



FHB, other disease issues in oats from 2017-2024 and Bacterial leaf streak

POGA's 27th Annual Conference, December 4th, 2024. Banff, Alberta.

Alejandra Oviedo-Ludena
Crop Development Centre, University of Saskatchewan

My experience with Oats

In Ecuador we love
oats too!

In Canada, Crop
sequence study

-6 sites in Western
Canada

-Up to 9 crops
including oats

-From 2018-2022

-FHB, leaf spots,



Crop sequence at Saskatoon



CANADIAN
AGRICULTURAL
PARTNERSHIP
Innovate. Grow. Prosper.



Alberta Wheat
COMMISSION



Western
Grains
Research Foundation



Prairie Oat Growers
Association



Sask Wheat
DEVELOPMENT COMMISSION



Manitoba
Wheat
and Barley
Growers Association



Integrated Crop
Agronomy Cluster



Brewing and Malting
Barley Research Institute

FHB

- Caused by various species: *F. graminearum*, *F. poae*, *F. sporotrichioides*, *F. culmorum*, *F. avenaceum*, *F. equiseti*
- *Fusarium* species also cause seed decay, seedling blight, and root rot
- *Fusarium graminearum* (*Fg*) most important cause in western Canada

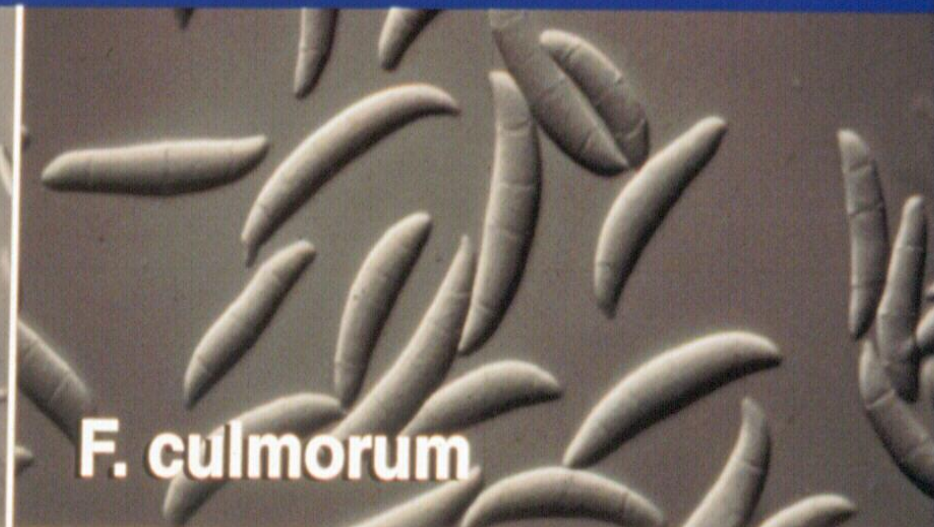


K. Lynch, NB Dept of Agriculture

4 SPECIES IN NORTH AMERICA CAN CAUSE FHB



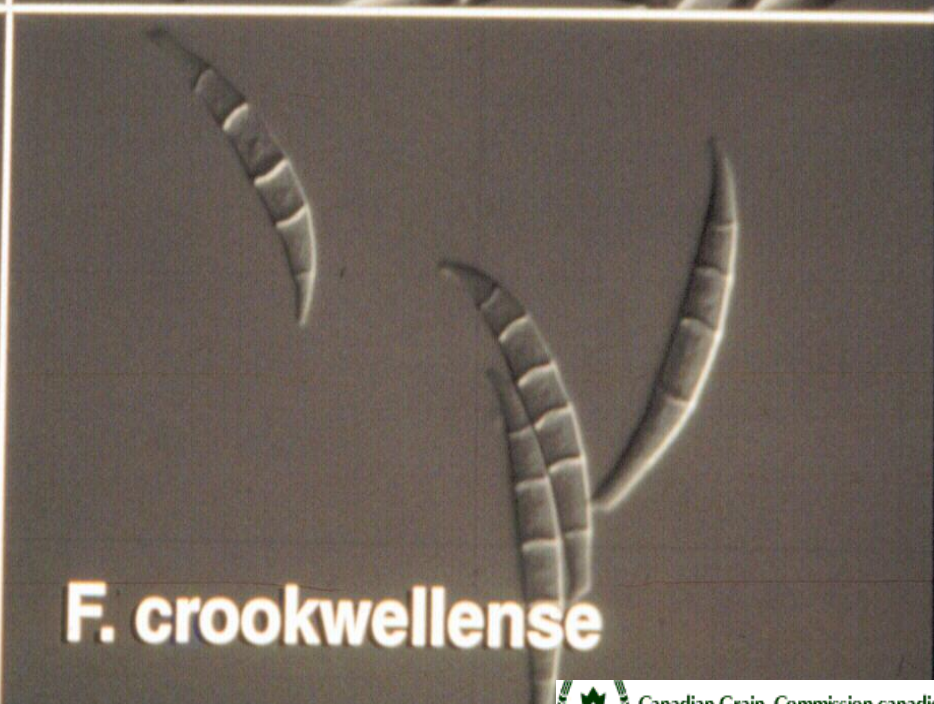
F. graminearum



F. culmorum



F. avenaceum

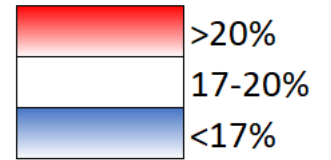


F. crookwellense

Crop sequence at Saskatoon 2022

FHB severity of durum

Year 2 - 2021



Year 1 - 2020

	durum	barley	maize	oat	canary seed	pea	lentil	canola	flax
durum	17.1	14.4	18.5	14.7	17.5	19.1	15.3	20.7	10.8
barley	18.8	20.1	20.7	19.4	23.6	18.8	18.7	17.1	16.8
maize	20.5	21.4	28.1	13.9	28.9	27.3	10.7	21.9	13.7
oat	14.3	17.3	12.1	18.6	17.1	21.8	18.3	18.3	14
canary seed	16.3	14.1	24	14	21	23.1	11.1	21.4	9.8
pea	17.3	20.5	14.8	12.5	18.9	21.9	15.3	17.9	10.5
lentil	20	12.4	14	15.7	25.1	18.2	24.7	16.8	20.8
canola	20.5	17.2	14.8	14.6	17.3	21.7	16.3	21.5	13
flax	11.5	11.1	7.7	11.6	11.6	22.4	16.2	11.7	11.1

* higher FHB severity on oat-oat-durum, oat-pea-durum, and oat-lentil-durum

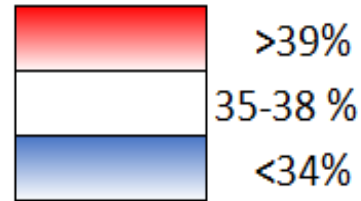
Crop sequence at Saskatoon 2022

Leaf spots severity of durum

Year 2 - 2021

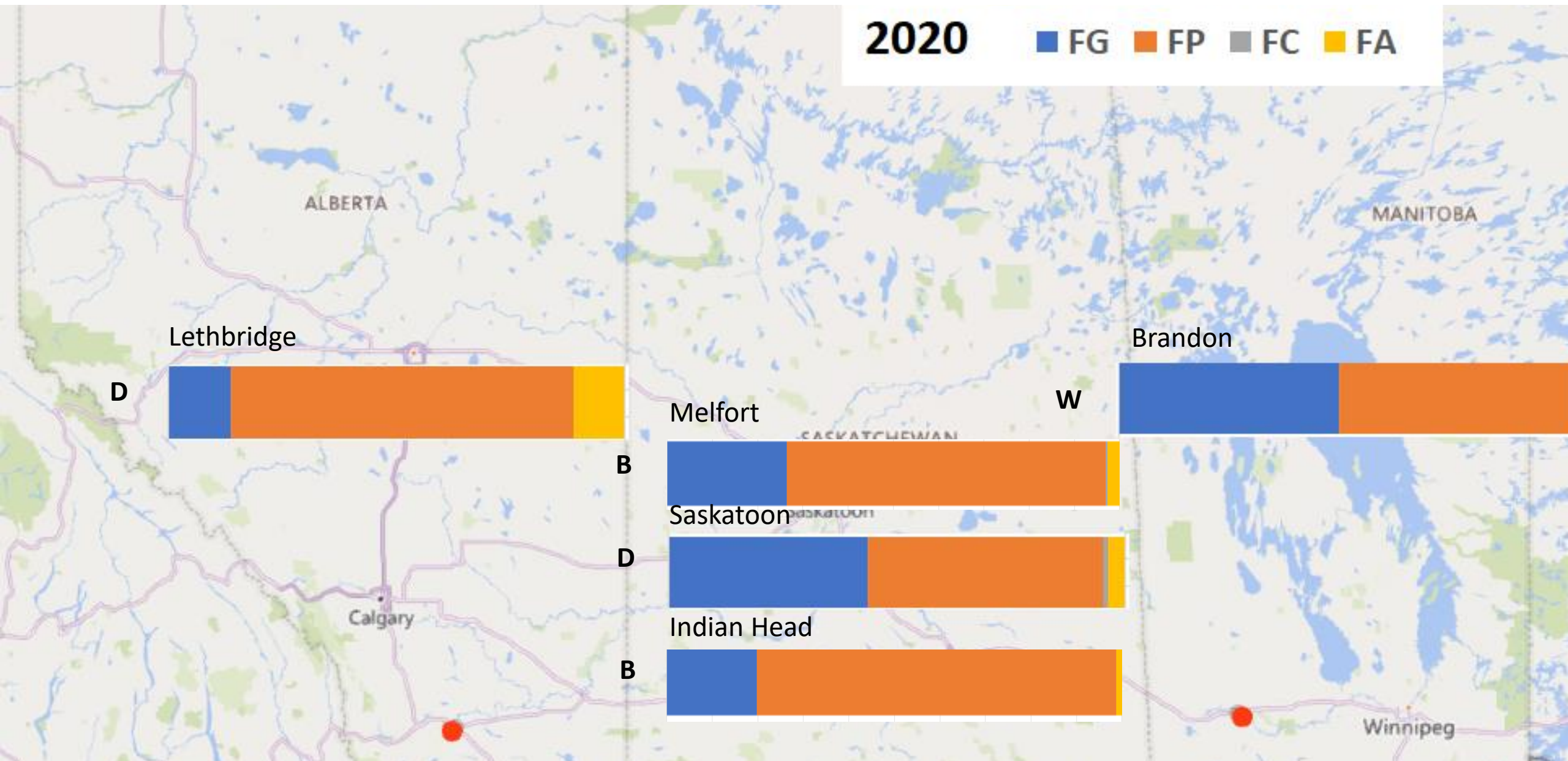
Year 1 - 2020

	durum	barley	maize	oat	canary	pea	lentil	canola	flax
durum	57.3	45.8	47.9	47.9	55.2	39.6	52.1	54.2	21.9
barley	30.2	18.7	36.5	25	20.3	39.6	33.3	20.3	25
maize	36.5	21.9	25	10.9	33.3	62.5	18.7	18.7	14.1
oat	47.9	54.2	45.8	45.8	54.2	42.7	49	42.7	31.3
canary	45.8	33.3	39.6	45.8	39.6	39.6	55.2	30.2	25
pea	39.6	39.6	47.9	21.9	39.6	54.2	39.6	42.7	17.2
lentil	17.2	18.7	7.8	21.9	25.5	39.6	30.2	17.2	25.5
canola	45.8	31.3	39.6	39.6	52.1	37.5	27.1	44.8	25
flax	21.9	14.1	12.5	21.9	41.1	44.8	31.3	20.3	14.1



* higher leaf spots severity on oat-canary-durum, oat-barley-durum, oat-lentil-durum, oat-durum-durum

Fusarium spp. isolation frequency (%) in the crop sequence

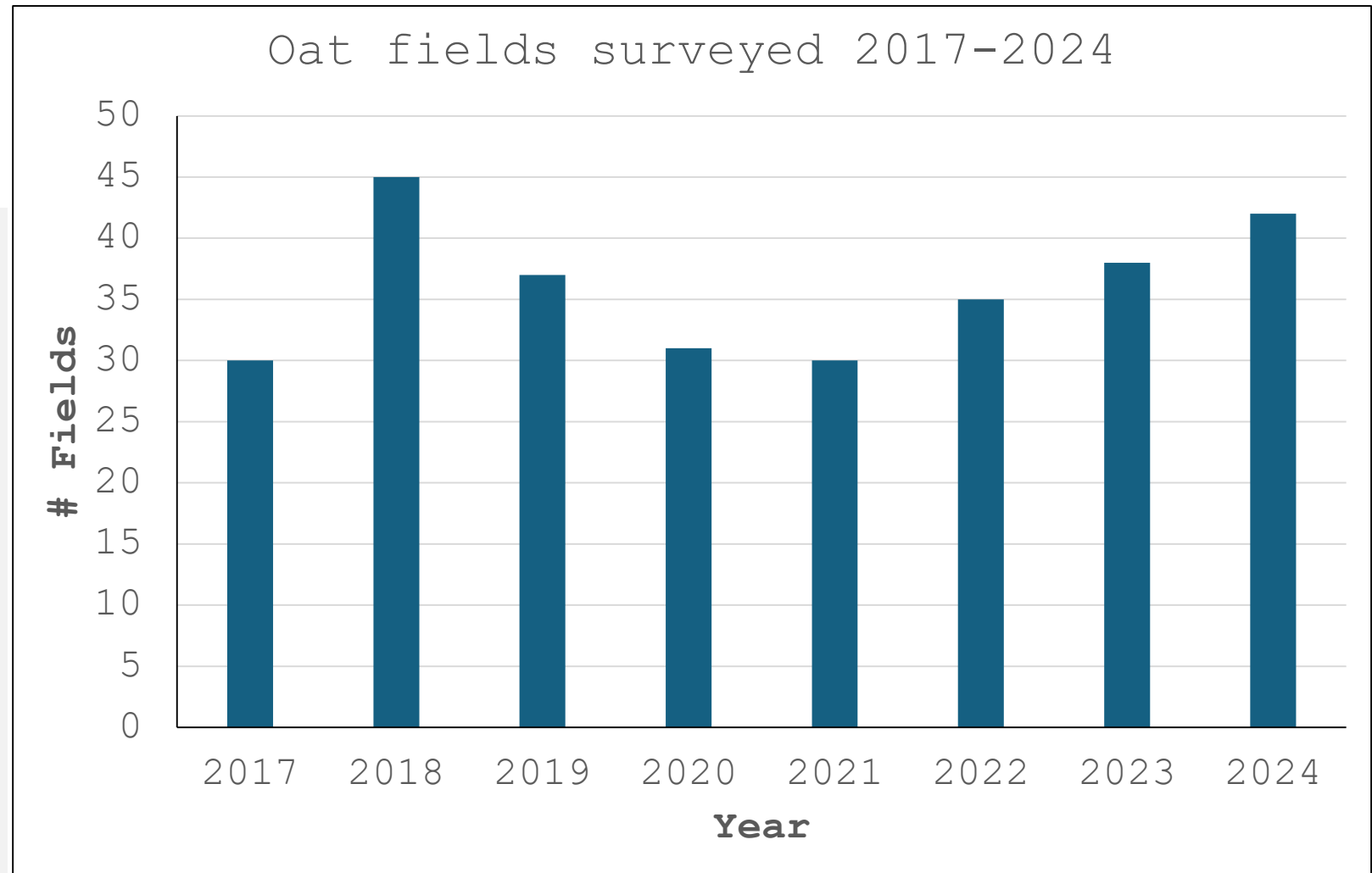


D: durum, W: wheat, B: barley, O: oat, FG: *F. graminearum*, FP: *F. poae*, FC: *F. culmorum*, and FA: *F. avenaceum*.

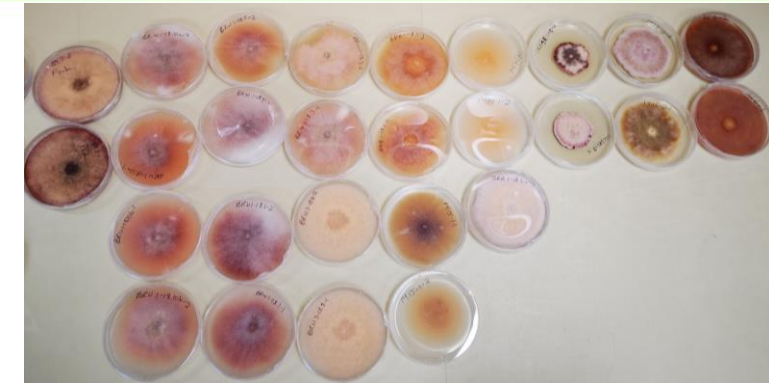
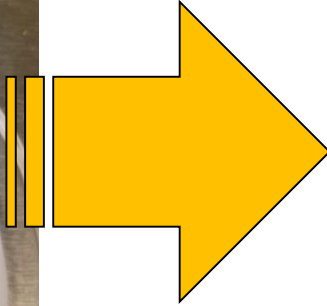
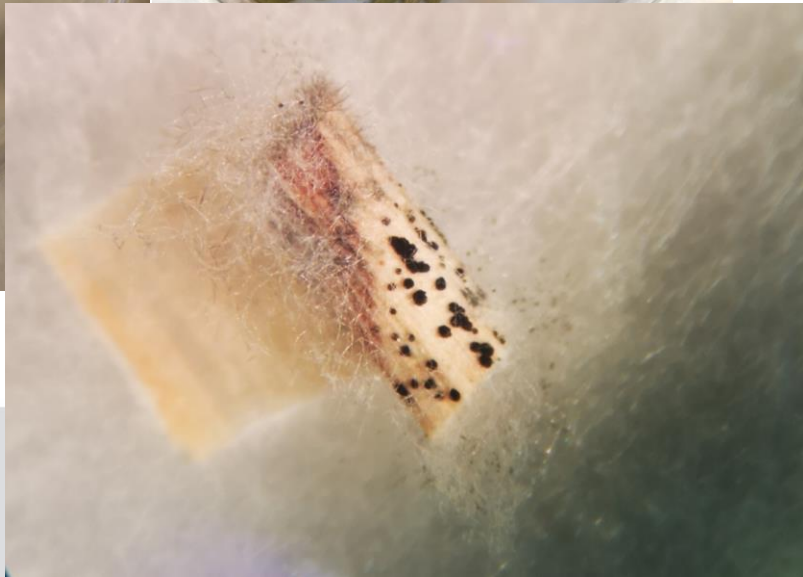
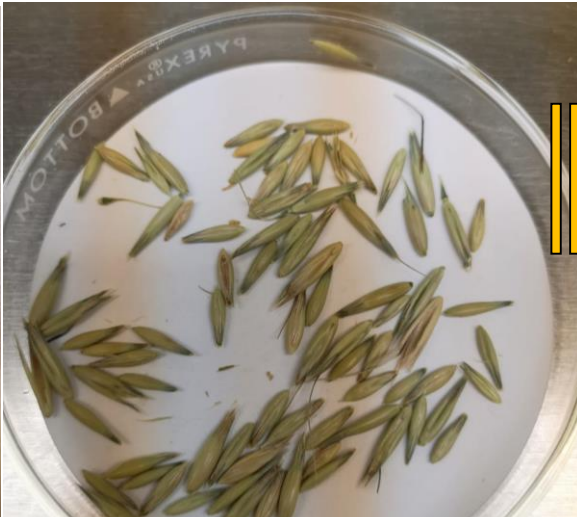
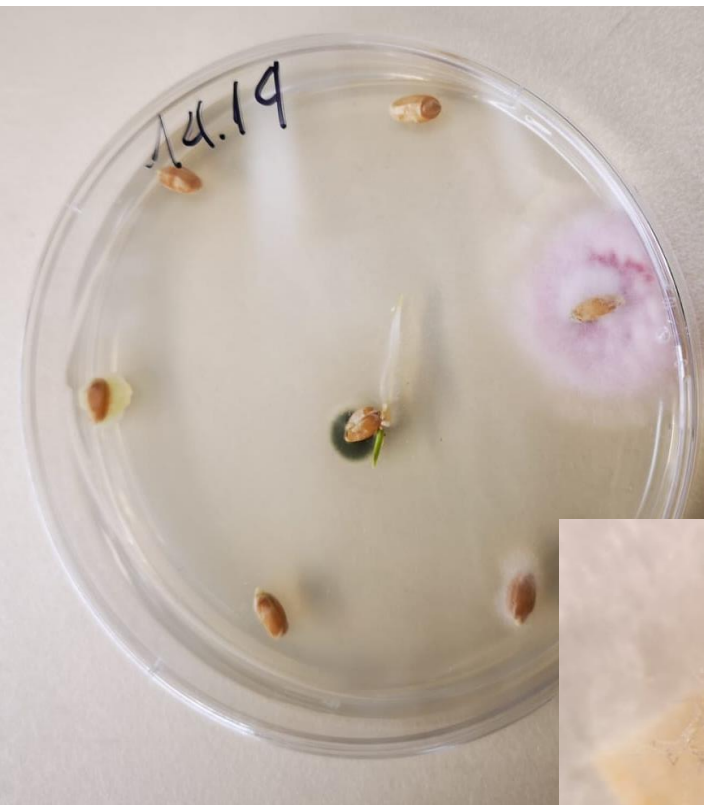
Oat Disease Surveys in Saskatchewan 2017-2024

Fields surveyed in Saskatchewan

- Samples collected by Cpath lab U of S (2015-2018)
- Samples collected by Saskatchewan Crop Insurance Corporation (2015-2024)
- Total of 288 fields surveyed from 2017-2024
- Average 36 fields per year



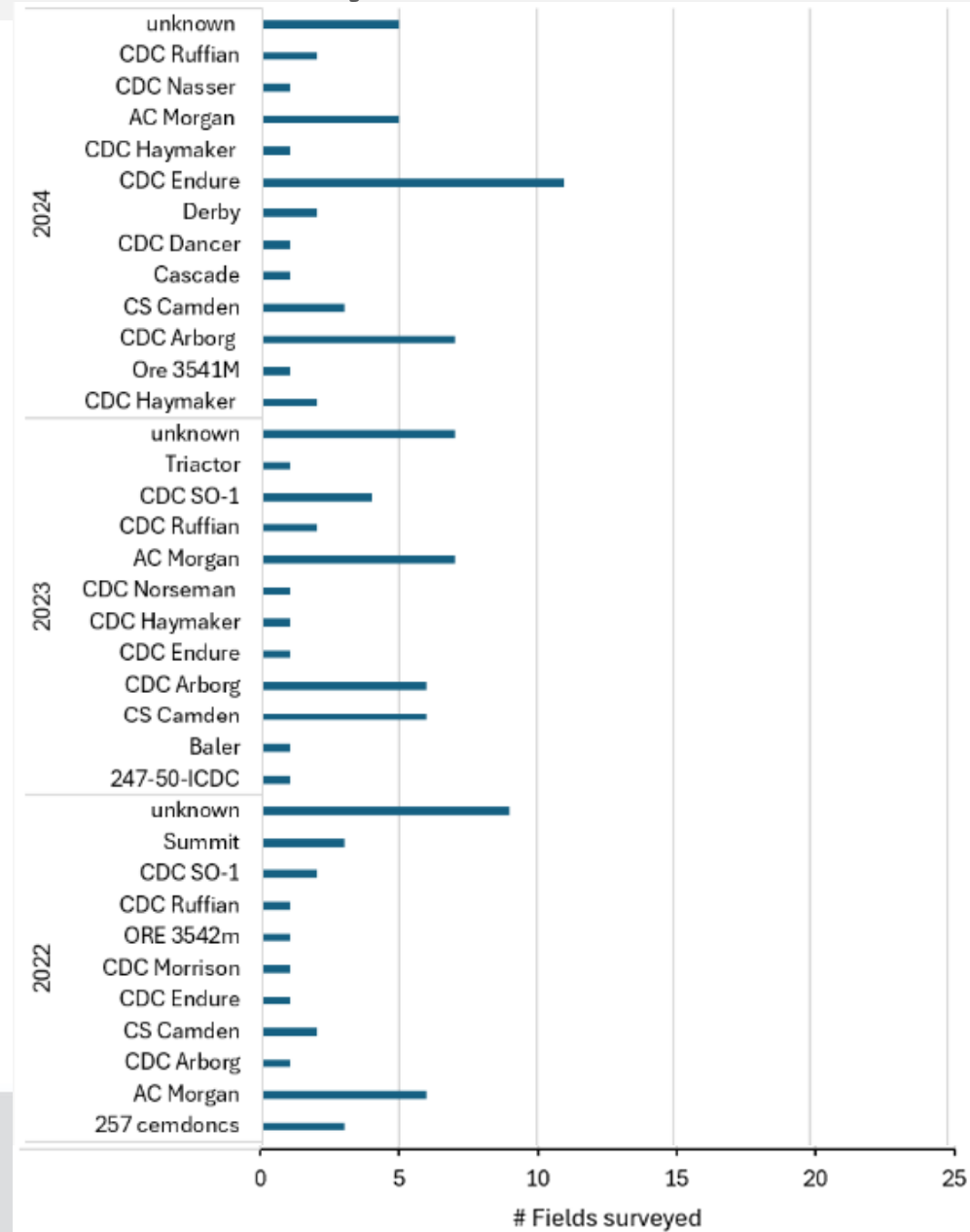
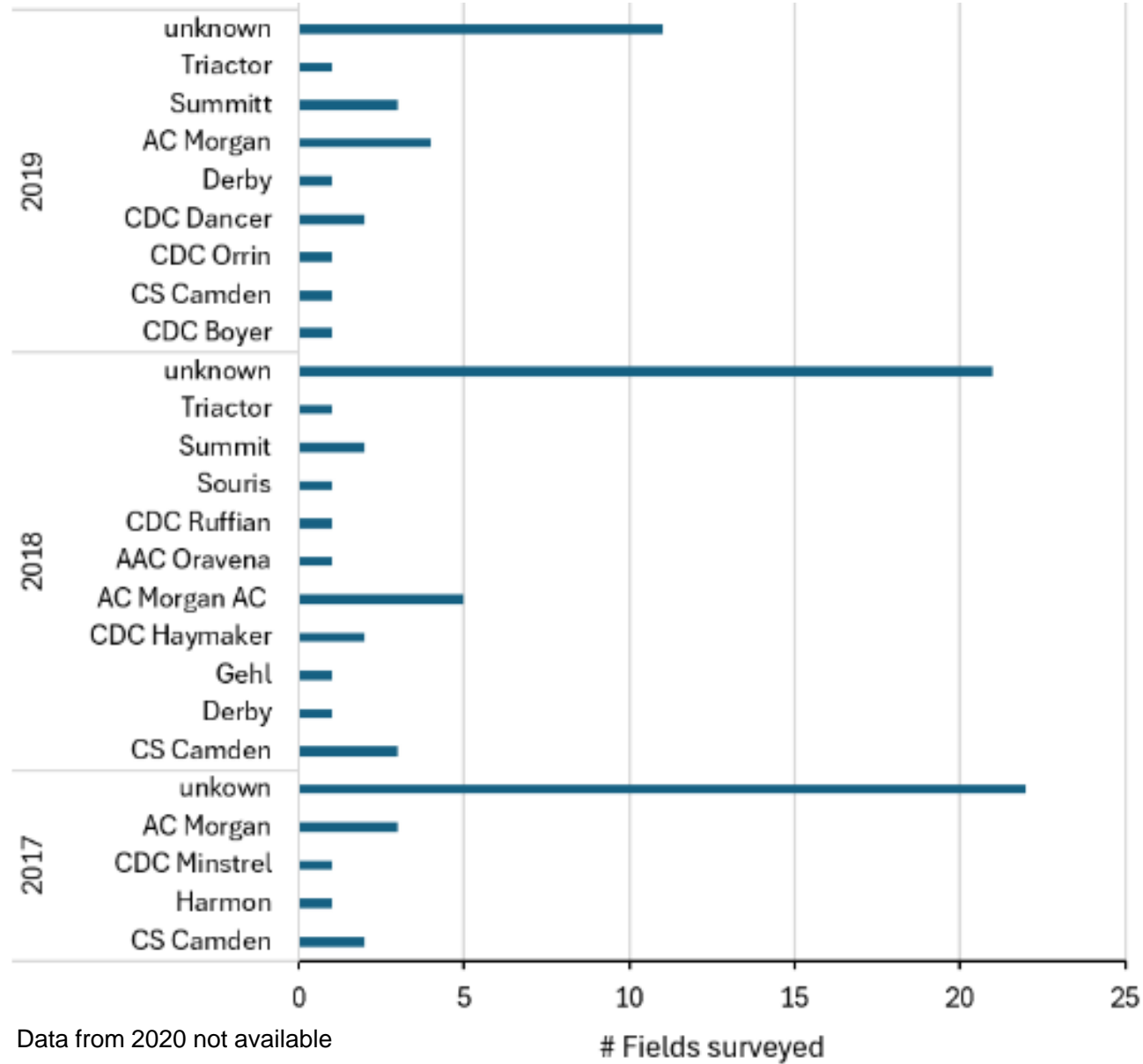
Surface sterilization and isolation of fungi pathogens



Morphological identification

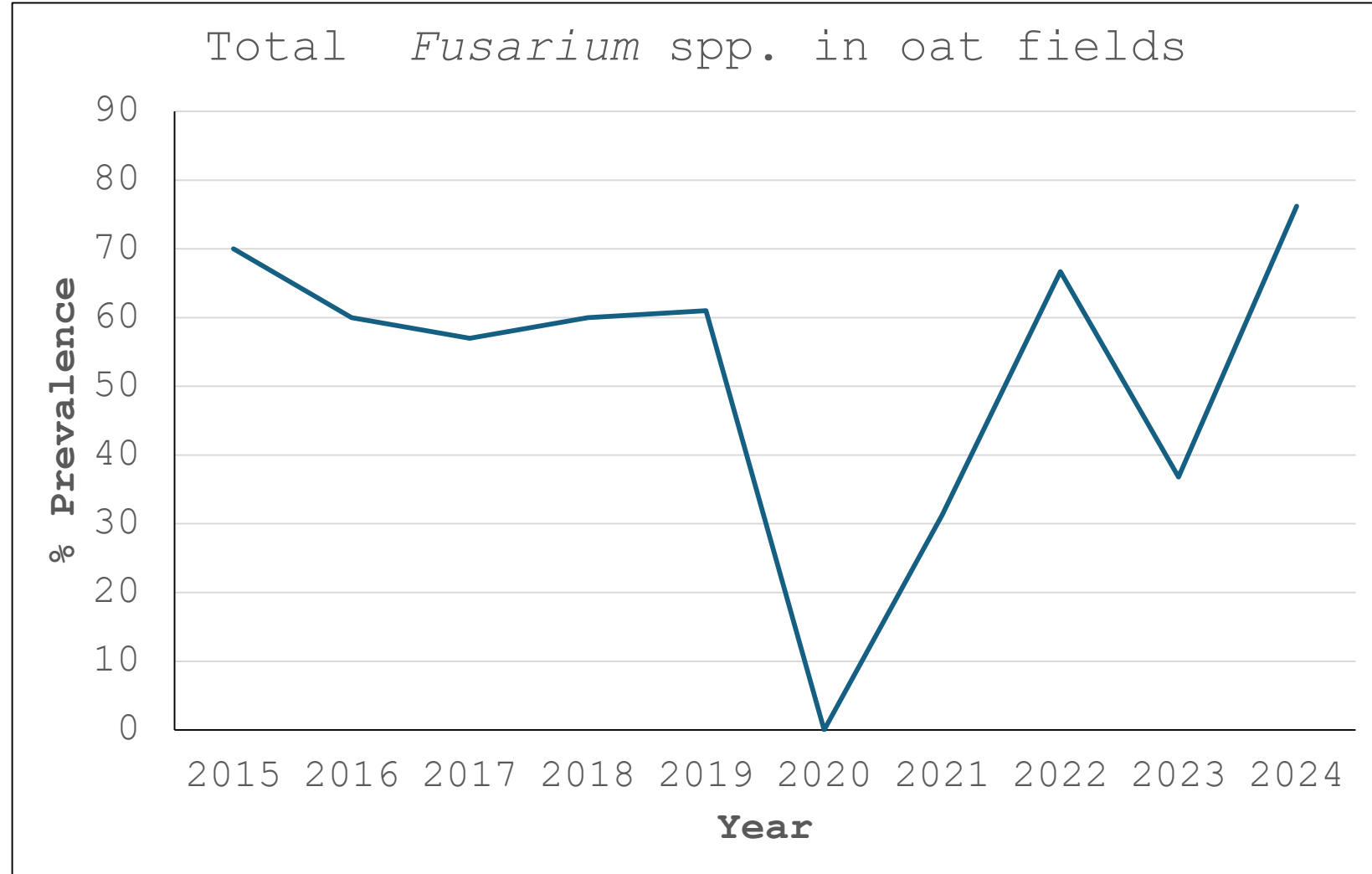


Varieties grown from 2017-2024 in surveyed fields



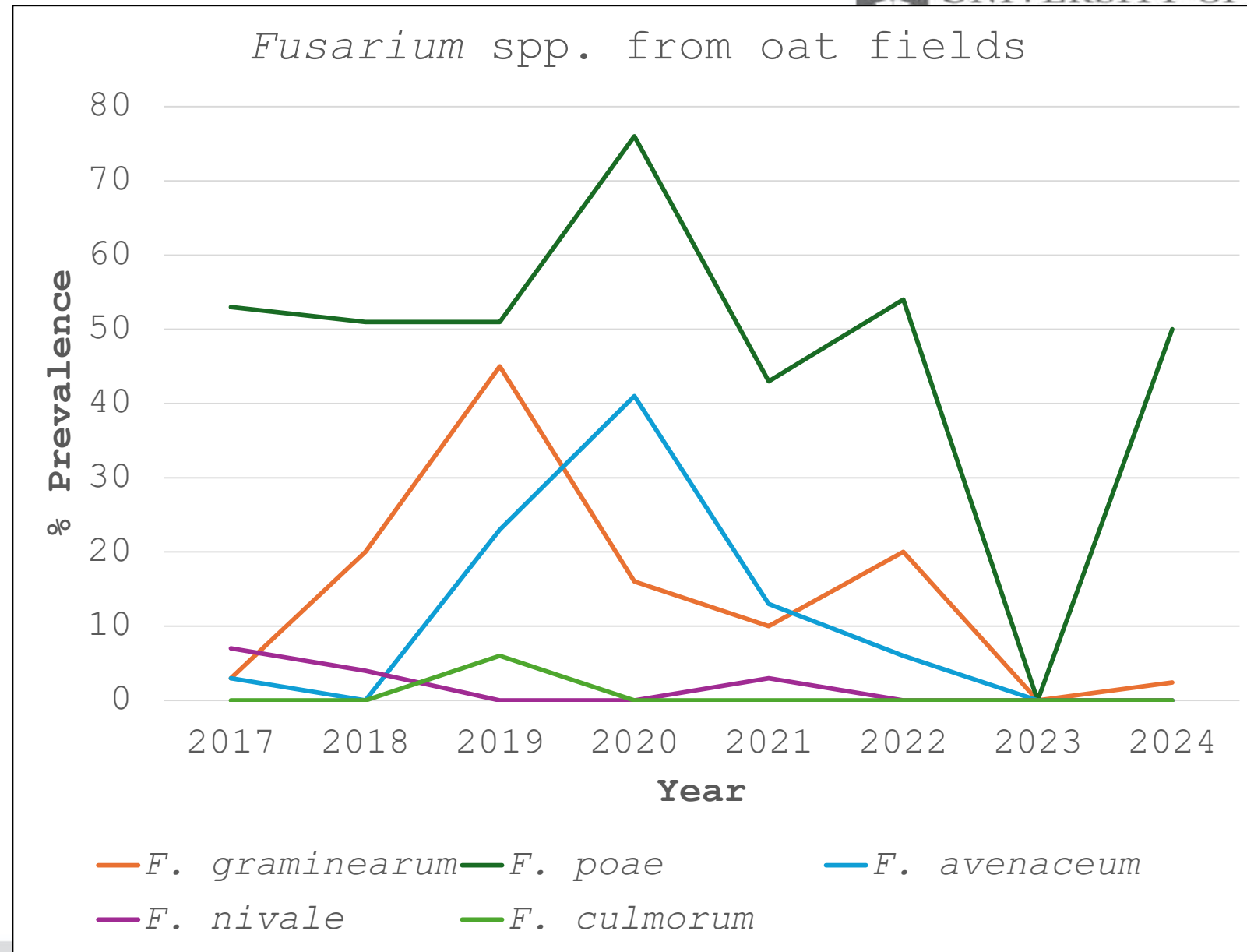
Fusarium spp. in oat fields

- Prevalence: #fields infected/total fields
- Average 57.7% *Fusarium* species isolated from oat fields.
- 2020 no data available due to covid-19 restrictions.

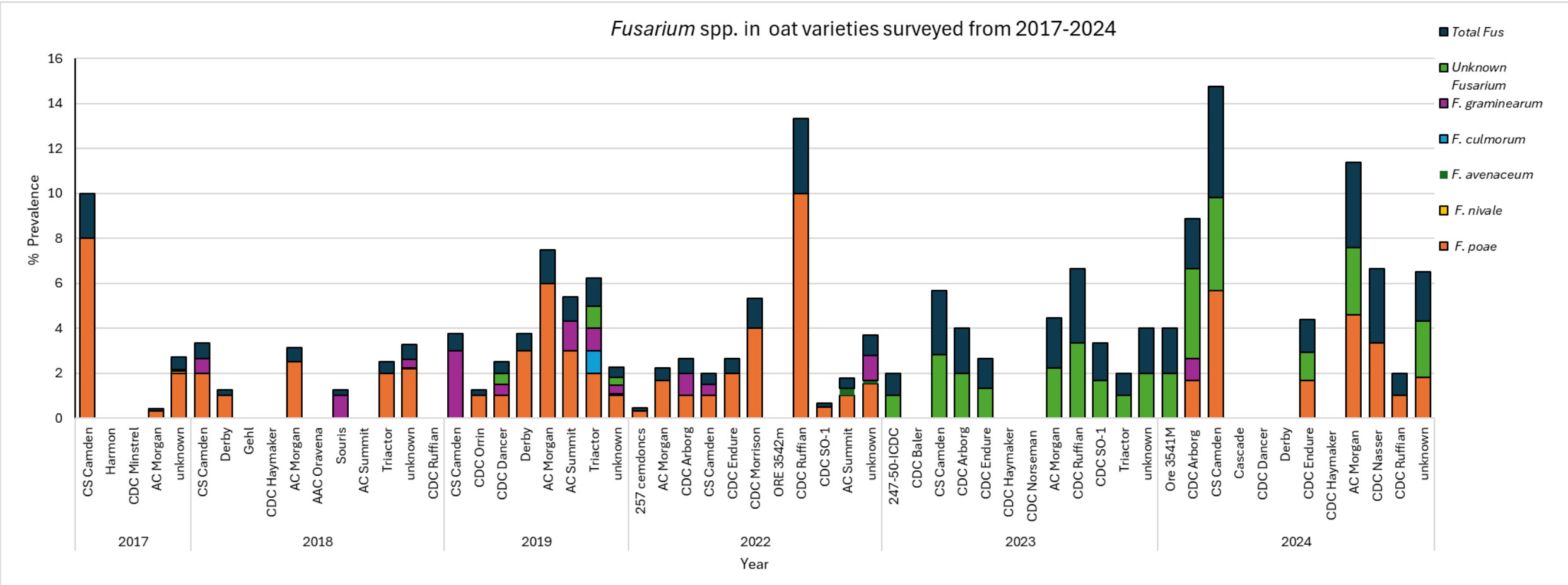


Fusarium spp. in oat fields

- Predominance of *Fusarium poae* from 2017-2024.
- 2023 no data available
- Most aggressive species in Western Canada is *F. graminearum*



Fusarium species in oat varieties from 2017-2024



Total Fus: Total *Fusarium* species found on oat kernels.

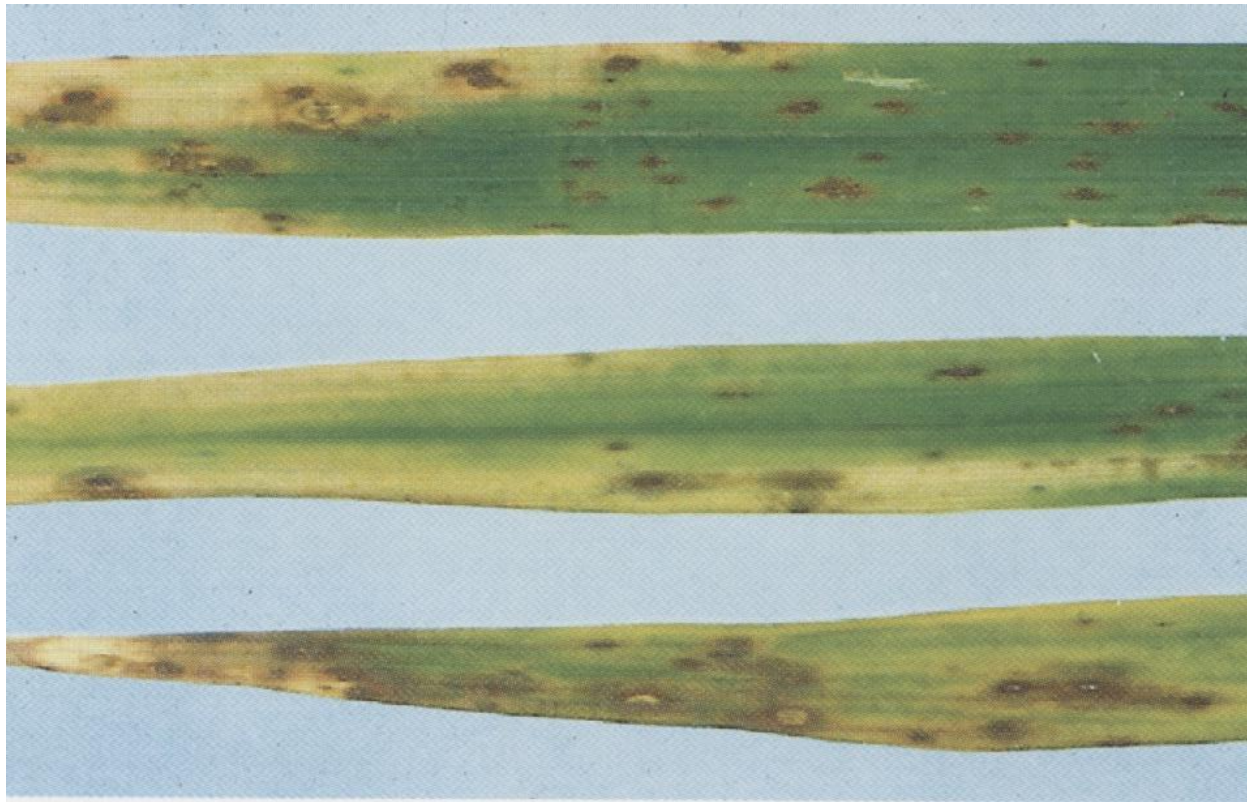
Data from 2020 not available

“Unknown variety” means no variety description on the survey sheet.

Leaf spotting diseases of Oat

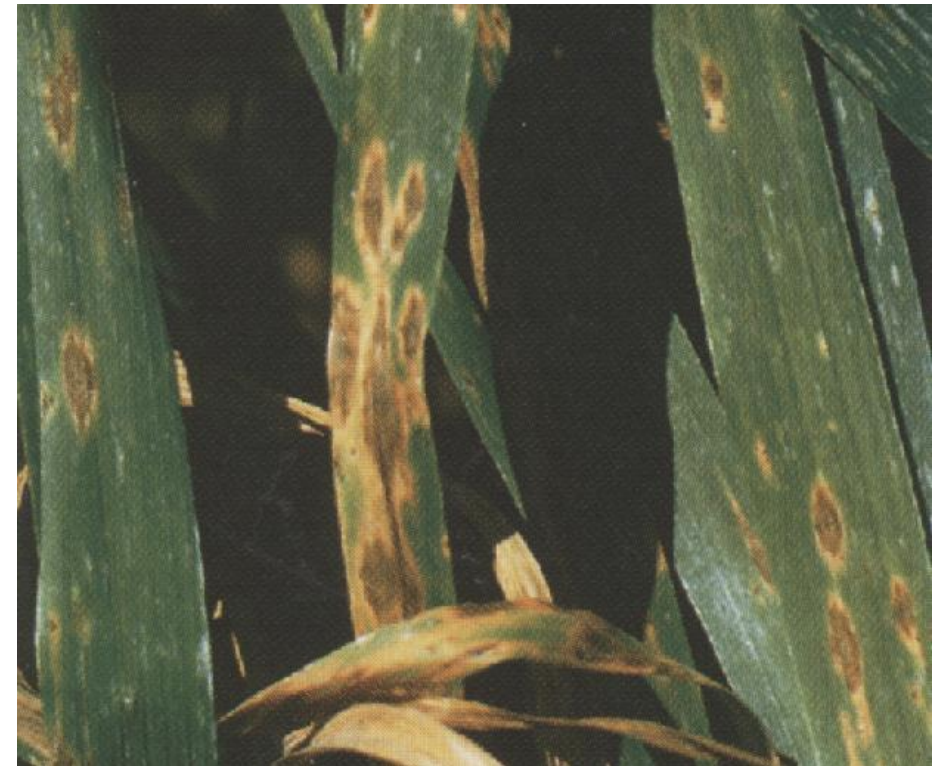
- Pyrenophora leaf blotch – *Pyrenophora avenae*
- Stagonospora (Septoria) leaf blotch – *Stagonospora avenae*
- Spot blotch - *Cochliobolus sativus*

Pyrenophora leaf blotch



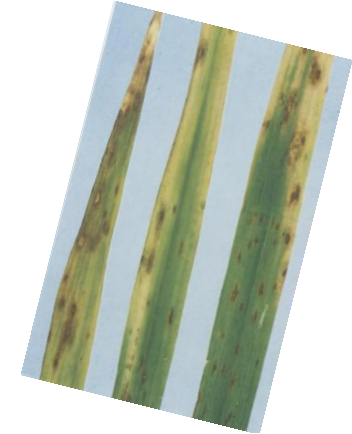
Diseases of Field Crops in Canada

Stagonospora (Septoria) leaf blotch



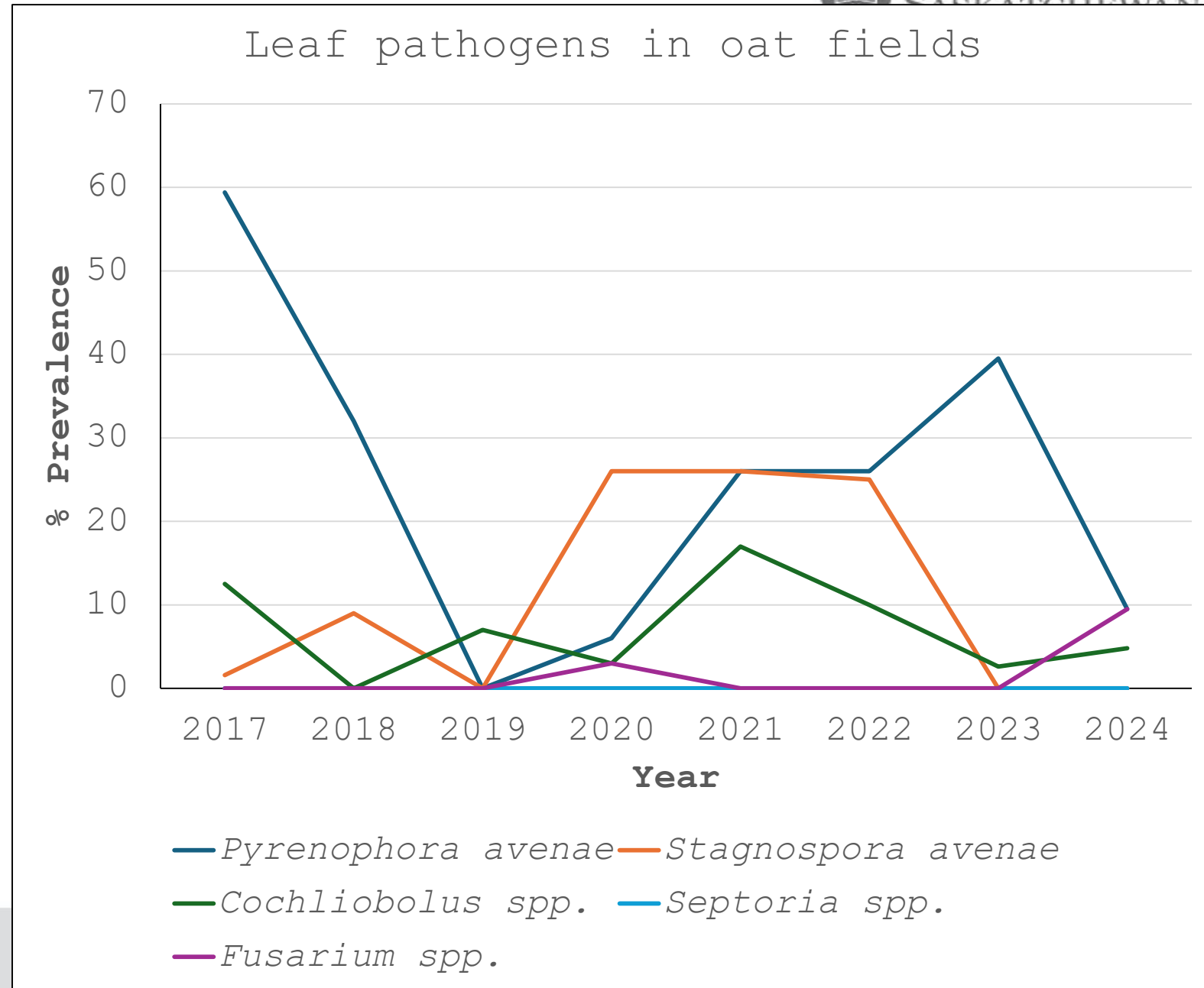
Leaf spots

- Severity depends on the amount of inoculum present in an area and the environment
- Control:
 - crop rotation
 - varietal variation
 - fungicide – Caramba, propiconazole, Stratego



Fusarium spp. in oat fields

- Predominance of *Pyrenophora avenae* and *Stagnospora avenae* from 2017-2024.
- 2018-2020 dry years for leaf spots development



Bacterial leaf streak (BLS)

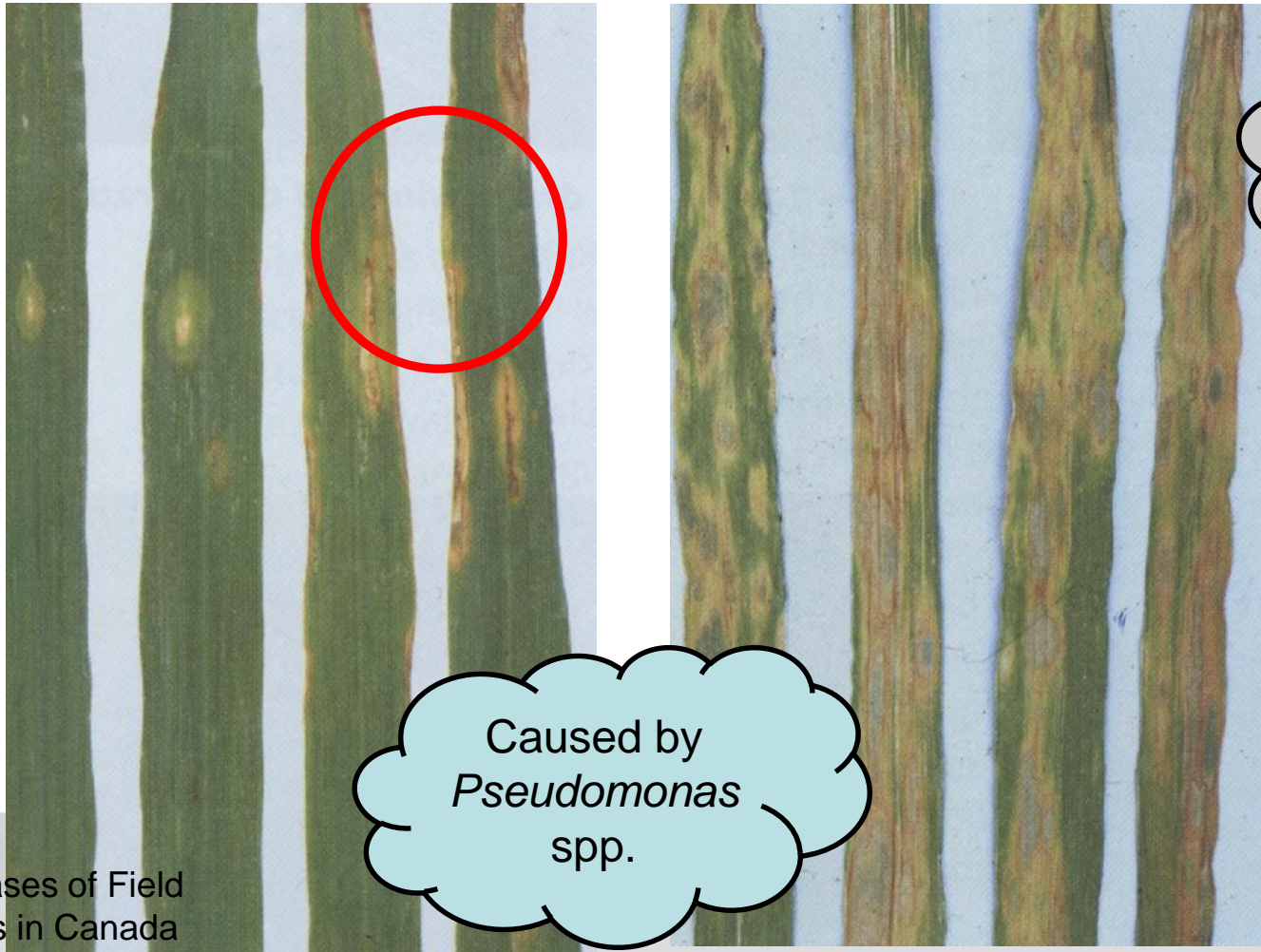


Bacterial blights of Oats

Halo blight

Stripe blight

Bacterial leaf streak



Bacterial leaf streak (BLS)

***Xanthomonas translucens* (Xt) – BLS on cereals**

Pathovars (pv): depending on the host

Xt pv. *translucens*: barley

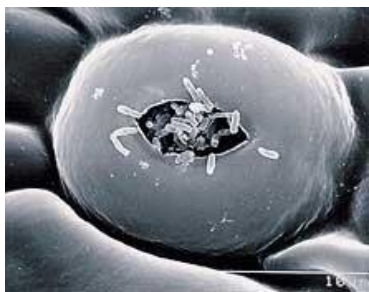
Xt pv. *undulosa*: wheat and barley

BLS has not been detected in oats in Canada but is present in USA

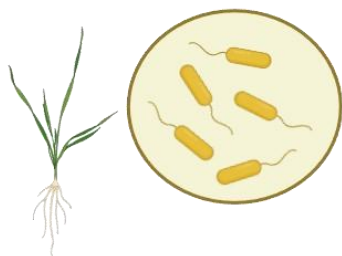
Disease Cycle

Infection

Humidity
Temperature
15-30°C
Wounds
Stomata



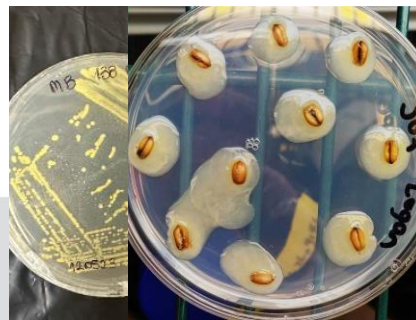
Multiplication and release of bacteria



Progress of disease to top of the plant
Black chaff



Perennial weeds



Dissemination



Survival in soil and debris

Seed borne

Symptoms

Initial

Water soaking

Streaked lesion

Advanced

Bacterial ooze

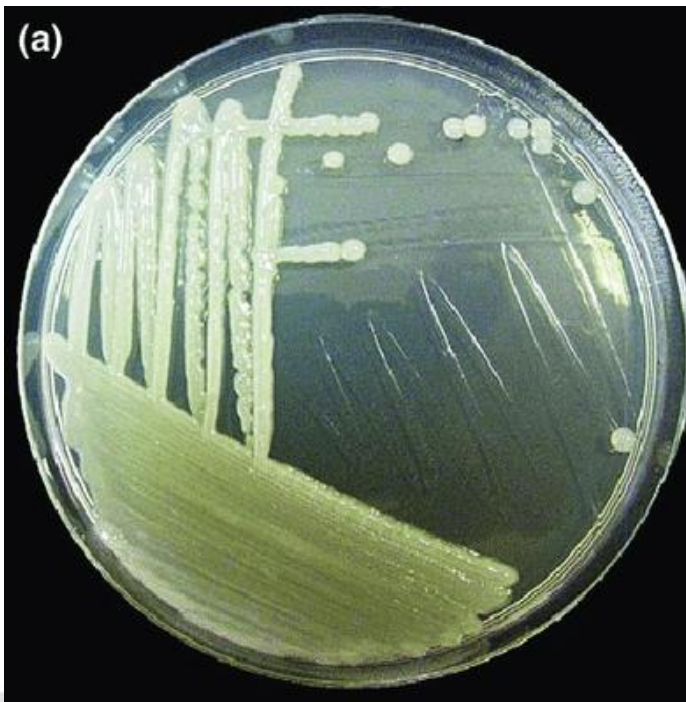
Chlorosis

Necrosis

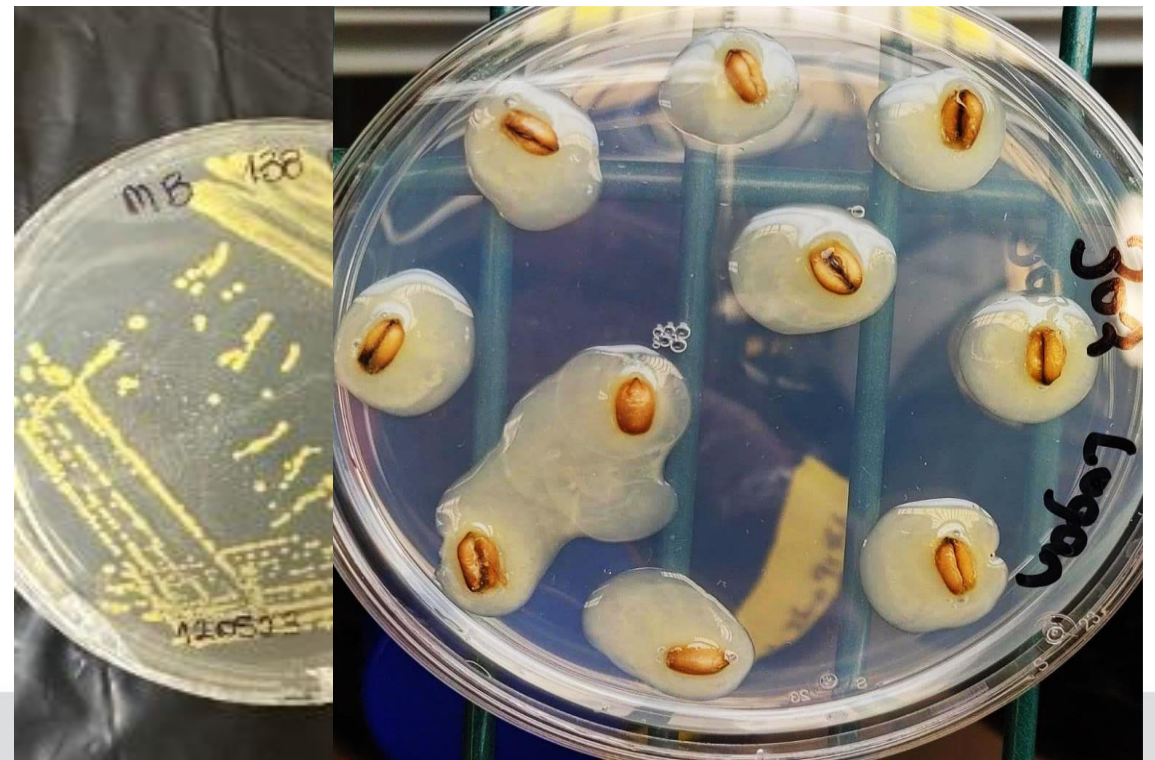


Bacterial blight or bacterial leaf streak?

- Symptoms look the same at early stage of infection
- Requires confirmation by PCR, serological and pathogenicity tests.



Pseudomonas syringae



Xanthomonas translucens

Cereal and Flax pathology lab U of S

- Assessing seed to seedling transmission of *X. translucens* causing BLS on cereals.
- Genotypic screening and diagnostic seed test to assess BLS in wheat germplasm



INTERNATIONAL JOURNAL OF SYSTEMATIC AND EVOLUTIONARY MICROBIOLOGY

Volume 74, Issue 9

Research Article | Open Access

Taxonogenomic analysis of the *Xanthomonas translucens* complex leads to the descriptions of *Xanthomonas cerealis* sp. nov. and *Xanthomonas graminis* sp. nov. 

James T. Tambong^{1,2} , Renlin Xu¹, Maria Constanza Fleitas³ and Randy Kutcher³

James T. Tambong , Renlin Xu, Maria Constanza Fleitas, Lipu Wang, Mercy Akuma, Sylvia I. Chi, and

Hadley R. Kutcher

www.apsnet.org

Final recommendations against BLS

- Scout, keep records – distribution is usually patchy
- Seed testing is available– use clean seed
- Host Resistance (if available)
- Seed Treatments (if available)
- Weed control
- Fungicides do not work!
- Limited to no chemical control
- Crop rotation? Maybe because is seed borne



Thank you POGA for
the invitation

Questions?

Alejandra Oviedo-Ludena
alejandra.oviedo@usask.ca

BE WHAT THE WORLD NEEDS