years
very high	once in 12 to 25 years
extremely high	once in 25 to 50 years
wettest	< once in 50-years
no data	

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80 40 0 80 160 km

Alberta Agriculture and Forestry

Compiled by Alberta Agriculture and Forestry, Environmental Stewardship Branch, Engineering and Climate Services Section
Created on August 02, 2017

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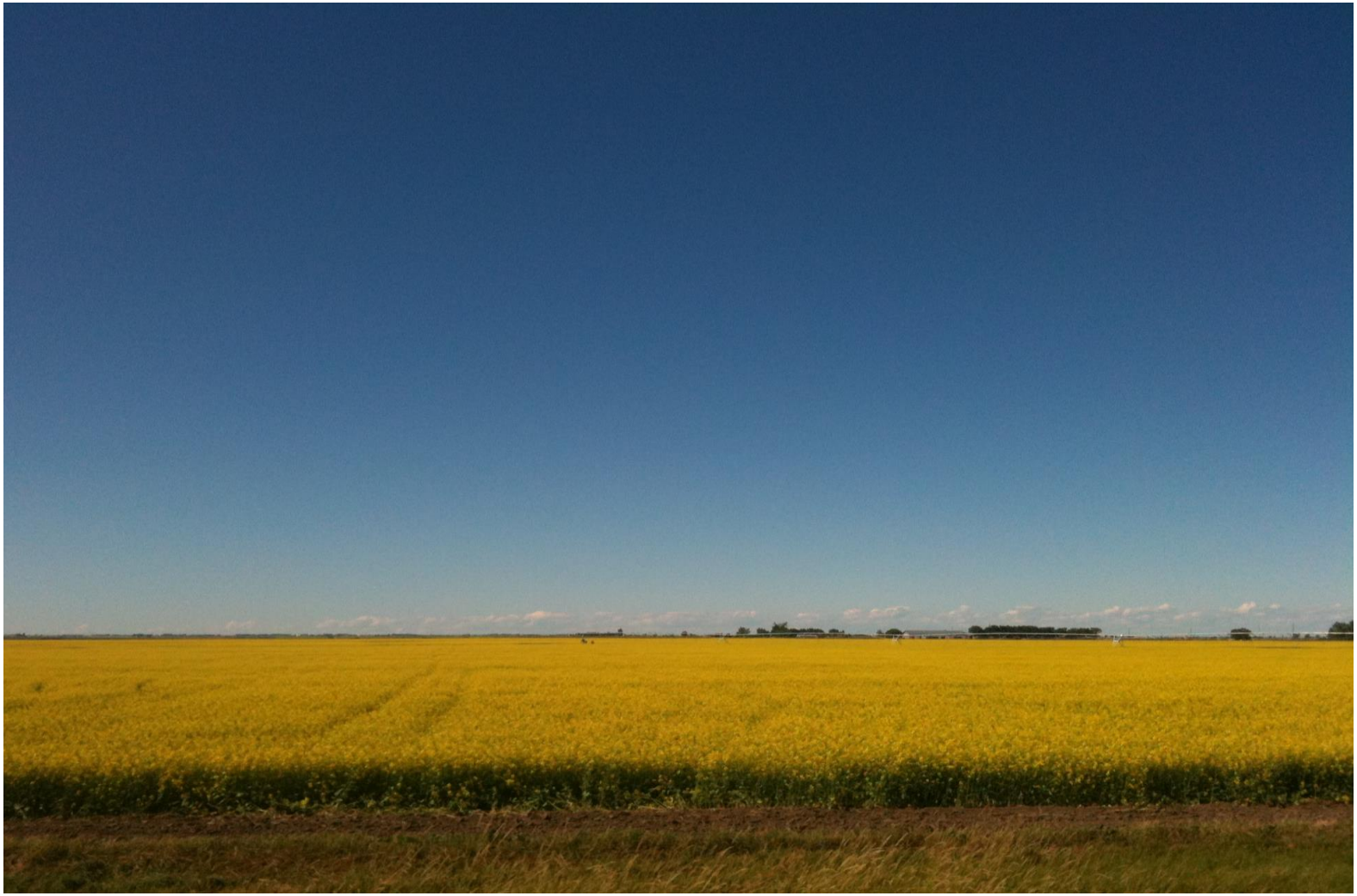
Alberta Government

CANOLA DISEASES



What canola disease had the highest prevalence and incidence across Alberta in 2017?

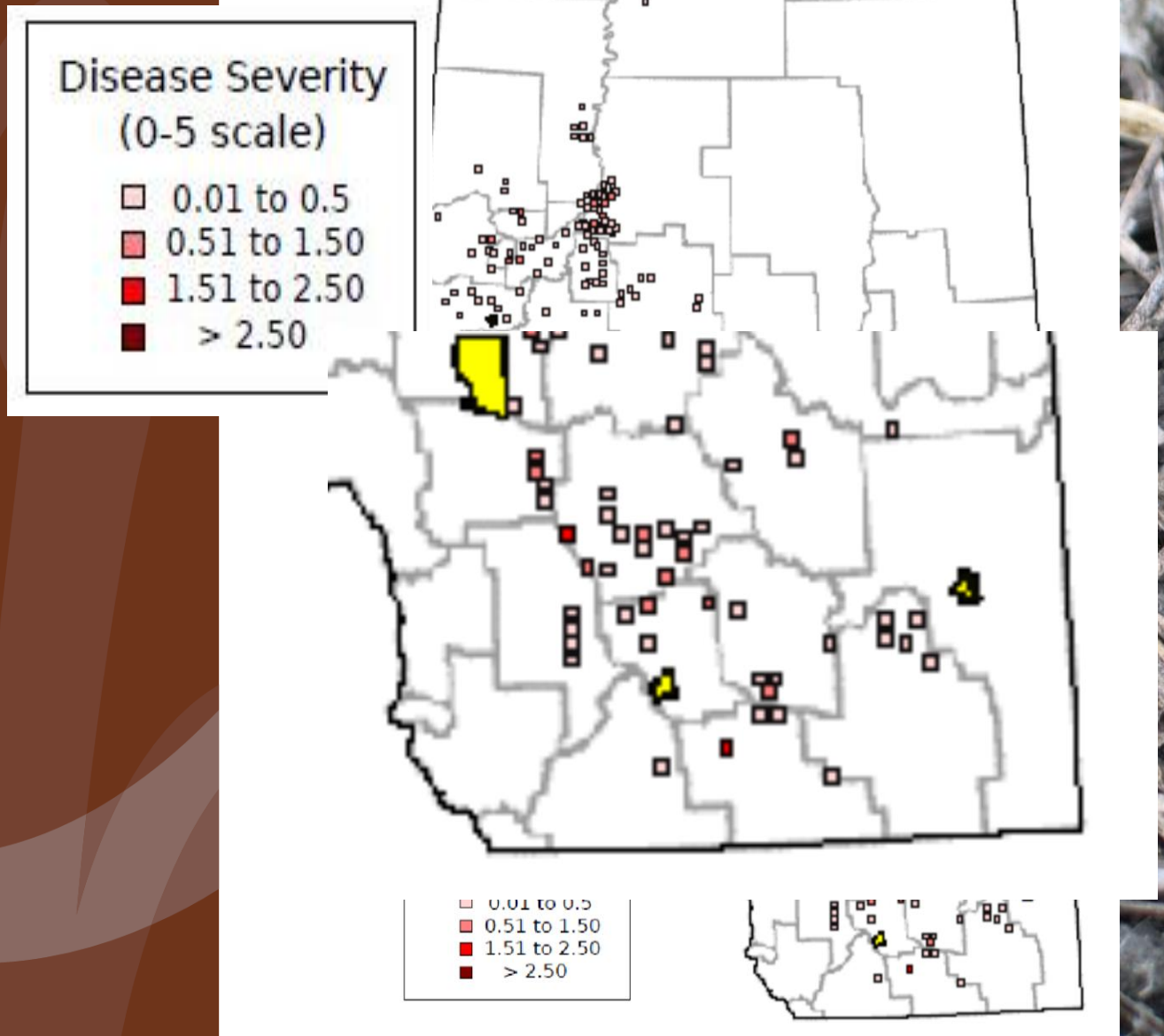
1. Clubroot
2. Blackleg
3. Sclerotinia stem rot
4. Verticillium wilt

CANOLA: Blackleg

# fields affected	Disease Prevalence (%)	Disease Incidence (%)
346/421	82.2%	14.0%

Severity was low in most fields (ave = 0.26)

CANOLA: Blackleg



CANOLA: What about stem rot?

# fields	Prevalence (%)	Incidence (%)
75/352	21%	2%

What a difference a year makes

# fields	Prevalence (%)	Incidence (%)
252/311	81%	31%

CANOLA: Clubroot

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2017 Survey:

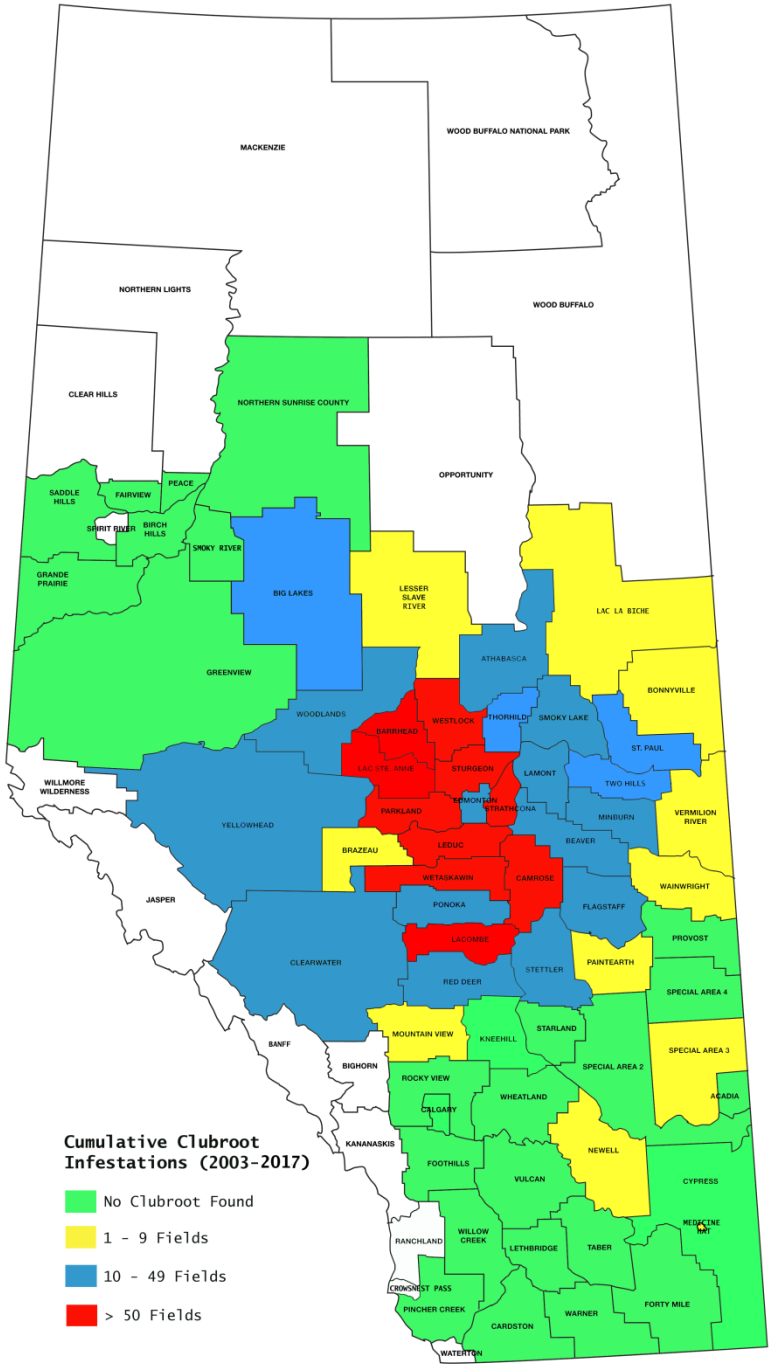
301 new cases

4 new counties

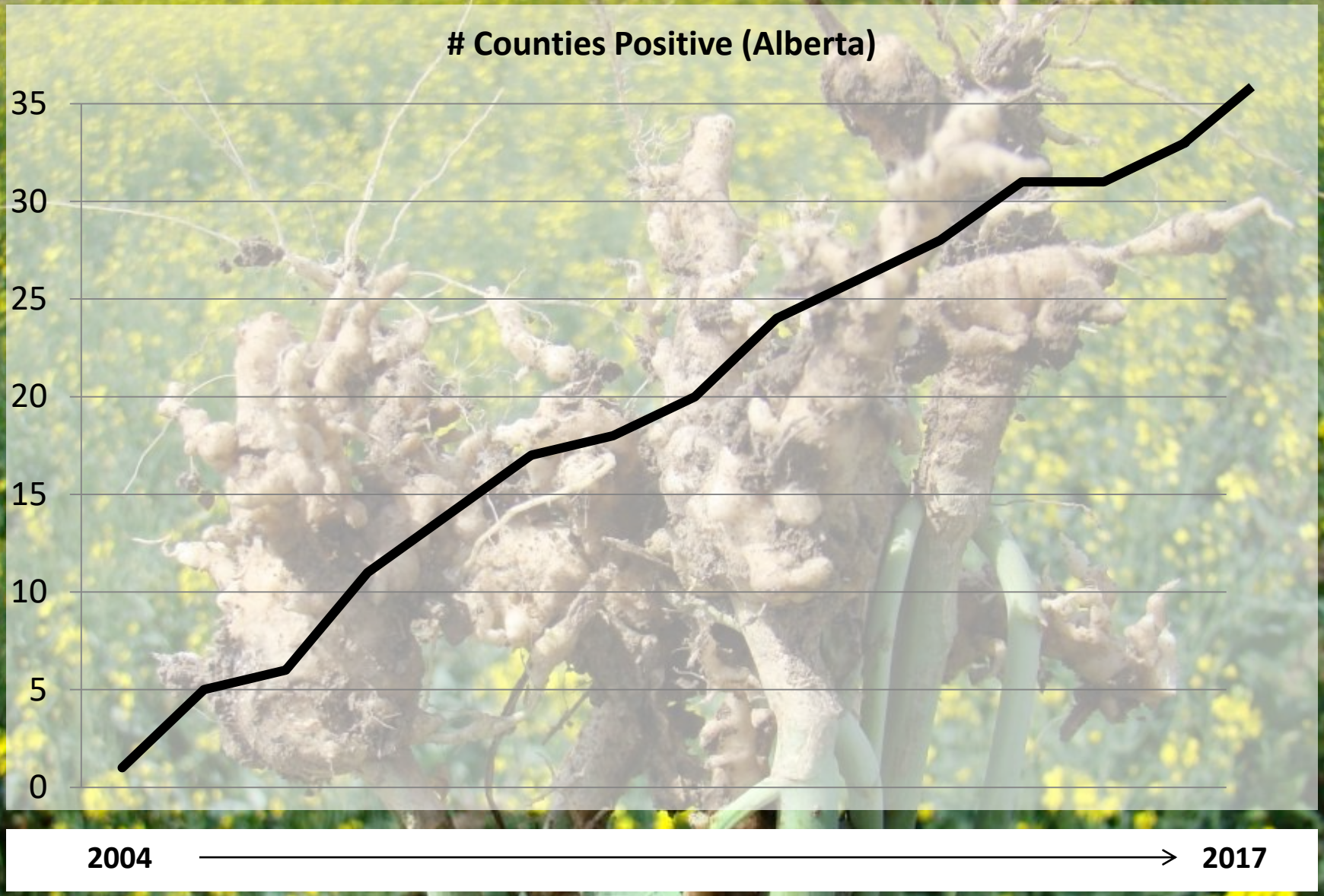
Grand Total:

> 2700 fields

36 counties



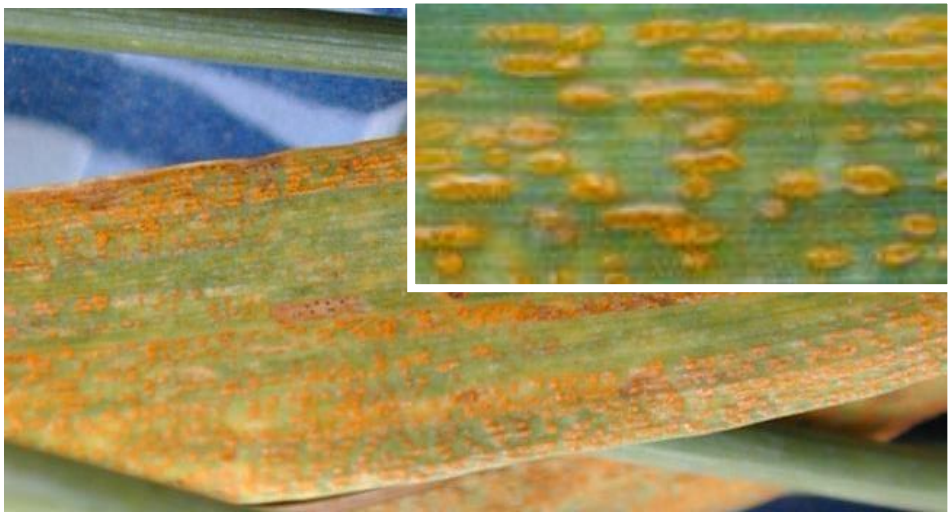

Fields Positive (Alberta)
3000
2500
2000
1500
1000
500
0
2004
2017


Counties Positive (Alberta)
35
30
25
20
15
10
5
0
2004
2017

CEREAL DISEASES

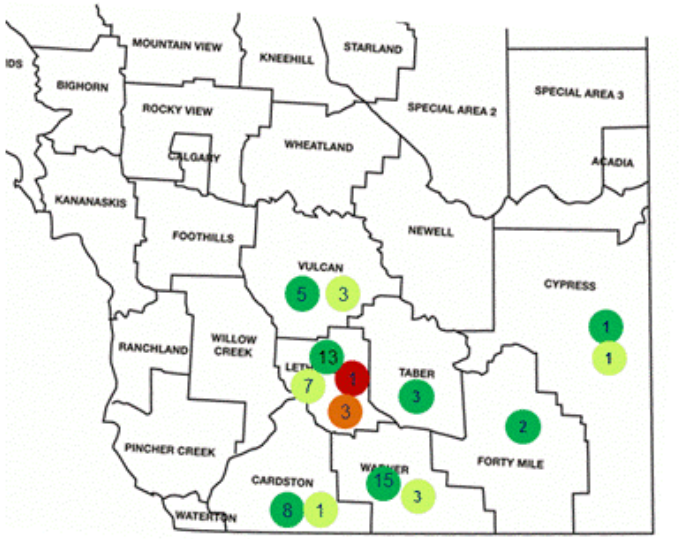
CEREALS: Leaf spots in wheat

Wheat	Prevalence (%)	Severity
Leaf spot	100%	< 4 (0-9)
SR - south	25%	6% severe

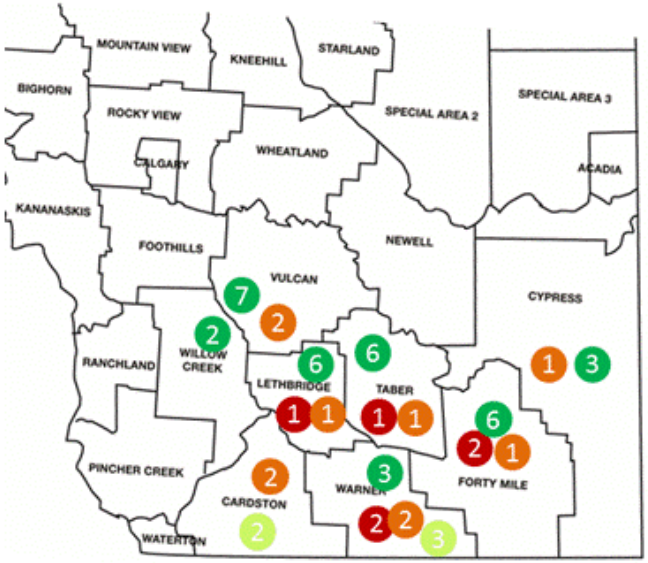


Stripe rust in 2016 and 2017

A



B



2017 spring/summer level of infection

2016 spring/summer level of infection

Dark green: clean fields, light green: trace or light, orange: moderate, red: severe.

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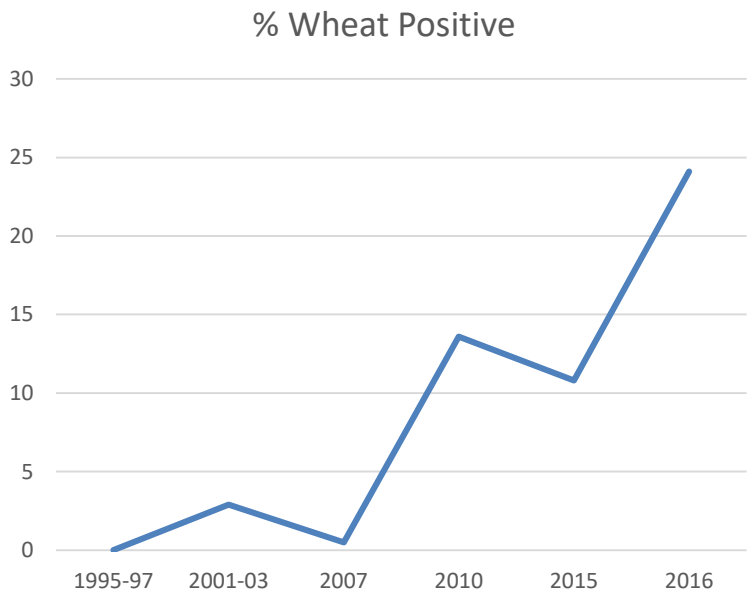
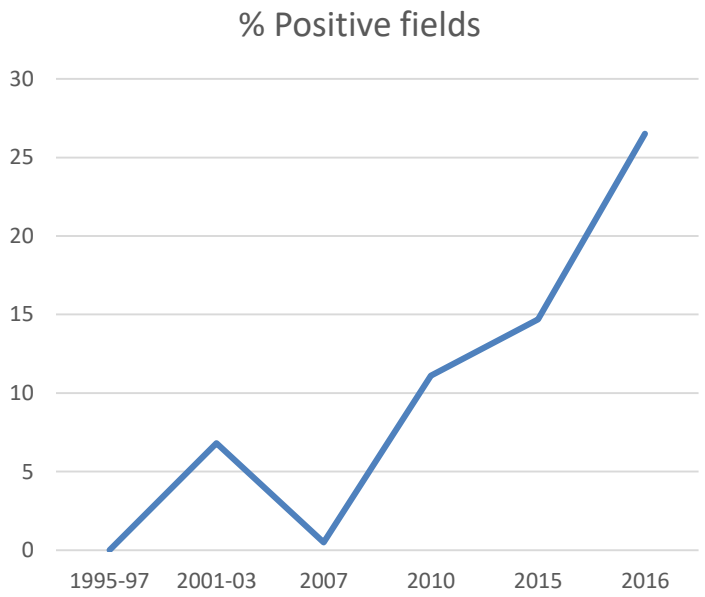
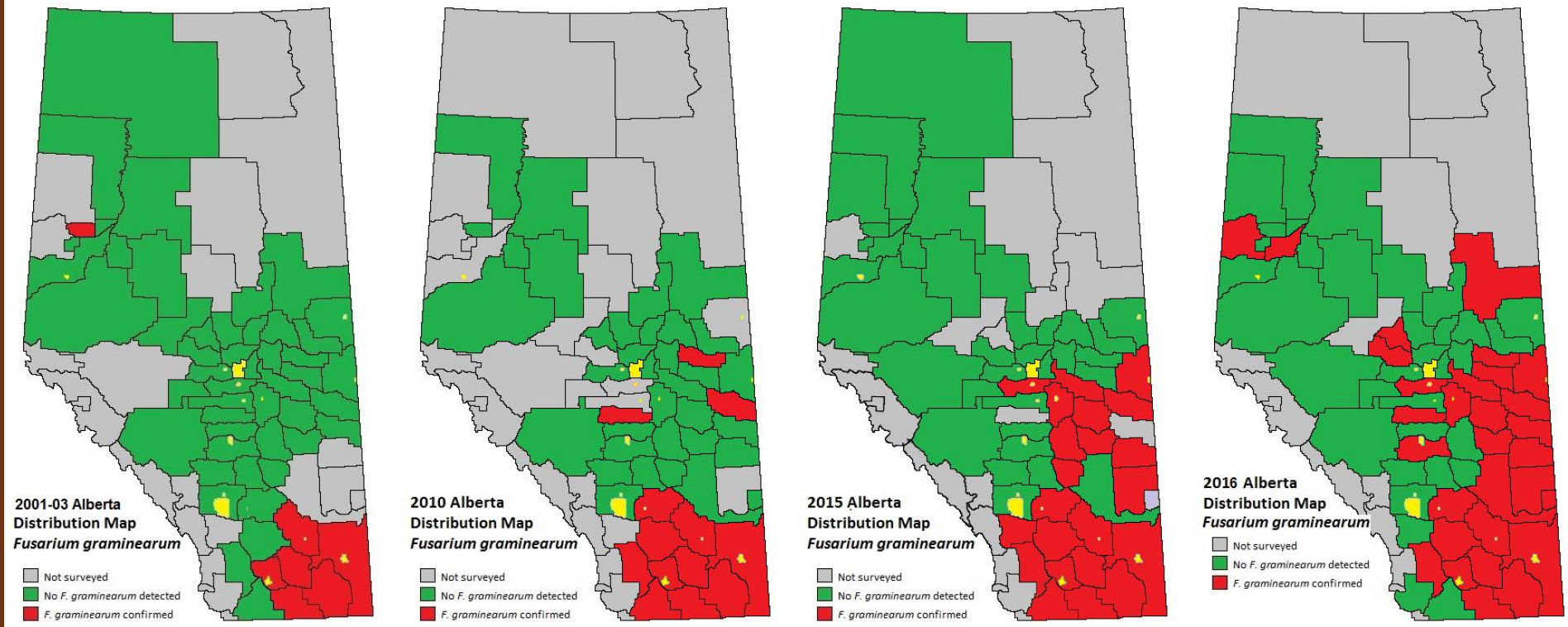
FUSARIUM HEAD BLIGHT

CEREALS: Fusarium head blight





CEREALS: Fusarium head blight



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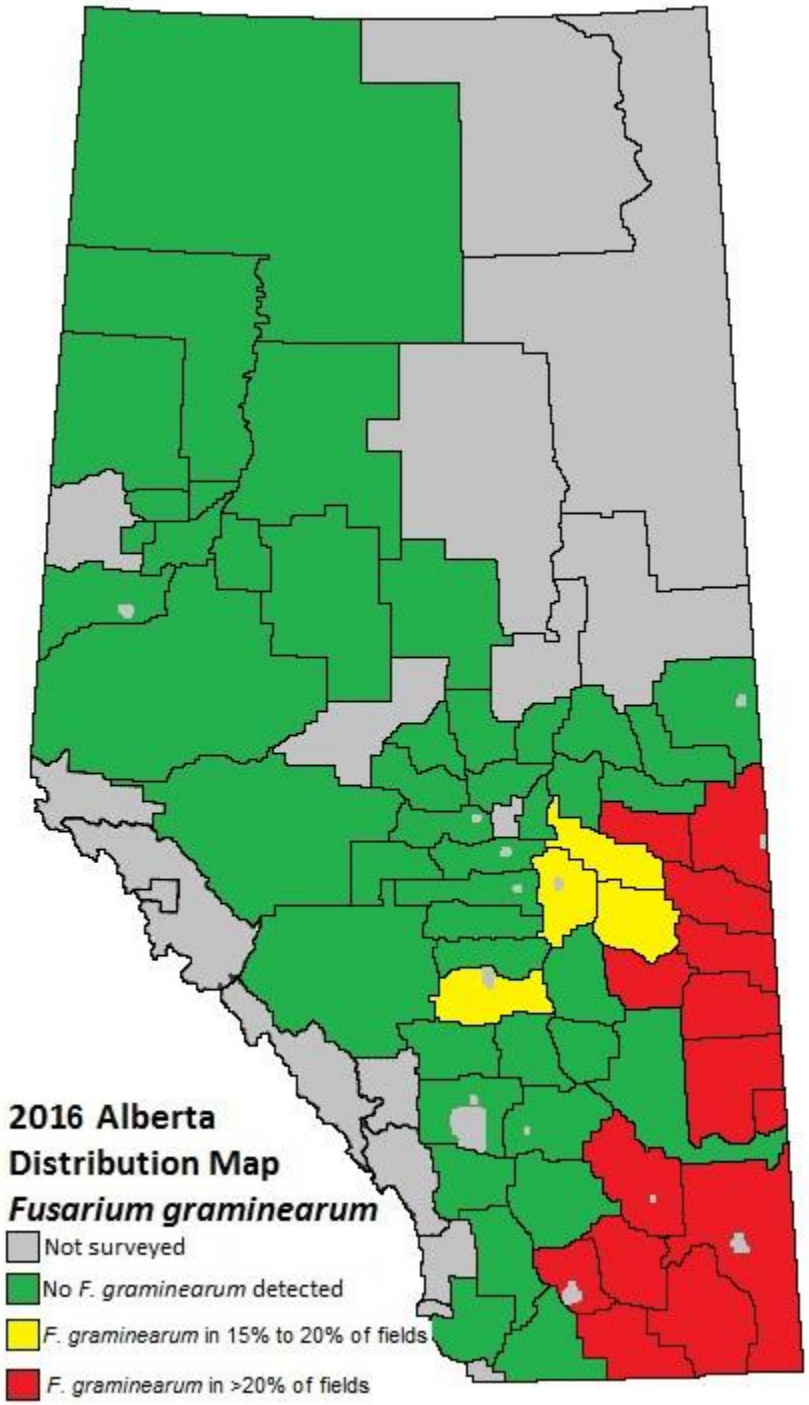
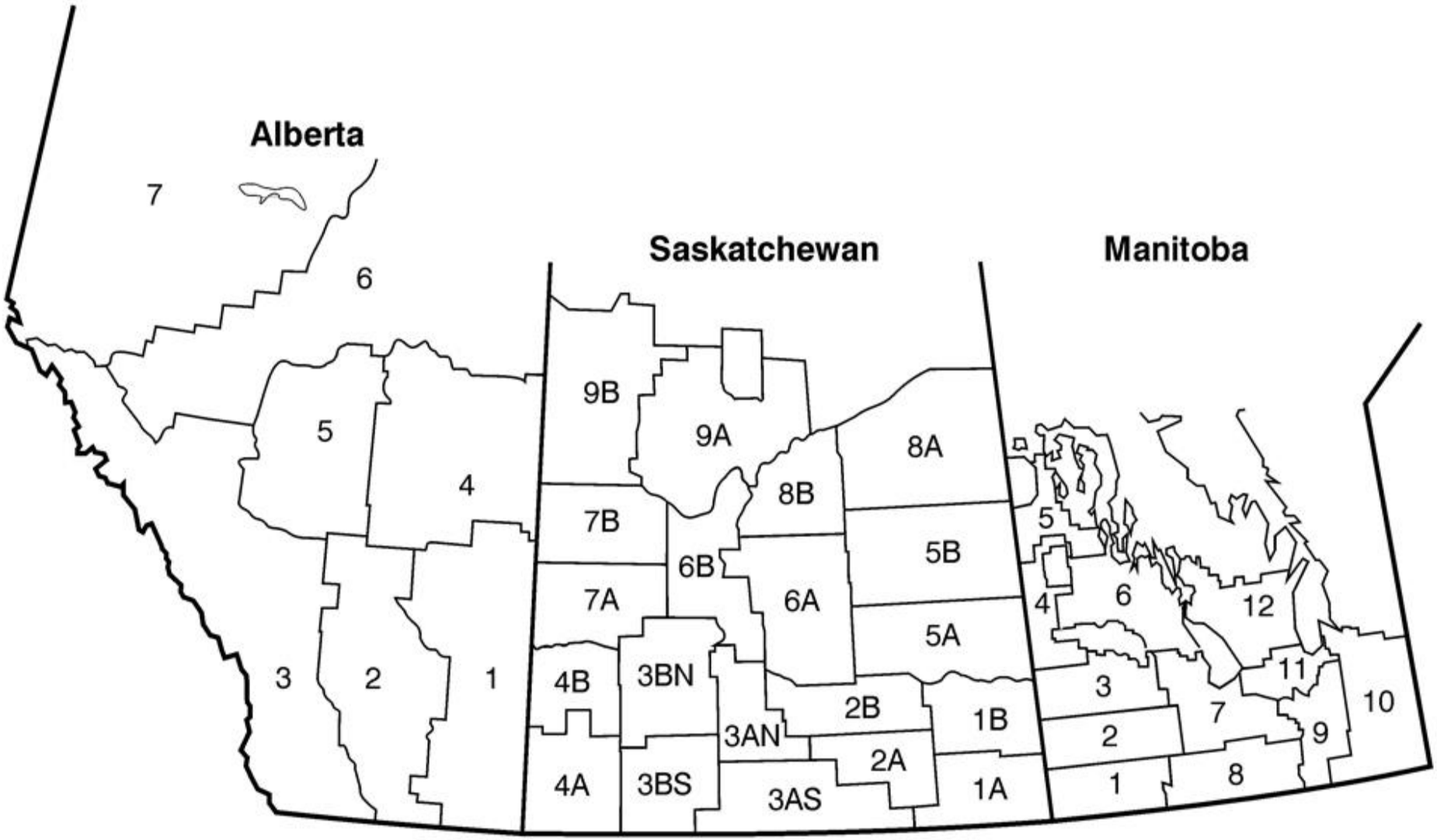
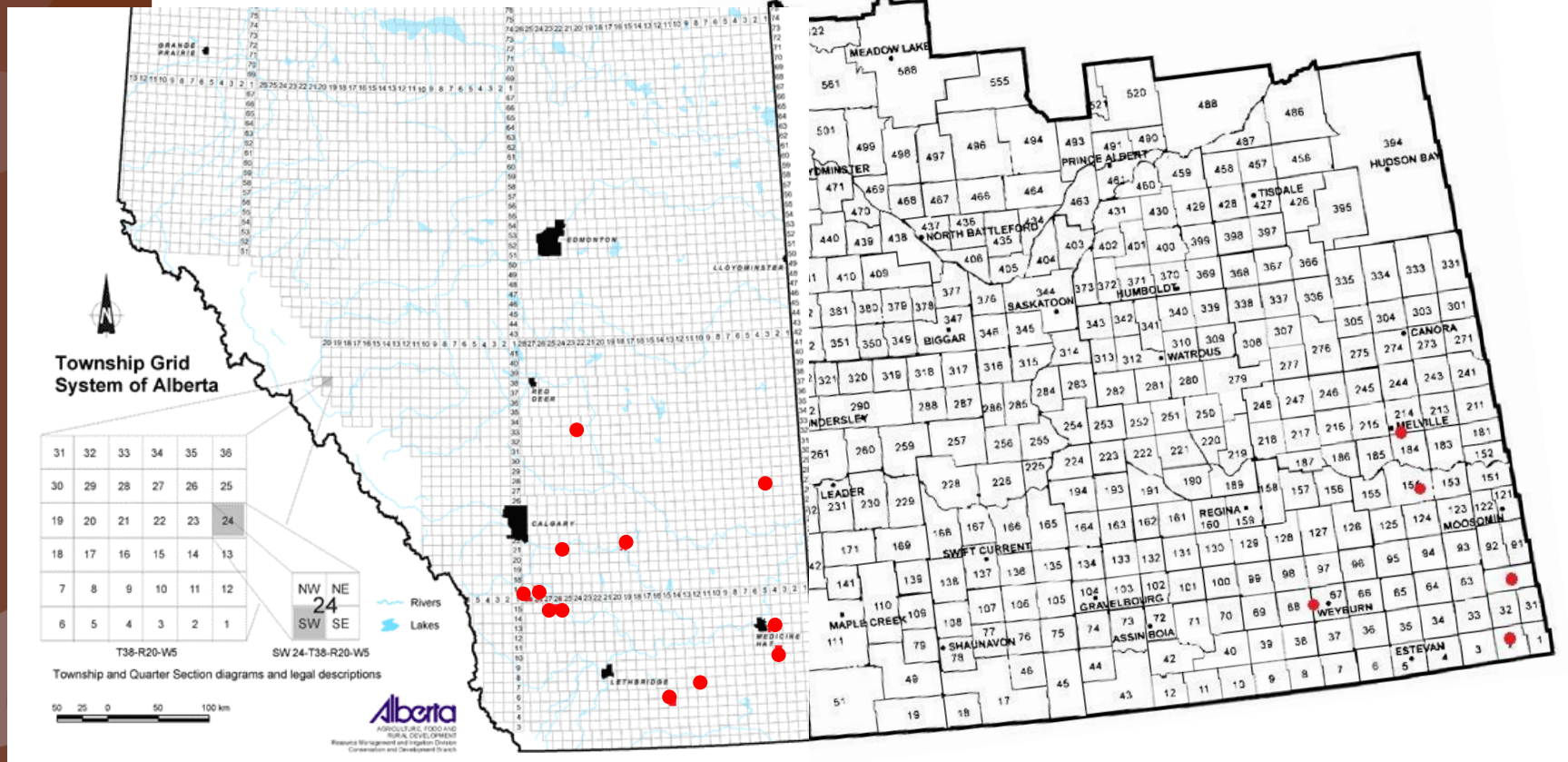



Alberta
Saskatchewan
Manitoba
7
6
5
4
3
2
1
9B
9A
8A
8B
7B
6B
5B
7A
6A
5A
4B
3BN
2B
1B
3AN
2A
4A
3BS
3AS
1A
5
4
6
12
3
11
7
10
2
9
1
8

Other Wheat Diseases



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PULSE DISEASES

What was the prevalence of root rots in pea fields in 2017

1. ~ 25%
2. ~50%
3. ~75%
4. > 75%

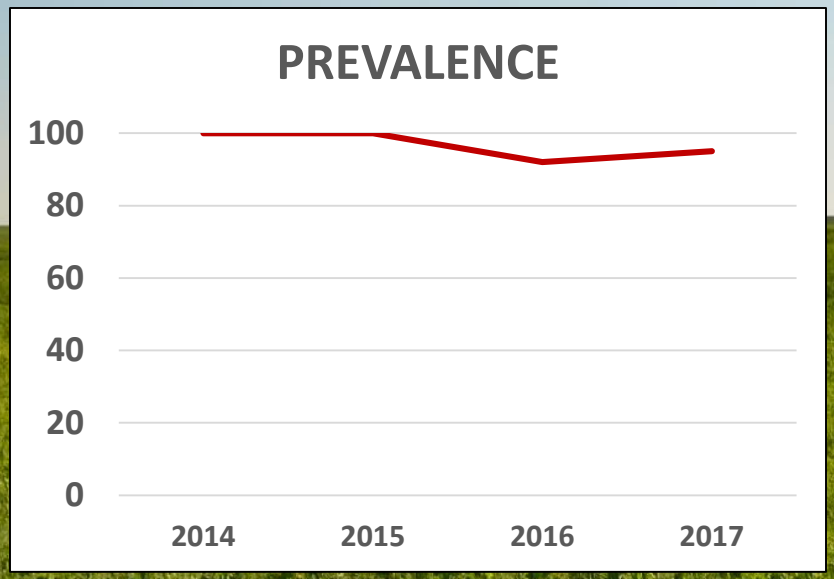
What was the prevalence of root rots in pea fields in 2017

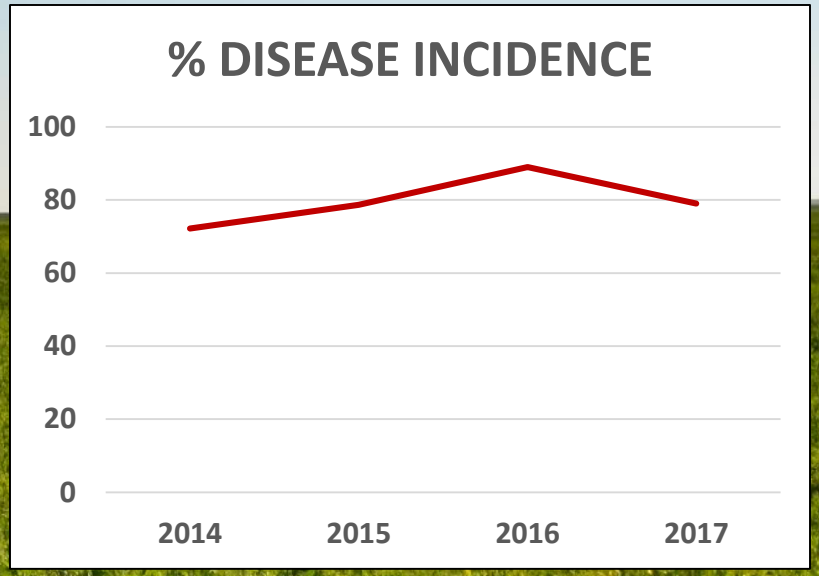
Prevalence of root rot in Alberta in 2017 = 95%
Incidence of root rot in Alberta in 2017 = 75%
Average severity = 3.0

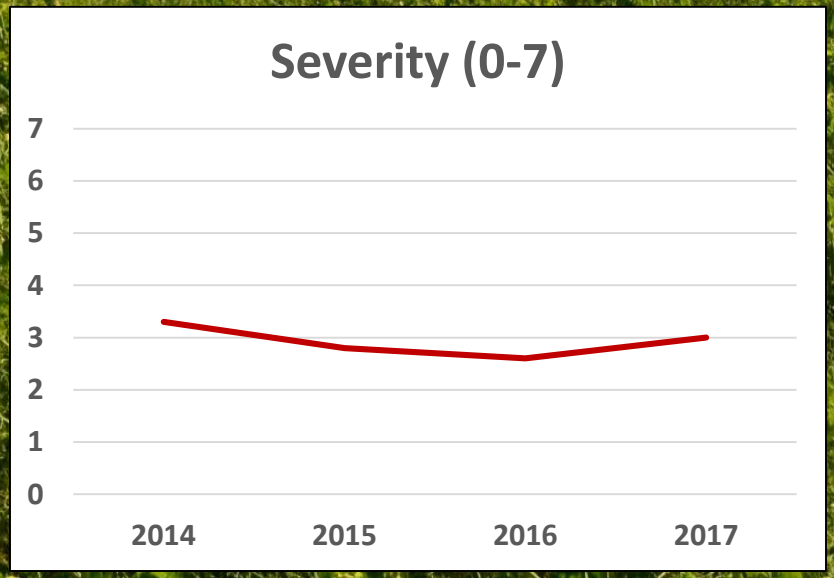
Healthy

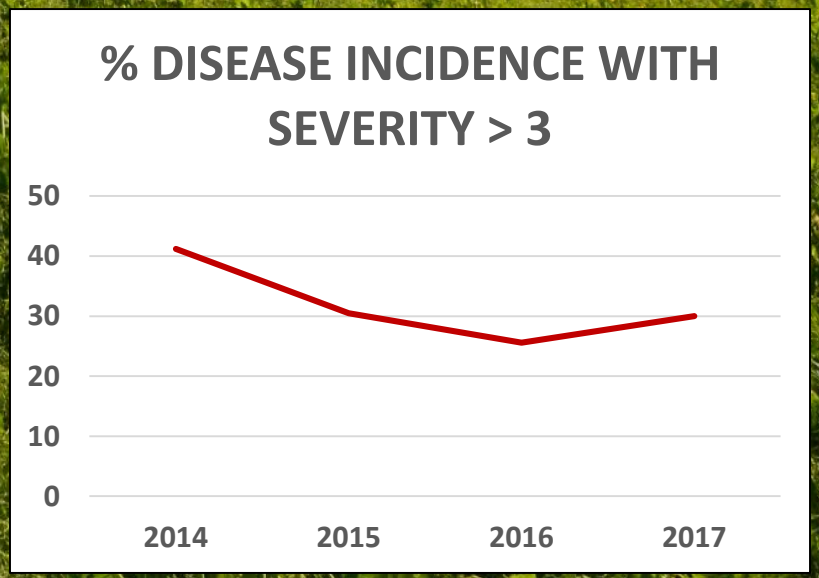
Moderate

Severe


PREVALENCE
100
80
60
40
20
0
2014
2015
2016
2017


% DISEASE INCIDENCE
100
80
60
40
20
0
2014
2015
2016
2017


Severity (0-7)
7
6
5
4
3
2
1
0
2014
2015
2016
2017


% DISEASE INCIDENCE WITH SEVERITY > 3
50
40
30
20
10
0
2014
2015
2016
2017

OTHER PEA DISEASES IN 2017

Category	Result
Mycosphaerella blight (prevalence)	53%
Mycosphaerella blight (incidence)	24%
Mycosphaerella blight (severity; 0-5)	0.3
Bacterial blight (prevalence)	50%
Bacterial blight (incidence)	35%
Bacterial blight (severity; 0-3)	0.5

Other diseases

Dry Bean – white mould

Date	Prevalence (%)	Incidence (%)	Mean Disease severity (0-5)
Aug 18	100	6.39	1.11

Dry Bean – root rots were low in incidence and severity

Faba bean – chocolate spot

Date	Prevalence (%)	Incidence (%)	Mean Disease severity (0-4)
July/Aug	100	>20%	2.1

SUMMARY

- Dry conditions in July-Sept of 2017 led to reduced disease levels in many fields
- Root diseases were more of a problem than foliar diseases in a number of fields
- Pathogens are not gone – so 2018 could bring disease challenges if the environment is conducive

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FUNGICIDE USE AND TIMING:

protecting yields, avoiding unecessary applications

IRRIGATED CROP PRODUCTION UPDATE

Lethbridge, AB January 16, 2018

Michael Harding, Alberta Agriculture and Forestry

K. Turkington (AAFC)

Many factors affect the profitability of fungicide applications

1. Yield potential
2. Disease potential
   a) Causal agent
   b) Amount of inoculum
3. Cultivar susceptibility
4. Crop stage
5. Environmental conditions
6. Chemical properties and activities of the fungicide product
7. Application specs (ground speed, boom height, nozzle type, water volume, weather)

Principles of judicious fungicide use

1. AVOID RELYING HEAVILY ON FUNGICIDES
2. Know your crop and your enemies
3. Know your options
4. Prepare for the worst – hope for the best
5. Evaluate risk
6. Make an information-based decision
7. Reap the rewards (or learn from mistakes)

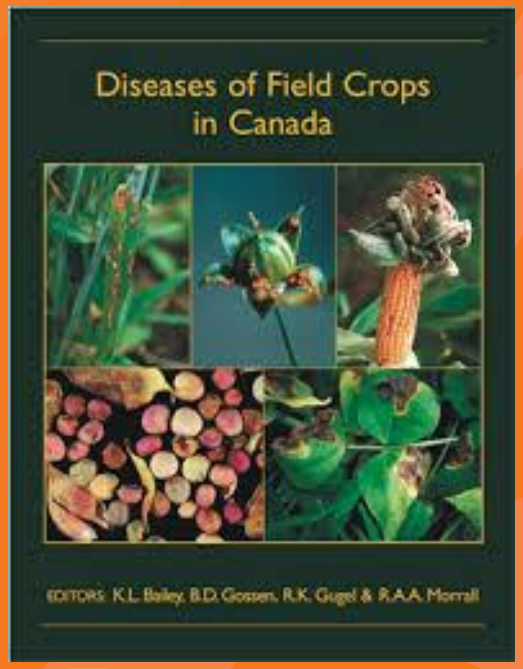
AVOID RELIANCE ON FUNGICIDES

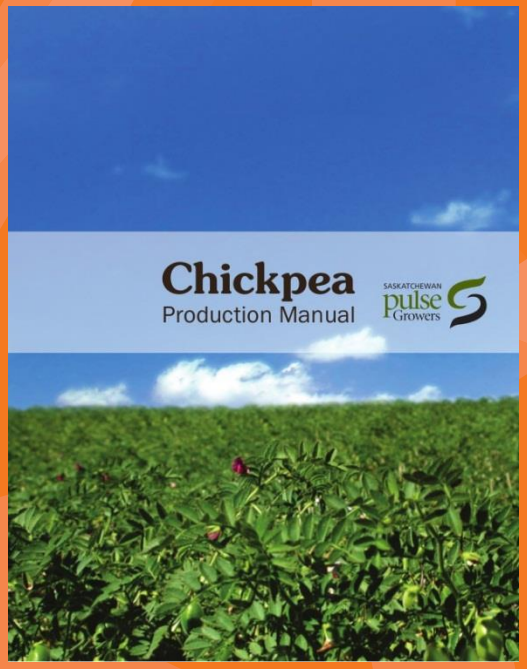
1. REDUCE PATHOGEN POPULATIONS

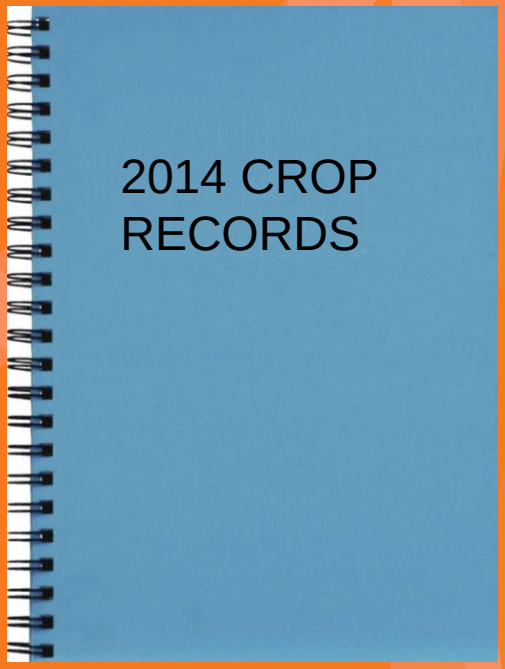
- Crop rotation, crop sequence, and field selection
- Use resistant cultivars (if possible)
- Disease-free seed
- Good fertility
- Avoid crop injury
- Irrigation timing

KNOW YOUR CROP AND ENEMY

2a. WHAT DISEASES ARE LIKELY?

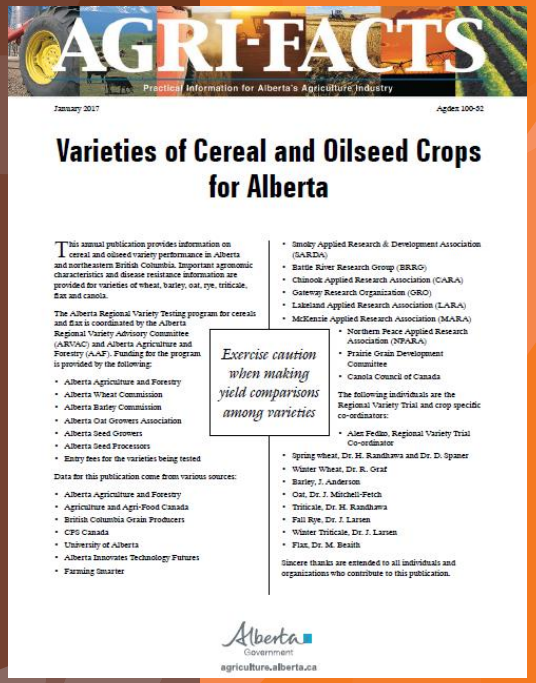






KNOW YOUR CROP AND ENEMY

2b. HAVE PLANT BREEDERS SOLVED THIS PROBLEM FOR ME?



AGRI-FACTS

Practical Information for Alberta's Agriculture Industry

January 2017 Agdex 100-92

Varieties of Cereal and Oilseed Crops for Alberta

This annual publication provides information on cereal and oilseed variety performance in Alberta and northeastern British Columbia. Important agronomic characteristics and disease resistance information are provided for varieties of wheat, barley, oat, rye, triticale, flax and canola.

The Alberta Regional Variety Testing program for cereals and flax is coordinated by the Alberta Regional Variety Advisory Committee (ARVAC) and Alberta Agriculture and Forestry (AAF). Funding for the program is provided by the following:

- Alberta Agriculture and Forestry
- Alberta Wheat Commission
- Alberta Barley Commission
- Alberta Oat Growers Association
- Alberta Seed Growers
- Alberta Seed Processors
- Entry fees for the varieties being tested

Exercise caution when making yield comparisons among varieties

Data for this publication come from various sources:

- Alberta Agriculture and Forestry
- Agriculture and Agri-Food Canada
- British Columbia Grain Producers
- CFS Canada
- University of Alberta
- Alberta Innovates Technology Futures
- Farming Smarter
- Smoky Applied Research & Development Association (SARDA)
- Battle River Research Group (BRRG)
- Chinook Applied Research Association (CARA)
- Gateway Research Organization (GRO)
- Lakeland Applied Research Association (LARA)
- McKenzie Applied Research Association (MARA)
- Northern Peace Applied Research Association (NPARA)
- Prairie Grain Development Committee
- Canola Council of Canada

The following individuals are the Regional Variety Trial and crop specific co-ordinators:

- Alex Fedin, Regional Variety Trial Co-ordinator
- Spring wheat, Dr. H. Randhawa and Dr. D. Spaner
- Winter Wheat, Dr. R. Graf
- Barley, J. Anderson
- Oat, Dr. J. Mitchell-Fetch
- Triticale, Dr. H. Randhawa
- Fall Rye, Dr. J. Larsen
- Winter Triticale, Dr. J. Larsen
- Flax, Dr. M. Beaith

Sincere thanks are extended to all individuals and organizations who contribute to this publication.

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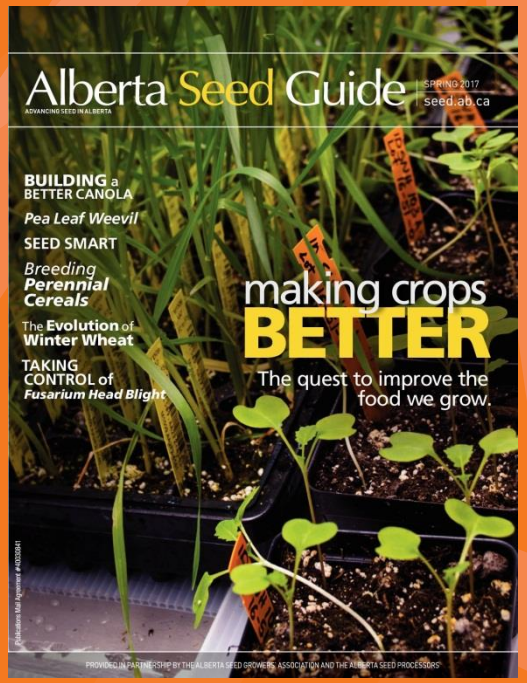


Leaf Spot Reaction of Barley Varieties For Alberta

Based on Varieties of Cereal and Oilseed Crops For Alberta - 2013, AARD Agdex 100/32

T.K. Turkington [1], and K. Xi [2]

[1] Agriculture and Agri-Food Canada Lacombe, AB; [2] Alberta Agriculture and Rural Development (AARD), Lacombe, AB

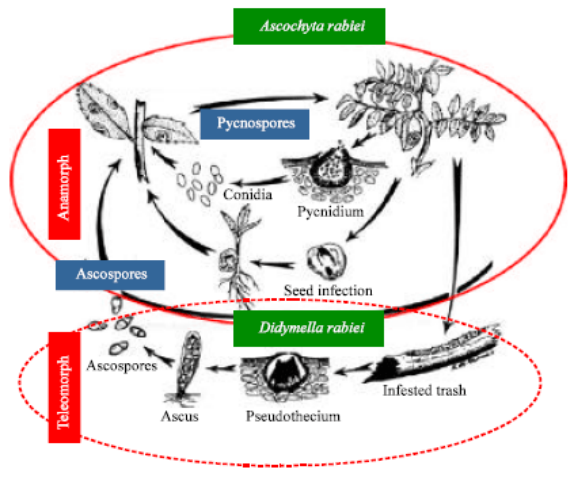
Leaf Spot Reaction

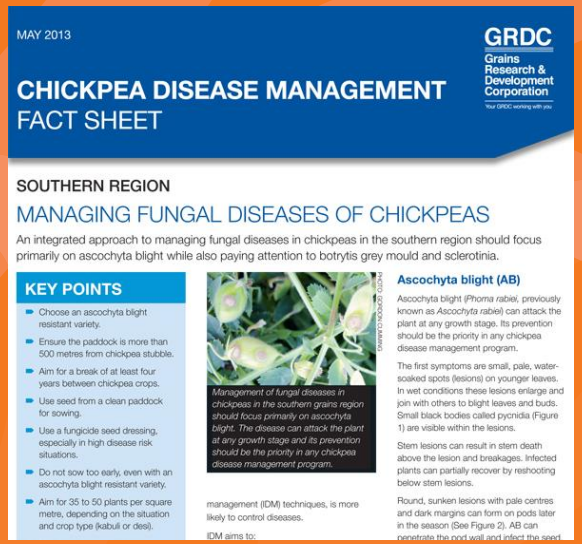
Very Good (VG) Good (G) Fair (F) Poor (P) Very Poor (VP)

Barley (row type)	Scald	Net form	Spot form	Spot
General purpose		Net	Net	Blotch*
AC Harper (6)	F	F	F	xx
AC Lacombe (6)	P	P	G	xx
AC Ranger (6)	P	F	G	G
AC Rosser (6)	VP	F	G	xx
Busby (2)	F	P	G	G
CDC Austenson (2)	VP	P	VG	G
CDC Coalition (2)	VP	VP	G	F
CDC Cowboy (2)	P	F	G	F
CDC Dolly (2)	F	VP	P	xx
CDC Helgason (2)	VP	G	G	F
CDC Maverick (2)	P	F	G	xx
CDC Mindon (2)	VP	VP	G	F
CDC Trey (2)	P	F	VG	F
Champion (2)	VP	VP	F	P
Chigwell (6)	G	F	G	G
Conlon (2)	VP	F	G	P
Gadsby (2)	VG	P	G	VP
Muskwa	G	P	G	F
Ponoka (2)	G	P	G	G
Seebe (2)	G	VP	P	xx
Sundre (6)	VG	P	F	F
TR07728 (2)	VP	F	F	VP
Trochu (6)	F	VP	G	xx
Xena (2)	VP	VP	F	VP

KNOW YOUR CROP AND ENEMY

2c. LEARN THEIR PATTERNS AND TELLS




MAY 2013

GRDC
Grains Research & Development Corporation

CHICKPEA DISEASE MANAGEMENT
FACT SHEET

SOUTHERN REGION

MANAGING FUNGAL DISEASES OF CHICKPEAS

An integrated approach to managing fungal diseases in chickpeas in the southern region should focus primarily on ascochyta blight while also paying attention to botrytis grey mould and sclerotinia.

KEY POINTS

- Choose an ascochyta blight resistant variety.
- Ensure the paddock is more than 500 metres from chickpea stubble.
- Aim for a break of at least four years between chickpea crops.
- Use seed from a clean paddock for sowing.
- Use a fungicide seed dressing, especially in high disease risk situations.
- Do not sow too early, even with an ascochyta blight resistant variety.
- Aim for 35 to 50 plants per square metre, depending on the situation and crop type (kabuli or desi).

Management of fungal diseases in chickpeas in the southern grains region should focus primarily on ascochyta blight. The disease can attack the plant at any growth stage and its prevention should be the priority in any chickpea disease management program.

Ascochyta blight (AB)

Ascochyta blight (*Phoma rabiei*, previously known as *Ascochyta rabiei*) can attack the plant at any growth stage. Its prevention should be the priority in any chickpea disease management program.

The first symptoms are small, pale, water-soaked spots (lesions) on younger leaves. In wet conditions these lesions enlarge and join with others to blight leaves and buds. Small black bodies called pycnidia (Figure 1) are visible within the lesions.

Stem lesions can result in stem death above the lesion and breakages. Infected plants can partially recover by reshooting below stem lesions.

Round, sunken lesions with pale centres and dark margins can form on pods later in the season (See Figure 2). AB can

management (IDM) techniques, is more likely to control diseases.

IDM aims to:

3. KNOW YOUR OPTIONS

MAY 2013

GRDC Grains Research & Development Corporation

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- Do not sow too early, even with an ascochyta blight resistant variety.
- Aim for 35 to 50 plants per square metre, depending on the situation and crop type (kabuli or desi).
- Monitor crops regularly during the growing season for disease development and take appropriate action to reduce disease impact.
- Observe good on-farm hygiene to reduce disease sources and prevent spread.
- Varieties resistant to ascochyta blight still require foliar fungicide at podding.
- Harvest early to minimise infection of seed. Crop desiccation enables even earlier harvest.

Integrated disease management

A single disease management strategy rarely provides complete disease control. Using a number of integrated disease management (IDM) techniques, is more likely to control diseases.

IDM aims to:

1. reduce background inoculum levels through paddock selection, control of volunteers and stubble management;
2. exclude pathogens through the use of clean seed and farm hygiene; and
3. protect the crop by using resistant varieties, seed treatments and strategically applied foliar fungicides.

Management of fungal diseases in chickpeas in the southern grains region should focus primarily on ascochyta blight, paying attention also to botrytis grey mould and sclerotinia.

Chickpeas can also be damaged by seedling root diseases, root lesion nematodes and viruses so an integrated approach is essential.

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Stem lesions can result in stem death above the lesion and breakages. Infected plants can partially recover by reshooting below stem lesions.

Round, sunken lesions with pale centres and dark margins can form on pods later in the season (See Figure 2). AB can penetrate the pod wall and infect the seed. Severe pod infection can result in reduced seed set and discoloured seed.

Losses are worse in wet springs in crops with dense canopies.

Reduce old chickpea residue and aim for a break of at least four years between chickpea crops.

AB resistance in a chickpea variety does not mean immunity, but will delay disease onset and reduce the need for fungicide applications.

Under high disease pressure, even resistant varieties can suffer production losses or grain quality damage.

Botrytis grey mould (BGM)

Botrytis grey mould (*Botrytis cinerea*) can attack the plant at any growth stage.

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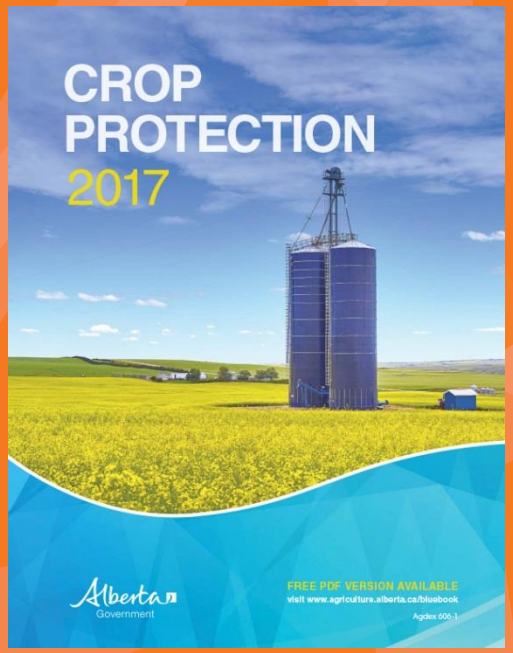


FUNGICIDE TECHNICAL FACTSHEET

3. KNOW YOUR OPTIONS

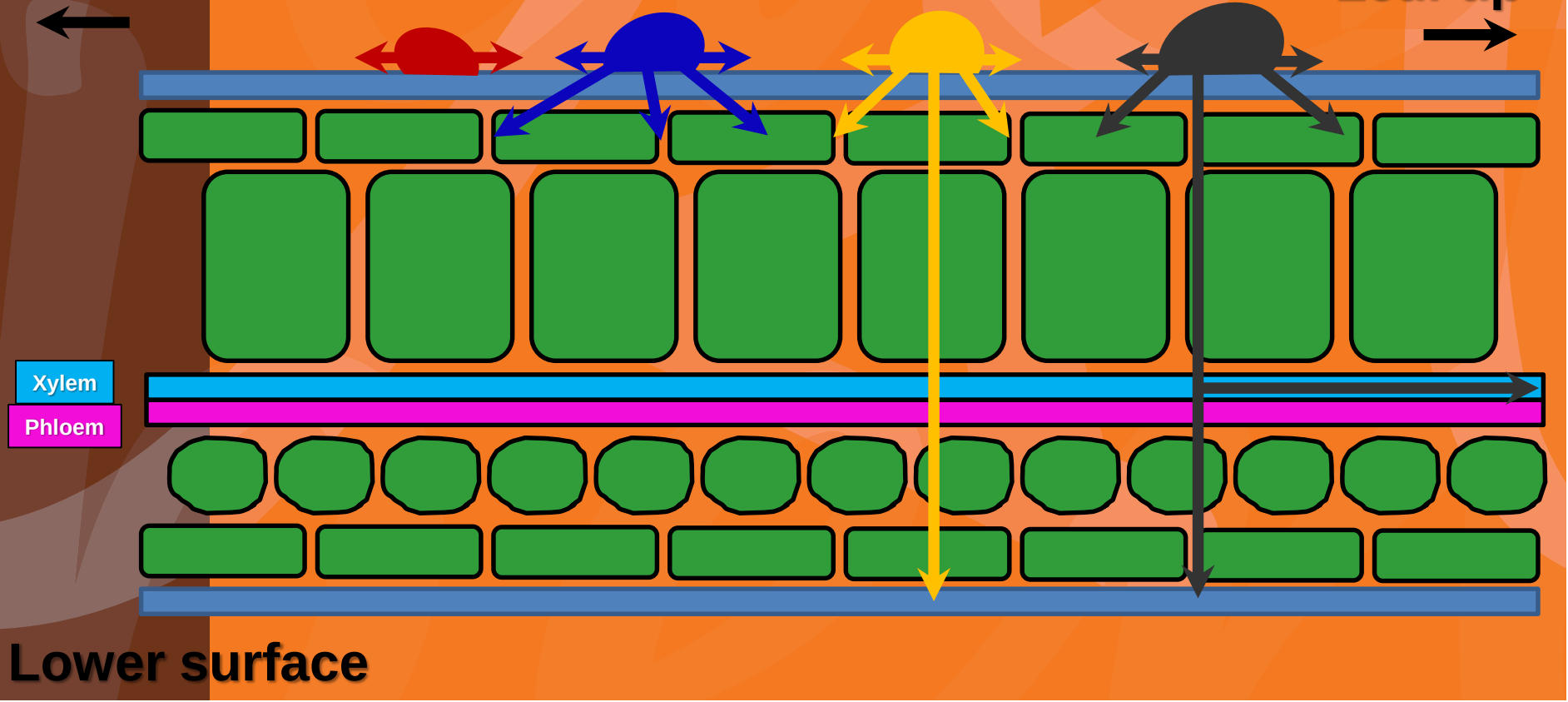
Fungicide movement

Contact

Locally systemic

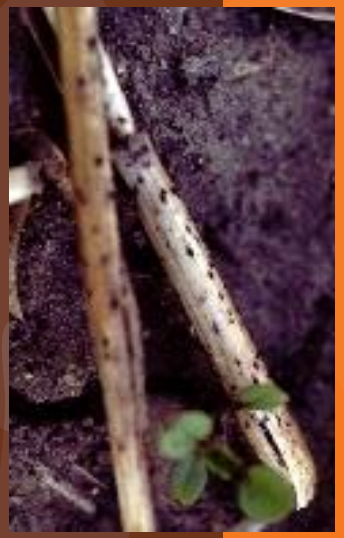
Trans-laminar

Xylem mobile

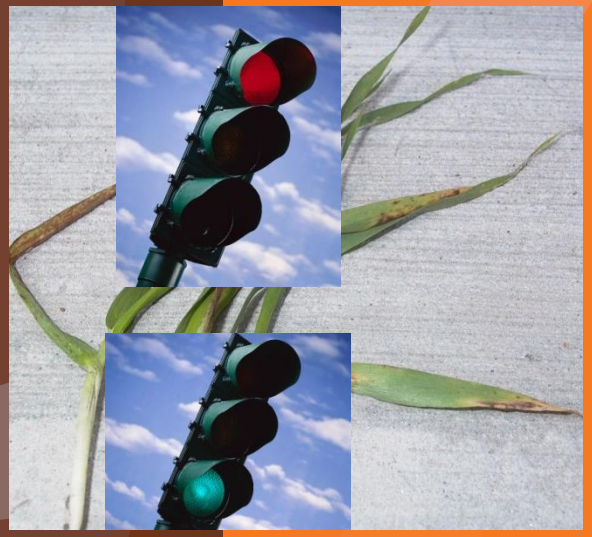


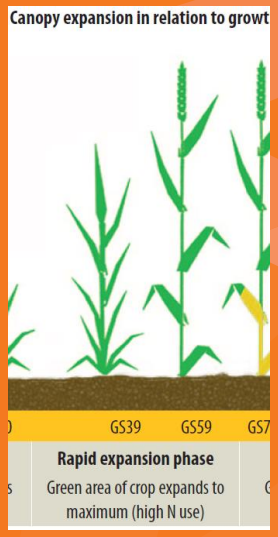
4. PREPARE FOR THE WORST AND HOPE FOR THE BEST

5a. EVALUATE RISK

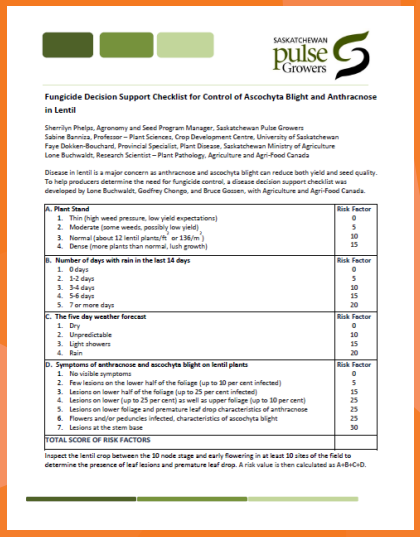


- PRE-SEED SCOUTING: RESIDUE-BORNE INOCULUM
- IN-SEASON SCOUTING: WAIT-AND-SEE APPROACH
- END OF SEASON SCOUTING: PROGRAM EVALUATION
- CROP STAGE EVALUATION
- WEATHER-BASED RISK TOOLS
- DECISION SUPPORT CHECKLISTS





https://agriculture.alberta.ca/acis/fusarium-risk-tool.jsp



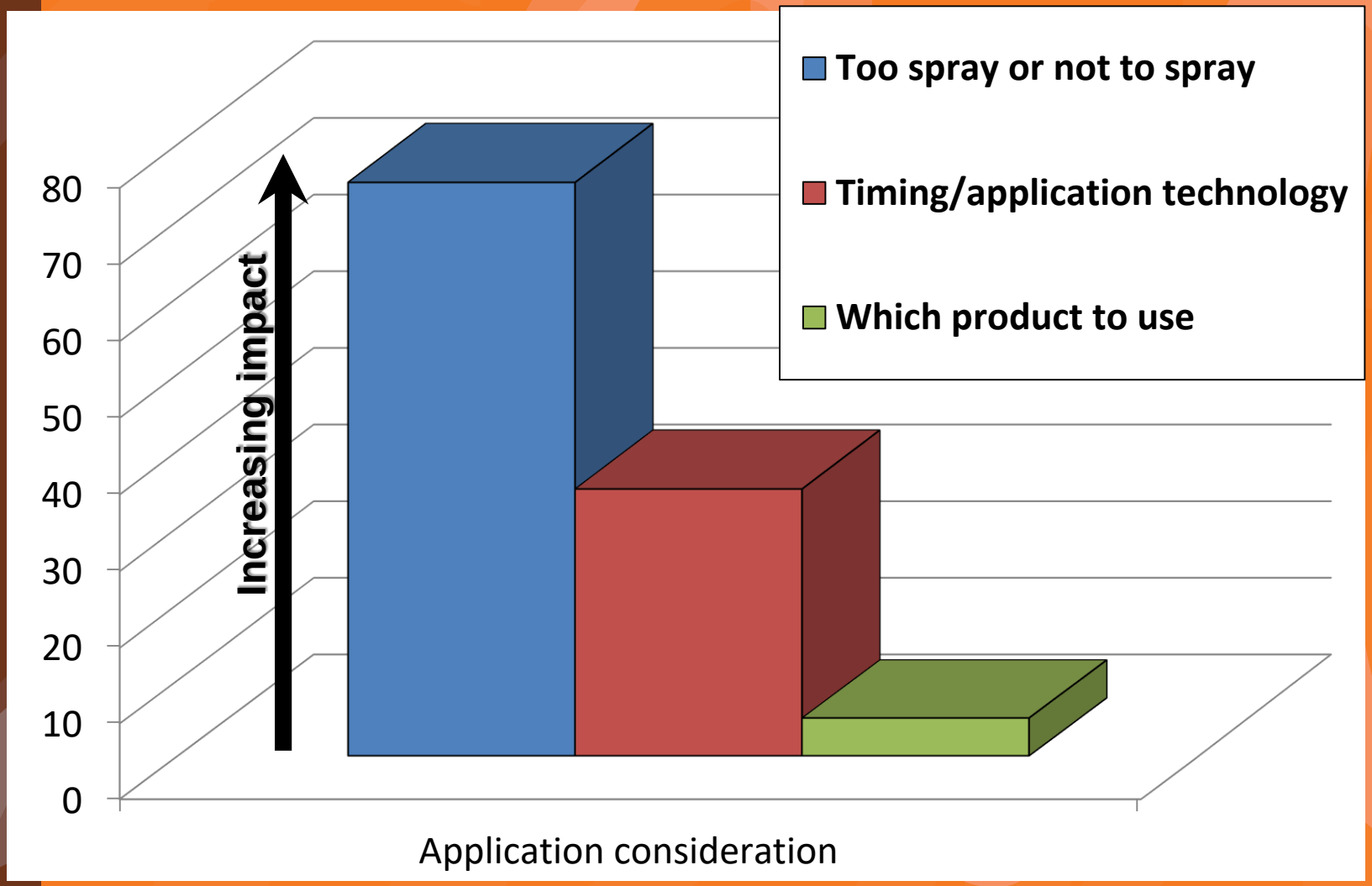
Fungicide Decision Support Checklist for Control of Ascochyta Blight and Anthracnose in Lentil

A. Plant Stand	Risk Factor
1. Thin (high weed pressure, low yield expectations)	0
2. Moderate (some weeds, possibly low yield)	5
3. Normal (about 12 lentil plants/ft² or 136/m²)	10
4. Dense (more plants than normal, lush growth)	15
B. Number of days with rain in the last 14 days	**Risk Factor**
1. 0 days	0
2. 1-2 days	5
3. 3-4 days	10
4. 5-6 days	15
5. 7 or more days	20
C. The five day weather forecast	**Risk Factor**
1. Dry	0
2. Unpredictable	10
3. Light showers	15
4. Rain	20
D. Symptoms of anthracnose and ascochyta blight on lentil plants	**Risk Factor**
1. No visible symptoms	0
2. Few lesions on the lower half of the foliage (up to 10 per cent infected)	5
3. Lesions on lower half of the foliage (up to 25 per cent infected)	15
4. Lesions on lower (up to 25 per cent) as well as upper foliage (up to 10 per cent)	25
5. Lesions on lower foliage and premature leaf drop characteristics of anthracnose	25
6. Flowers and/or peduncles infected, characteristics of ascochyta blight	25
7. Lesions at the stem base	30
TOTAL SCORE OF RISK FACTORS	

5b. EVALUATE RISK

a) IS THERE ENOUGH YIELD AT RISK?
b) IS IT A FUNGAL DISEASE?
c) DISEASE TRIANGLE?
    i. WHAT IS THE WEATHER FORECAST?
    ii. WILL MY CULTIVAR RESPOND?
    iii. IS THE PATHOGEN THREATENING?
d) CAN I GET THE TIMING RIGHT?
e) WILL THE PRODUCT AVAILABLE DO THE JOB?
f) CAN I HIT THE TARGET?
g) ARE THERE MRL ISSUES OR PHI?

6. MAKE A DECISION



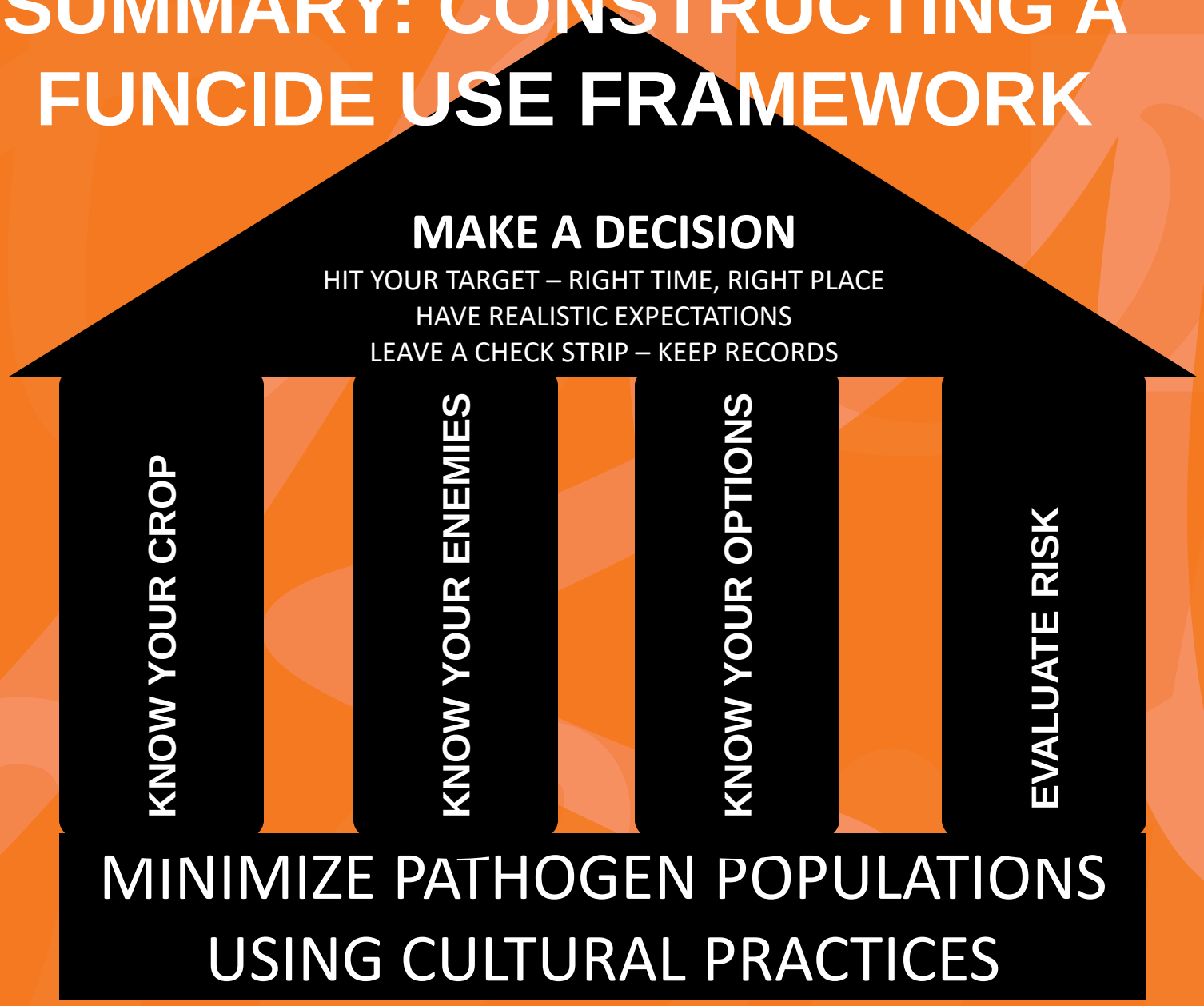
(G. Hollaway, DPI Victoria, Australia)

Alberta Government

REAP THE REWARDS !

LEARN FROM MISTAKES!

SUMMARY: CONSTRUCTING A FUNCIDE USE FRAMEWORK



CASE STUDY #1

ENDEMIC MONOCYCLIC DISEASE WITH NO CULTIVAR RESISTANCE

Eg. Fusarium head blight and sclerotinia

- Crop – no complete resistance
- Pest – present every year
- Fungicide options available: apply at specific crop stage

- Decision: I will schedule a spray and ensure product and application services are in place.

CASE STUDY #1

- But what about the weather?

SCLEROTINIA RISK		FHB RISK	
2016	**2017**	**2016**	**2017**
30.7%	1.95%	43%	< 2%

CASE STUDY #2

ENDEMIC POLYCLIC DISEASE WITH MODERATE CULTIVAR RESISTANCE

Eg. Cereal leaf spot or stripe rust

- Crop – moderate resistance
- Pest – present every year
- Fungicide options available: apply to protect green leaf tissue

- Decision: I will ensure product and application services are available, but scout regularly.

CASE STUDY #2

Scouting reveals no leaf spot near upper canopy leaves (or flag leaves not emerged)

Wait and see

Scouting reveals no stripe rust present (or no flag leaves yet)

Scouting reveals leaf spot near upper canopy leaves

Prepare to spary

Scouting reveals some stripe rust present and flag leaves exposed

Leaf spot beginning to appear on upper canopy leaves, > 2% of flag leaf area

Protect upper canopy

Stripe rust found on > 1 plant/m^2 and on > 2% of flag leaf area