

# **Biosecurity in the Cereal and Oilseed Crops Industry**

**Keystone Agricultural Producers Biosecurity Workshop  
Canad Inns, Polo Park, Winnipeg, MB  
November 25, 2008**

**Ron Howard, Ph.D., P.Ag.  
Alberta Agriculture and Rural Development  
Crop Diversification Centre South, Brooks, AB**

# Outline

- Biosecurity Concerns for Cereal and Oilseed Crops in Western Canada
- External and Internal Threats to C & O Crops
- Management of Infectious Plant Diseases
- Developing Biosecurity Programs for Crops
- Biosecurity Programs in Alberta
- Case Studies: Fusarium Head Blight of Cereals and Clubroot of Canola
- Summary
- Contact Information

# Biosecurity Concerns for Cereal and Oilseed Crops

- Crop biosecurity concerns include:
  - Diseases (bacteria, fungi, viruses, viroids, protists, phytoplasmas, nematodes)
  - Pests (insects, arthropods, molluscs)
  - Weeds (mosses, gymnosperms, angiosperms)
- New introductions of plant pathogens can occur via domestic and international movement of plants, plant products, soil, machinery & equipment, vehicles, people and animals, as well as by air and water

# Biosecurity Concerns for Cereal and Oilseed Crops

Examples of “external” disease concerns for cereal and oilseed crops in western Canada:

- Cereals
  - Stem rust of wheat (Ug99)
  - Karnal bunt
- Oilseeds
  - Beet western yellows
  - Verticillium wilt

# Stem Rust of Wheat (Race Ug99)

- Caused by *Puccinia graminis* f. sp. *tritici*
- Ug99 was discovered in Uganda in 1999
- Spread quickly to wheat-growing areas of Kenya and Ethiopia
- Common varieties were susceptible
- The potential exists for airborne spores to spread the pathogen long distances
- “Global Rust Initiative” organized by CIMMYT and ICARDA
- Published “Sounding the Alarm on Global Stem Rust” (10 recommendations)

**Wheat  
Stem Rust  
Race Ug99**



# Karnal Bunt of Cereals

- Caused by *Tilletia indica* (*Neovossia indica*)
- Originated in India
- KB can affect common wheat, rye and triticale and it mainly reduces the quality
- Infection is favored by cool, wet weather conditions
- Reported from Mexico and the U.S.A.
- KB is a quarantine disease in Canada
- *Tilletia indica* can be seed- and soil-borne
- Very difficult to control

# Karnal Bunt On Wheat



# Beet Western Yellows of Canola

- Caused by *Beet Western Yellows Virus*
- Occurs worldwide on >150 species in 23 families
- BWYV can affect Brassica vegetables (cabbage, broccoli), rapeseed, canola and crucifer weeds
- BWYV is related to *Barley Yellow Dwarf Virus*
- Spread by aphids, esp. the Green Peach Aphid
- Fields of winter oilseed rape in Europe have served as reservoirs of infection for summer vegetables
- Managed by weed control, use of insecticides and crop isolation

# Beet Western Yellows



# Verticillium Wilt of Canola

- Caused by *Verticillium dahliae* and *V. longisporum*
- *Vd* had a wide host range, but *Vl* is somewhat host-specific to the Brassica family
- Important in some areas of Europe, especially on oilseed rape
- Survives in the soil as microsclerotia
- Cause premature plant death
- Cannot be controlled with fungicides
- Very little varietal resistance is available

# Verticillium Wilt of Canola



# Biosecurity Concerns for Cereal and Oilseed Crops

Examples of “internal” disease concerns for cereal and oilseed crops in western Canada:

- Cereals
  - Fusarium head blight on wheat and barley
  - Stripe rust of wheat
- Oilseeds
  - Blackleg and clubroot on canola
  - Powdery mildew on flax
  - Stem blight on sunflower

# Management of Infectious Diseases

Four strategies form the basis of control programs for infectious plant diseases:

- **Eradication** - Eliminating pathogen inoculum from the seed, field or soil
- **Exclusion** - Helping plants escape infection
- **Protection** - Limiting infection and disease spread within the field
- **Host Resistance** - Selecting and planting disease-resistant varieties

# Developing Biosecurity Programs

- Lessons learned from the livestock industry:
  - AI (Avian Influenza) and BSE (Bovine Spongiform Encephalopathy) have had catastrophic effects on the poultry and cattle industries in Canada
  - Comprehensive disease management programs have included four key elements: **Prevention, Preparedness, Response and Recovery**
  - Federal and provincial governments and industry groups have worked together to develop appropriate response plans

# Developing Biosecurity Programs

- **Prevention**
  - Free-standing surveillance programs and on-farm food safety programs
- **Preparedness**
  - Response plans & simulation exercises
- **Response**
  - Command centres for first line response
- **Recovery**
  - Protocols for cleanup and disposal
  - Compensation and insurance programs

# Biosecurity Programs in Alberta

- A biosecurity initiative was launched in 2006 by the Office of the Provincial Veterinarian to reduce the risk of introducing poultry and livestock diseases to farms and ranches
- The program was designed to increase the awareness and use of biosecurity practices among the province's livestock and livestock service industries, and the general public
- Information products were developed for a wide audience
- The Alberta Veterinary Surveillance Network was created in 2005

## WHY IS BIOSECURITY IMPORTANT?

A few simple measures can reduce the risk of you spreading diseases among farms or regions in the countries you visit.

These same measures can reduce the risk of bringing a foreign animal disease (FAD) back to Canada when you return. Several FADs, such as Foot and Mouth Disease (FMD) and Avian Influenza (AI) occur in other countries and can have severe consequences if brought into Canada.

Also, certain animal diseases can affect humans. A few basic precautions while around livestock can reduce your risk of getting sick or passing infections to others.

## COMING HOME...

Follow the Canadian Food Inspection Agency recommendations when returning to Canada. If you visited an agri-food establishment outside Canada, you must:

- Ensure all footwear, clothing, equipment and personal effects are thoroughly cleaned and disinfected before returning to Canada
- Declare to customs upon arrival all plant and animal products (meat, dairy, eggs, etc.) Do not bring these products to a farm or anywhere that livestock could contact them

It is recommended that you not visit farms in Canada for 14 days after arrival.

## NEED MORE INFORMATION?

To find out more, visit the Chief Provincial Veterinarian web pages at:  
<http://www.agric.gov.ab.ca/chiefvet>

For current animal disease situations visit the World Organization for Animal Health at:  
<http://www.oie.int>

### Contact

Office of the Chief Provincial Veterinarian  
Food Safety Division  
Alberta Agriculture, Food and Rural Services  
9th Floor, Q.S. Longman Building  
6909 116 Street  
Edmonton, AB T6H 4P2

T. 780.427.3448  
F. 780.415.0810

<http://www.agric.gov.ab.ca>



## BIOSECURITY FOR OVERSEAS TRAVELERS

Alberta

## NEED MORE INFORMATION?

For more information on how to keep your birds safe from the incidental spread of disease, please visit Ropin' the Web at [www.agric.gov.ab.ca/biosecurity](http://www.agric.gov.ab.ca/biosecurity).

Or call the Ag Info Centre:  
Toll-free in Alberta: 310 FARM (310.3276)  
or 1.866.882.7677 Out of province: 1.403.742.7901

For current animal disease situations visit the World Organization for Animal Health at: [www.oie.int](http://www.oie.int)

### Contact

Office of the Chief Provincial Veterinarian  
Food Safety Division  
Alberta Agriculture, Food and Rural Development  
9th Floor, O.S. Longman Building  
6909 116 Street  
Edmonton, AB T6H 4P2

T: 780.427.3448  
F: 780.415.0810



## BACKYARD BIRDS AND AVIAN INFLUENZA

### WHAT YOU SHOULD DO

Alberta

# AG Strategies

Agriculture Business Strategies

October 2005

Agdex 888-7

## Biosecurity Considerations for Ag Tourism Ventures

*The purpose of this factsheet series is to help producers and processors understand the key elements needed to manage a business. The factsheets also discuss some of the essential components used to develop a business plan and assess the profitability of a business venture.*

**A**lberta Agriculture, Food and Rural Development (AAFRD) supports rural diversification. This includes supporting farms, ranches and acreages offering non-traditional ag tourism pursuits.

The occupants and owners of these enterprises may be third-generation landowners or emerging agriculture entrepreneurs. They may be involved in activities ranging from operating a fruit farm business to offering horseback riding holidays for guests.

No matter what the situation, biosecurity precautions are a part of the common sense agricultural production management practices followed by ag tourism operators.

Ag tourism guests are primarily from urban locations. They are classified as "low-risk visitors" as they reside in towns and cities and for the most part do not have contact with livestock and poultry. They bring almost no risk of disease introduction, even if few precautions are taken. However, it is common courtesy to greet each guest and to:

- make them aware of the operation's biosecurity program
- enquire about their proximity to livestock and poultry in the past two weeks

Often these concerns can be easily satisfied as part of the initial guest contact assessment.


## What is biosecurity?

The term "biosecurity" refers to those precautions taken to reduce the risk of introducing livestock or poultry diseases to a farm or region where they do not already exist. Examples of common biosecurity practices include:

- quarantining new stock
- controlling rodents
- cleaning footwear
- changing coveralls

A complete farm biosecurity program will cover:

- incoming stock
- vaccinations
- feedstuffs
- water
- pets
- pest control (birds, rodents, wildlife, insects, etc.)
- farm visitors

 Agriculture and  
Agri Food Canada

The Agricultural Policy Framework (APF)  
A FEDERAL-PROVINCIAL-TERRITORIAL INITIATIVE

Alberta  
AGRICULTURE, FOOD AND  
RURAL DEVELOPMENT

<http://www.agric.gov.ab.ca>



## NEED MORE INFORMATION?

To find out more about the Alberta Veterinary Surveillance Network, search for "AVSN" on Ropin' the Web at:  
<http://www.agric.gov.ab.ca/>

### Contact

O.S. Longman Building  
 6909 116 Street  
 Edmonton, AB T6H 4P2

T. 780.422.1923  
 F. 780.415.0810

### or contact

Airdrie Agriculture Centre  
 909 Irricana Rd. NE  
 Airdrie, AB T4A 2G6

T. 403.948.8575  
 F. 403.948.2063

## IF YOU ARE A VETERINARIAN...

...feel free to call.

Guidelines are available on the AVSN pages on Ropin' the Web (AAFRD's web site) describing the services that AAFRD specialists can provide to you. Our team looks forward to working with you.

As demonstrating livestock health and food safety becomes increasingly essential to international and domestic market access, AVSN will continue to support veterinary excellence in Alberta.

## IF YOU NEED ANIMAL HEALTH INFORMATION...

...tell us how we can help you. As we gather data, we will be able to provide reports describing the health of Alberta's livestock for market access, safety and public health.



## ALBERTA VETERINARY SURVEILLANCE NETWORK (AVSN)

# Biosecurity Guidelines

*TO PREVENT THE INTRODUCTION AND SPREAD OF PLANT PESTS FROM FARM TO FARM*

## Before the visit:

- Pre-plan your visit
- Contact the farm in advance, know their concerns
- Know the nature of the facility
- Be aware of the important pests of the crops grown on the farm
- Visit farms with unique pest problems last
- If you observe pests in a farm, avoid same-day visits to similar farms
- Wear dark blue, green or brown coloured clothing which are less attractive to insects

## During the visit:

- Always carry a "Biosecurity Supply Kit"
  - Disposal overalls/sani-suits
  - Booties
  - Gloves
  - Disinfectants (see below)
  - Spray-bottles
  - Paper towels
  - Disposal bags
  - Spare clothing and foot ware
- Follow appropriate biosecurity procedures during farm visit
- Avoid carrying mud or plant debris on your vehicle when entering a farm
- Park at designated parking areas, if not on paved or gravel surfaces
- Avoid contact with plant materials that may harbour plant pests
- Follow good sanitation practices
  - Sanitize hands
  - Use foot-bath
  - Wear protective clothing (if necessary)
- Use effective and appropriate disinfectants (concentration and exposure time varies)
  - For hands – antimicrobial hand soap (e.g. Onestep, Wet Ones)
  - For shoes, etc. – Virkon (1-2%), Chemprocide (15ml/litre), household bleach (10%)
  - For tires – Virkon (1-2%), Chemprocide (15ml/liter), household bleach (10%)

## End of the visit:

- Properly secure plant samples in sealed bags
- If necessary, wash/disinfect tires, mud flaps, etc of your vehicle when leaving
- Place all waste materials (disposal suits, plant waste, etc.) in disposal bags and dispose of them properly
- Make sure you have followed proper sanitation practices
- Check to see that you and your vehicle are free of soil and plant debris
- Keep a record of your visit
- Most importantly, if you've encountered a farm with pest problems, phone ahead to your next client and discuss the situation

## BIOSECURITY GUIDELINES FOR GARDEN CENTERS RECEIVING INSECT AND PLANT SAMPLES FROM THE PUBLIC

Knowledgeable staff at garden centers are an important resource to the public for identification of plants and plant problems. To prevent the public from introducing and spreading plant pests (insects, mites, fungi, bacteria, viruses, nematodes and weeds) to garden centers, consider the following:

### ALL STAFF MUST BE INFORMED OF THE GARDEN CENTER'S POLICY REGARDING RECEIVING PUBLIC SAMPLES

**If the garden center does not want the public to bring in specimens for identification of insect and plant problems:**

- Place signage at the entrance of the facility to inform customers of this policy.
- Explain that for biosecurity reasons, the garden center does not allow the public to bring plants into the facility.

**If the garden center is willing to assist the public in identification of plant problems:**

- The specimens must be contained in a plastic bag that is free of holes to prevent any pests from being released into the facility.
- Place signage at the entrance to the facility to inform customers that any specimens must be contained.
- Have plastic bags available for those customers that do not bring their samples contained.
- Receive specimens in areas that are located away from live saleable plants, preferably close to the entrance of the facility where the area can easily be cleaned after the sample is examined.
- Ensure the public does not track, or otherwise bring soil into the garden centre.
- The examination area should be supplied with sanitation supplies for cleaning the table top and any tools used to examine the specimen.
- After examining the specimens, collect the debris, seal it in the sample bag, and clean the examination area.
- WASH YOUR HANDS AFTER EXAMINING SPECIMENS AND BEFORE RESUMING ANY WORK IN THE GARDEN CENTER.
- Provide customers with the BCMAL factsheet 'BIOSECURITY GUIDELINES FOR THE PUBLIC BRINGING INSECT AND PLANT SAMPLES TO GARDEN CENTERS.'



Food Safety and Quality Branch  
BC Ministry of Agriculture and Lands

May 2006

# Biosecurity Programs in Alberta

- Crop biosecurity programs are less developed compared to livestock programs
- A number of plant diseases, insect pests and nematodes are “declared pests” under the Agricultural Pests Act and management plans have been implemented, e.g.:
  - Bacterial ring rot of potato
  - Clubroot of canola and mustard
  - Fusarium head blight of cereals
- A federal-provincial “Critical Plant Pest Infestation Response Plan” has been drafted

# Clubroot of Canola and Mustard



Revised May 2007

Agdex 140/638-1

## Clubroot Disease of Canola and Mustard

Clubroot is a serious soil-borne disease of cruciferous crops (canola and cabbage family) worldwide and was first identified in Europe in the thirteenth century. This disease is a major problem in cole crops (cruciferous vegetables) in some areas of British Columbia, Quebec, Ontario and the Atlantic provinces.

There have been two previous reports of clubroot in cole crops in Alberta. So, clubroot is not a new disease in Canada or Alberta. However, in 2003, clubroot was confirmed in several canola fields near Edmonton, Alberta, which was the first report on canola in western Canada.

Clubroot has continued to spread in the Edmonton area, mainly in the counties of Sturgeon, Parkland, Leduc and Strathcona.

The disease can affect broccoli, Brussels sprouts, cabbage, cauliflower, Chinese cabbage, kale, kohlrabi, radish, rutabaga and turnip. Canola/rapeseed and mustard are also susceptible to this disease. There are several weak, non-cruciferous hosts, but their contribution to disease development and carryover of the clubroot pathogen is not well known.

Clubroot was added as a declared pest to Alberta's *Agricultural Pests Act* (APA) in April 2007. The APA is the legislative authority for enforcement of control measures for declared pests in Alberta. The Minister of Alberta Agriculture and Food is responsible for this Act.

However, enforcement of pest control measures is the responsibility of the municipal authority, and Agricultural Fieldmen are responsible for enforcing pest control measures in their municipalities. Pest inspectors have the power to enter land at a reasonable hour, without permission, to inspect for clubroot and collect samples. The owner or occupant of the land has the responsibility for taking measures to prevent the establishment and spread of clubroot.

This factsheet contains current information about clubroot in canola and describes options

for Canadian canola growers to prevent this disease from being introduced and becoming well established in their fields.

### The disease cycle

The causal agent of clubroot is *Plasmodiophora brassicae* Woronin. In the past, this agent has been classified as a slime mould fungus (myxomycete), but more recently, it is regarded as a protist (an organism with plant, animal and fungal characteristics).

There are normally several different races or pathotypes in established infestations. *Plasmodiophora brassicae* is an obligate parasite, which means the pathogen cannot grow and multiply without a living host. The life cycle of *P. brassicae* is shown in Figure 1.

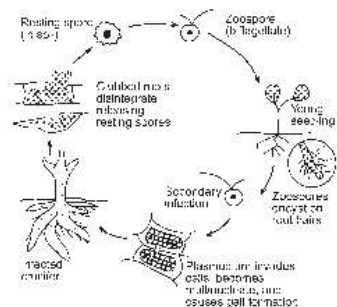


Figure 1. Life cycle of *Plasmodiophora brassicae*, the pathogen that causes clubroot (source: Ohio State University).



Photo: K. Turkington

## Alberta Clubroot Management Plan

Developed by:  
Alberta Clubroot Management Committee  
Revised February 2008



# What is Clubroot?

- Clubroot is an infectious plant disease that affects members of the cabbage family, e.g. cole crop vegetables, canola, mustard and cruciferous weeds
- The pathogen that causes clubroot is a microorganism called *Plasmodiophora brassicae*
- The name "Clubroot" comes from the characteristic symptoms ("clubs") produced on the roots of infected plants
- Clubroot was first described in Russia in the 1870s by the scientist Mikhail Woronin

# What is Clubroot?

- Clubroot occurs worldwide wherever cruciferous plants are grown, although it is most common in temperate regions
- *Plasmodiophora brassicae* is an obligate pathogen that can only grow and reproduce in host plants
- Clubroot can be spread from field to field by infected plant parts and infested soil
- Major areas of clubroot infestation in Canada include Ontario, Quebec, the Atlantic region, British Columbia **and now Alberta**

# Symptoms on Canola – Delayed Flowering





**Severe Root Galling**

# Root Galls on Chinese Cabbage





# Clubroot Management Plan

1. Remove soil from equipment and machinery prior to moving it out of infested fields
  - Knock off large clumps of soil
  - Sweep or scrape off loose soil and debris
  - For risk averse producers and contractors:
    - Power wash with water/steam/detergent
    - Mist clean equipment with 1-2% active ingredient bleach
    - Allow 10-15 minutes of contact time for the disinfectant on cleaned hard surfaces
  - Seed an area to grass near the field exit to use when cleaning equipment

WASH • CONTAIN • DISPOSE

# PORTABLE EQUIPMENT WASH SYSTEM



**Swift**   
ENVIRONMENTAL EQUIPMENT LTD.

DESIGN  
MANUFACTURING  
SALES  
SERVICE

The Portable Equipment Wash System developed by Swift Environmental is a mobile temporary system that enables operators to wash or disinfect equipment in the field while preventing harmful materials from entering the environment. The system is easy to set up and can be made to accommodate any size of equipment you have.

The system includes a Ride Side™ Berm that contains all wash down effluent and prevents it from reaching the environment while permitting vehicles to enter and exit the wash area quickly. A heavy duty ground support system protects the berm from damage and allows a variety of equipment to be easily cleaned no matter the weight. A wash curtain ensures all spray is directed to the berm for collection and proper disposal.

Portable pressure washing equipment is optional.



Setting up to wash a drilling rig. >>



**Swift**  
ENVIRONMENTAL EQUIPMENT LTD.

Swift Environmental Ltd.  
#2, 51331 Range Road 224, Sherwood Park, Alberta, Canada T8C 1H3  
Tel: 780.686.4301 Fax: 780.922.7610 Email: [swiftenv@telus.net](mailto:swiftenv@telus.net)  
Please visit our website: [www.swiftenvironmental.com](http://www.swiftenvironmental.com)

The Ride-Side™ Berm is available exclusively through Swift Environmental Ltd.  
The Ride-Side™ Berm is designed and manufactured by SEI Industries Ltd.  
The Ride-Side™ Berm is a registered trade name of SEI Industries Ltd.

# Clubroot Management Plan

2. Use long rotations between successive crops of canola, mustard and cruciferous vegetables
  - Length of rotation depends on the infestation level:
    - 3-5 years for light infestations
    - 6-8 years for moderate to heavy infestations
    - Soil tests can be carried out for *P. brassicae*
  - Control cruciferous weeds and volunteer canola in rotation crops
3. Use direct seeding or minimum tillage where possible
  - Reduced tillage = reduced risk of spreading the pathogen on machinery and equipment

# Clubroot Management Plan

4. Avoid spreading straw, hay, green feed, silage and manure harvested from clubroot-infested fields onto clean fields
  - Clubroot spores can survive on crop residues and passage through the digestive tract of livestock
5. Avoid planting common, untreated seed harvested from clubroot-infested fields
  - Includes canola, cereals and pulses
  - Seed treatments may reduce the viability of spores on seed, but more research is needed
  - Testing: 20/20 Seed Labs and BioVision Seed Labs
6. Scout canola fields regularly for clubroot

BEST MANAGEMENT PRACTICES

---

## **Clubroot Disease Management**

---

July 2008

<http://www.capp.ca>

2008-1030

---

2100, 350 – 7<sup>th</sup> Ave. S.W.  
Calgary, Alberta  
Canada T2P 3N9  
Tel (403) 267-1100  
Fax (403) 261-4622

403, 235 Water Street  
St. John's, Newfoundland  
Canada A1C 1B6  
Tel (709) 724-4200  
Fax (709) 724-4225

Email: [communication@capp.ca](mailto:communication@capp.ca) Website: [www.capp.ca](http://www.capp.ca)

# Fusarium Head Blight of Cereals



Revised March 2003

Agdex 110/632-1

## Fusarium Head Blight of Barley and Wheat

Fusarium head blight (FHB), also known as scab or tombstone, is a disease of wheat, barley, oats and other small cereal grains and corn (Figure 1). It is caused by several species of *Fusarium*; however, *Fusarium graminearum* is the primary species involved. In 1999, *Fusarium graminearum* was declared a pest under the *Alberta Agricultural Pests Act*.



Photo: Emma Evans

Figure 1. *Fusarium graminearum* infection in wheat; note the bleached heads.

Alberta is currently free of any outbreaks of fusarium head blight caused by *F. graminearum*. Trace levels of *F. graminearum* have been found in Alberta in a few instances, and actions have been taken to eliminate these traces. If this fungal disease were to become established in this province, it would have major economic consequences for Alberta's cereal and animal feeding industries.

This disease reduces yield and grade and may also contaminate the grain with fungal toxins (mycotoxins). FHB is favoured by humid conditions during flowering and early stages of kernel development.

FHB is recognized in the field by the premature bleaching of infected spikelets and the production of orange, spore-bearing structures called sporodochia at the base of the glumes. During wet weather, there may be whitish, occasionally pinkish, fluffy fungal growth on infected heads in the field.

Diseased spikelets can contain visibly affected kernels. The grading term given to visibly affected wheat seeds is fusarium damaged kernels (FDK), whereas in barley, it is called fusarium mould (Figure 2).



Photo: Kelly Burlington

Figure 2. The white, shriveled kernels are called FDK (fusarium damaged kernels) or tombstones. Fusarium head blight is also known as tombstone blight.

## Alberta *Fusarium graminearum* Management Program

Developed by the Provincial Fusarium Action Committee, August 2002

Contact: Alberta Agriculture, Food and Rural Development  
Pest Risk Management Unit

**Shaffeeq Ali**  
Leader, Pest Risk Management Unit  
Chair, Fusarium Action Committee  
Alberta Agriculture, Food and Rural Development  
304, J.G. O'Donoghue  
7000 - 113 Street,  
Edmonton, Alberta  
Tel: 780 422-4909  
Email: shaffeeq.ali@gov.ab.ca

**James Calpas**  
Provincial Integrated Pest Management Specialist  
Pest Risk Management Unit  
Alberta Agriculture, Food and Rural Development  
304, J.G. O'Donoghue Building  
7000 - 113 Street,  
Edmonton, Alberta  
Tel: 780 422-4911  
Email: james.calpas@gov.ab.ca

# What is Fusarium Head Blight (FHB)?

- FHB, also called Scab, is an infectious disease that can affect cereals, corn and grasses
- FHB is caused by fungi in the genus *Fusarium*, with the main species being *F. graminearum*, *F. pseudograminearum*, *F. avenaceum*, *F. poae*, *F. culmorum*, *F. equiseti*, and *F. sporotrichioides*
- *Fusarium* species infect heads at flowering and developing kernels are shrunken and chalky
- Infected kernels (FDKs) may contain mycotoxins such as DON (deoxynivalenol) which can reduce feed and processing quality

# Disease Cycle: Infection



**Infection:**  
48-72 hrs  
with rain or  
dew or  
high RH &  
15-30°C

**Symptoms:**  
Approx.  
7-14 days



# CPS Wheat With 4% FDK



# 2000 Manitoba Barley 15 ppm DON



# FHB Management Plan

1. Cereal grains intended for use as seed
  - Have seed tested for *Fusarium graminearum* through an accredited lab and request a certificate showing that the sample was free of the pathogen
  - Treat imported and locally grown seed with a registered fungicide
  - Seed infested with *Fusarium graminearum* should be properly and effectively disposed of, i.e. used for food or feed or land filled
  - Fields planted with seed infected with *Fusarium graminearum* will be subject to control measures specified in the Management plan

# FHB Management Plan

## 2. Cereal grains intended for use as feed

- Where possible, have seed and feed tested for *Fusarium graminearum* through an accredited lab
- For out-of-province grain:
  - Trucks should be securely covered during transport
  - Unloading sites should be screened or covered
  - Spillage should be minimized during unloading
  - Vehicles should be cleaned after unloading
  - Grain should not be stored in uncovered piles
  - Grain must not come in contact with the soil during feeding, i.e. use feed bunkers or troughs
  - Spilled grain should be recovered and disposed of

# FHB Management Plan

3. Management of *F. graminearum* infested fields
  - Infested crops should be cut and ensiled prior to maturity and fed in ways that prevent spillage
  - Mature crops should be harvested and fed to cattle
  - Remove crops residues from equipment before leaving infested fields
  - Incorporate infested crops residues after harvest
  - Use shallow tillage to avoid turning residues up
  - Control volunteer cereals and grasses
  - Rotate with non-host crops for three years
  - Avoid using corn in rotation with cereals
  - Plant disease-free cultivars with tolerance to FHB

# Summary

- Biosecurity is becoming increasingly important to the cereal and oilseed industries in Canada
- The CFIA is the lead agency for surveillance of alien invasive species and pests of quarantine concern
- Some provincial governments have developed biosecurity programs patterned after those used by the livestock industry
- There is a need for a national plant health surveillance program in Canada to support federal and provincial biosecurity initiatives

# Contact Information

Ron Howard, Ph.D., P.Ag.  
Plant Pathology Research Scientist  
Alberta Agriculture and Rural Development  
Crop Diversification Centre South  
301 Horticultural Station Road East  
Brooks, Alberta T1R 1E6  
Email: [ron.howard@gov.ab.ca](mailto:ron.howard@gov.ab.ca)