

Crop Rotations in NW Saskatchewan

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saskatchewan.ca



Government
— of —
Saskatchewan

Why Does Crop Rotation Matter?

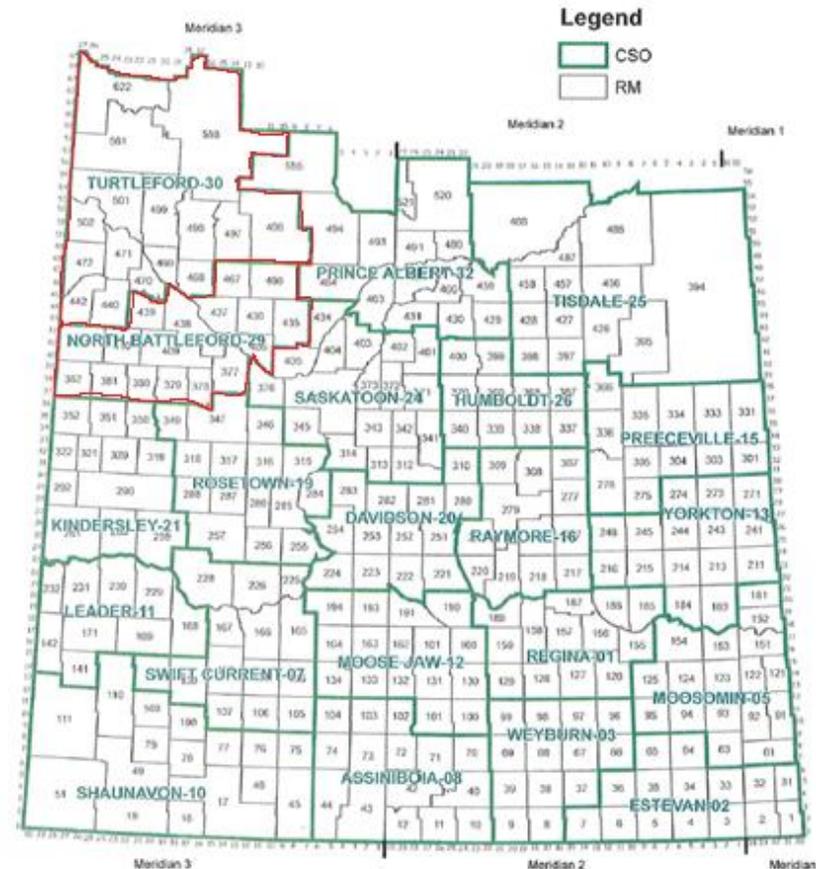
- Disease issues
 - Increased inoculum waiting for right weather conditions
- Weed issues
 - Herbicide resistant weeds
- Yield impacts
 - Lower yields due to pest issues
- Crop quality
 - Downgrading due to pest issues (insect damage, weed seeds, mycotoxins etc.)
- Variety genetics
 - Overuse of varieties with genetic traits
- Utilization of soil moisture and nutrients
 - Accessing all parts of soil profile, moderating salinity issues

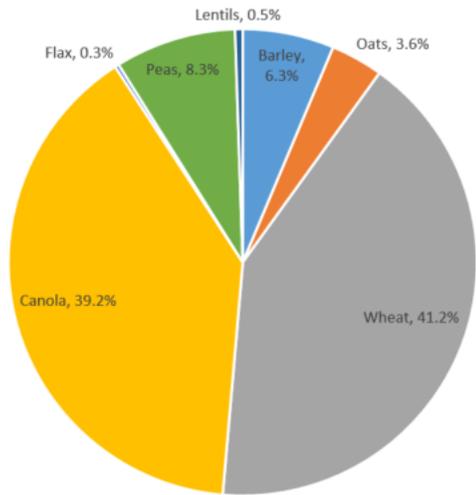
Looking Closer at the NW Region

What do our crop rotations look like in the NW?

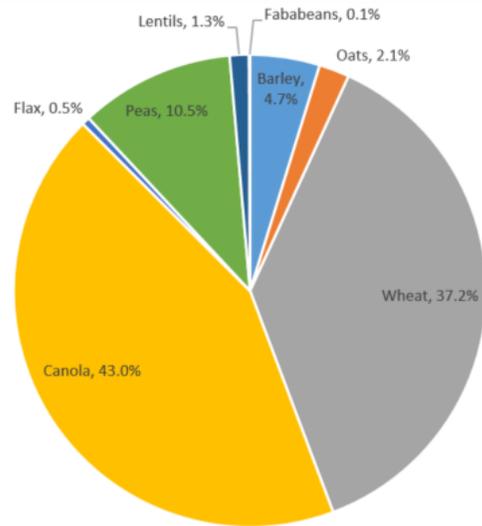
- Used SCIC data to evaluate seeded acres (insured and uninsured acres)
- Took 7 years of data
- Used CSO districts of North Battleford and Turtleford

SCIC Customer Service Office Map

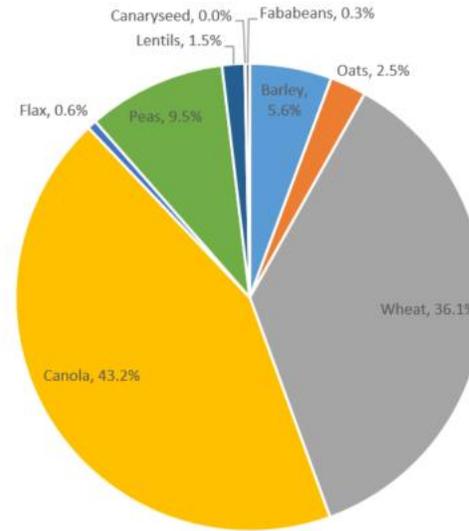




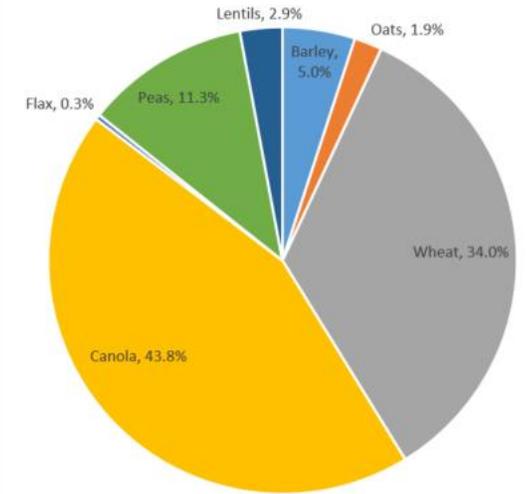
Percent Acreage Seeded 2013 (SCIC Data)



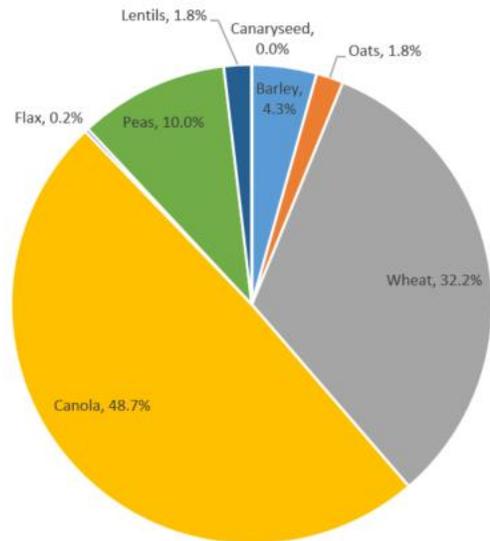
Percent Acreage Seeded 2014 (SCIC Data)



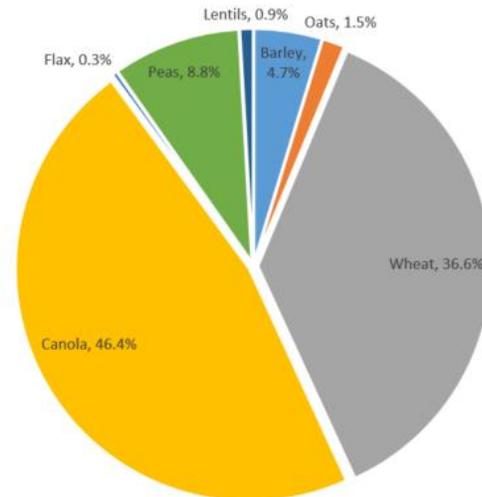
Percent Acreage Seeded 2015 (SCIC Data)



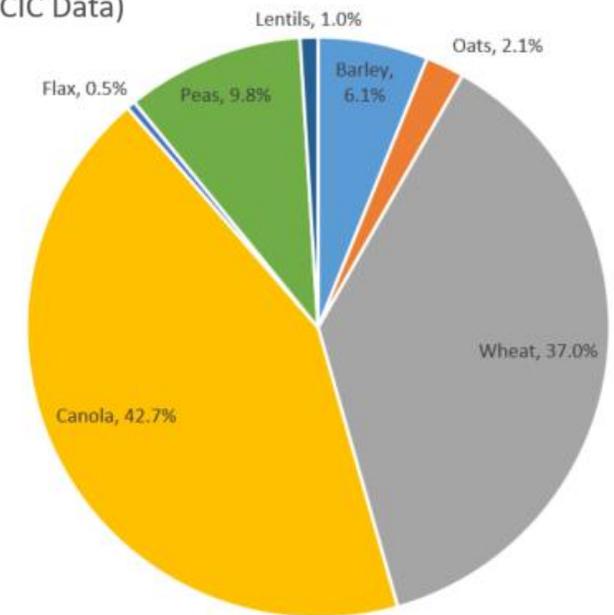
Percent Acreage Seeded 2016 (SCIC Data)



Percent Acreage Seeded 2017 (SCIC Data)

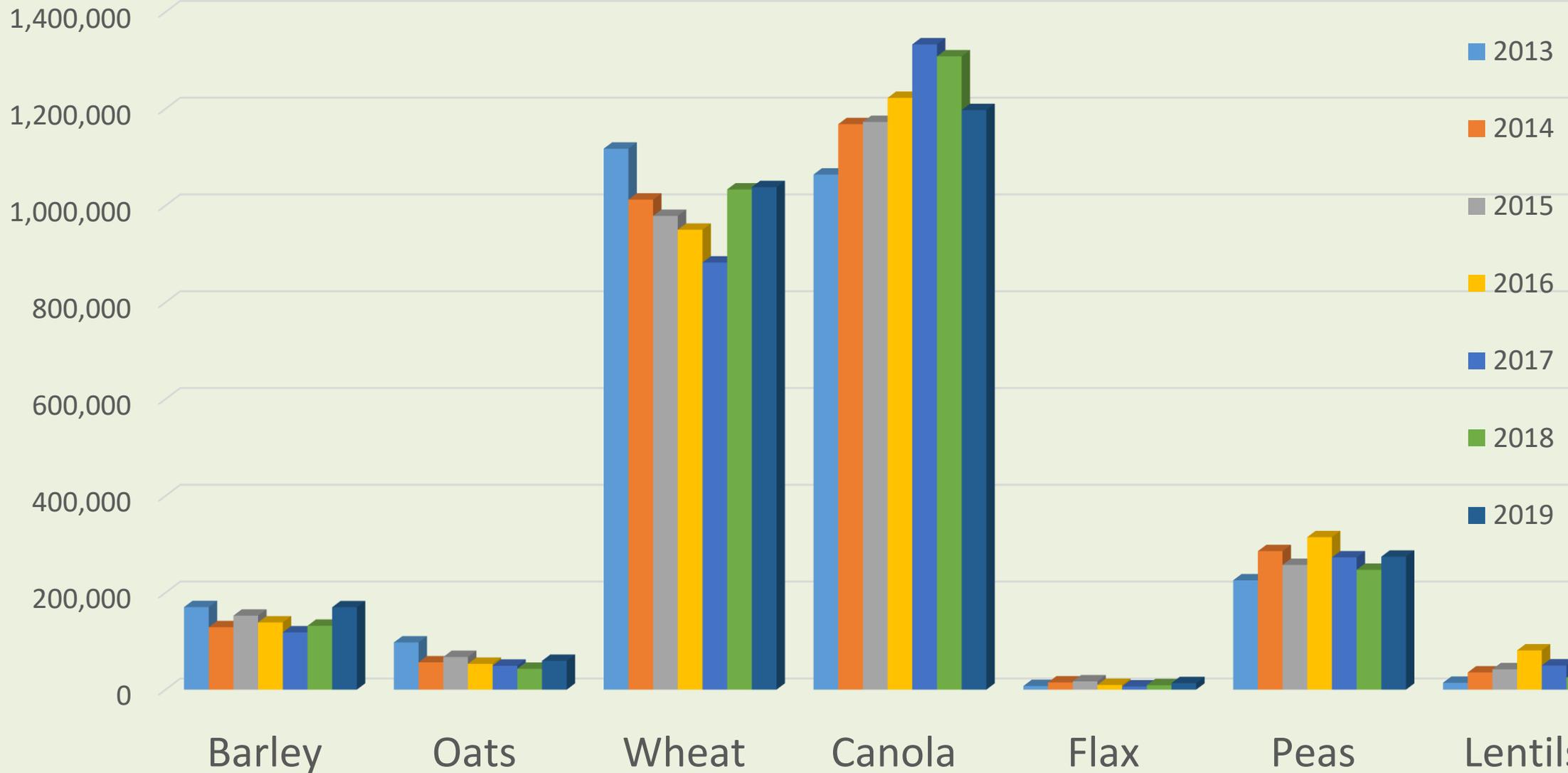


Percent Acreage Seeded 2018 (SCIC Data)



Percent Acreage Seeded 2019 (SCIC Data)

Seeded Acreage in NW 2013-2019 (SCIC Data) by Crop



Disease and Crop Rotation

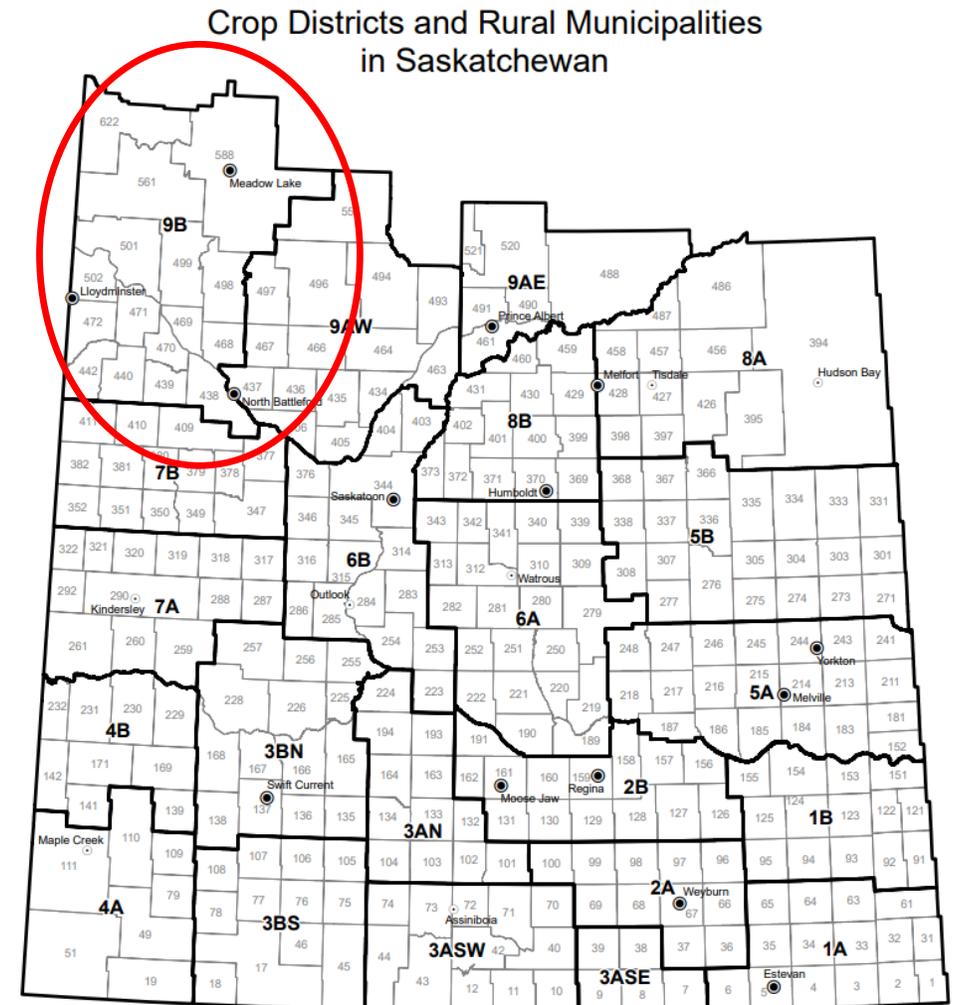
Diseases causing a lot of yield loss and crop quality concerns

- Canola –
 - Blackleg - 1 in 3 years canola (2 year break)
 - Clubroot – 1 in 3 years canola (2 year break)
 - Sclerotinia – 1 year break to decrease inoculum
 - Wheat – FHB
 - Barley – FHB
 - Oats – FHB
- Min 1 year break ... but 2 years better (residue needs to break down)
- Peas and Lentils – Root rot complex
 - Fusarium spp.
 - Rhizoctonia
 - Pythium
 - Aphanomyces
 - Sclerotinia
- Min of 6 year break... but up to 8 years



How Often Are We Growing These Crops?

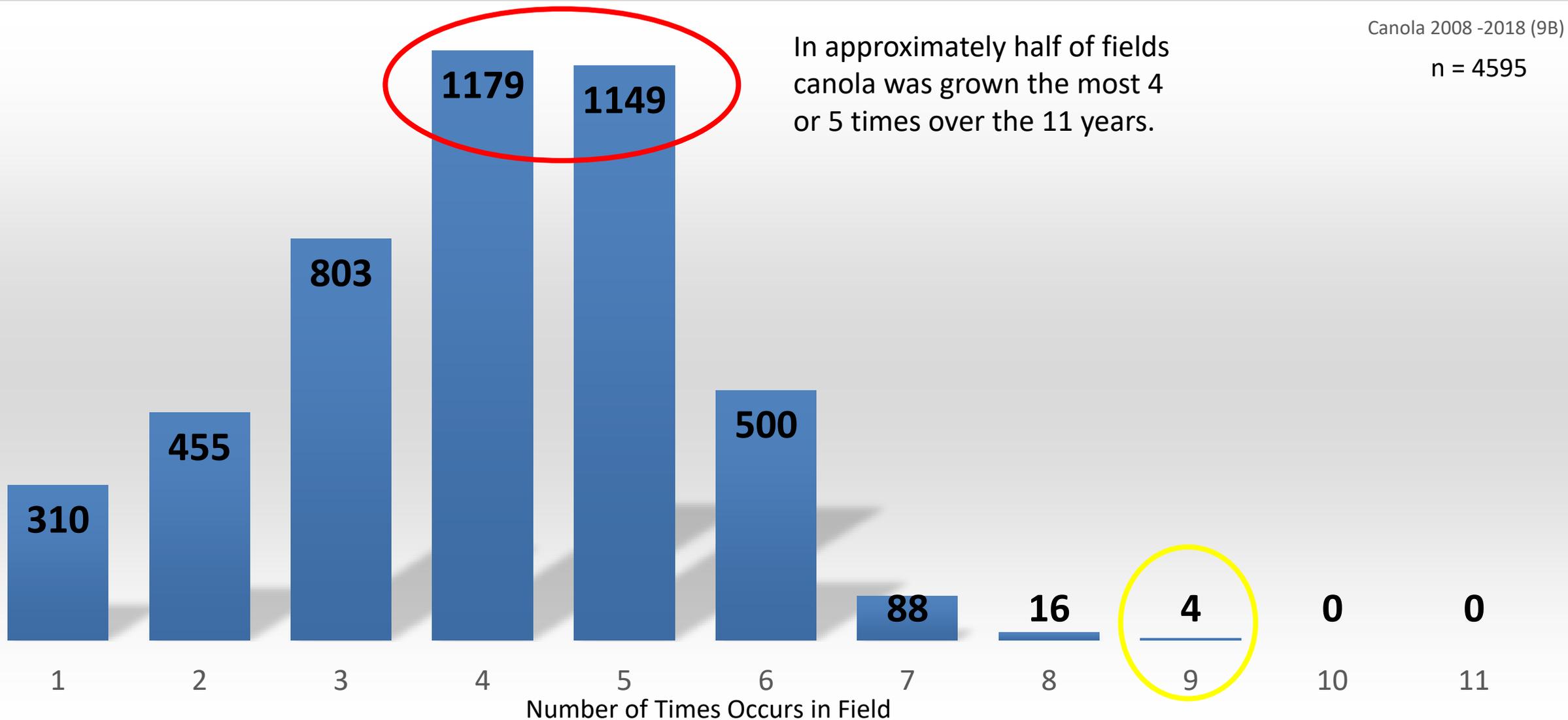
- Look SCIC data by crop district
 - Only crop district 9B
- Data years
 - 2008 to 2018
- Fields History
 - 9 out 11 years of field history with SCIC
- Field size
 - Minimum of 130 acres
 - Approx. 4500 fields in crop district 9B
- Crops included
 - Canola, wheat, barley, oats, flax, lentil, peas



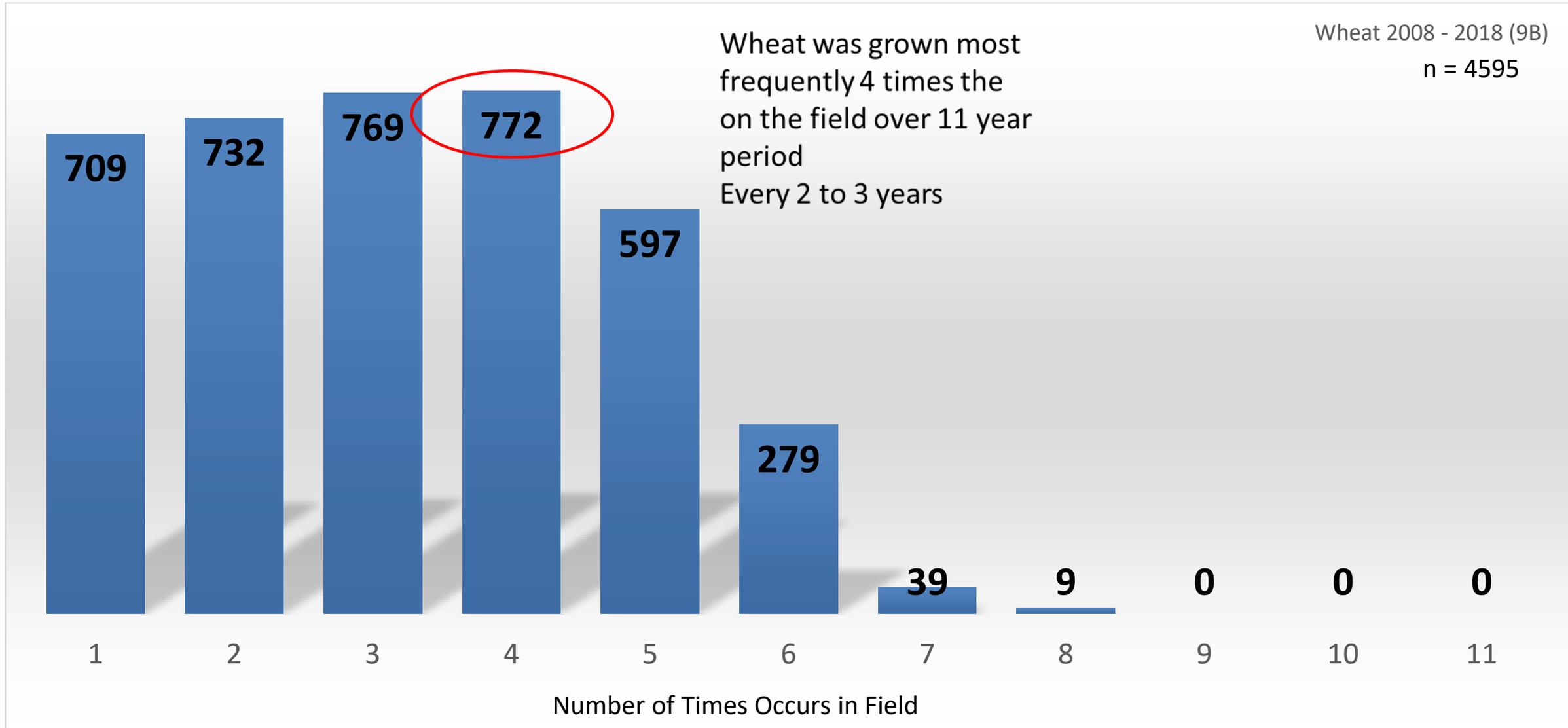
Frequency of Canola Grown 2008 -18 (9B)

Canola 2008 -2018 (9B)

n = 4595



Frequency of Wheat Grown 2008 - 18 (9B)

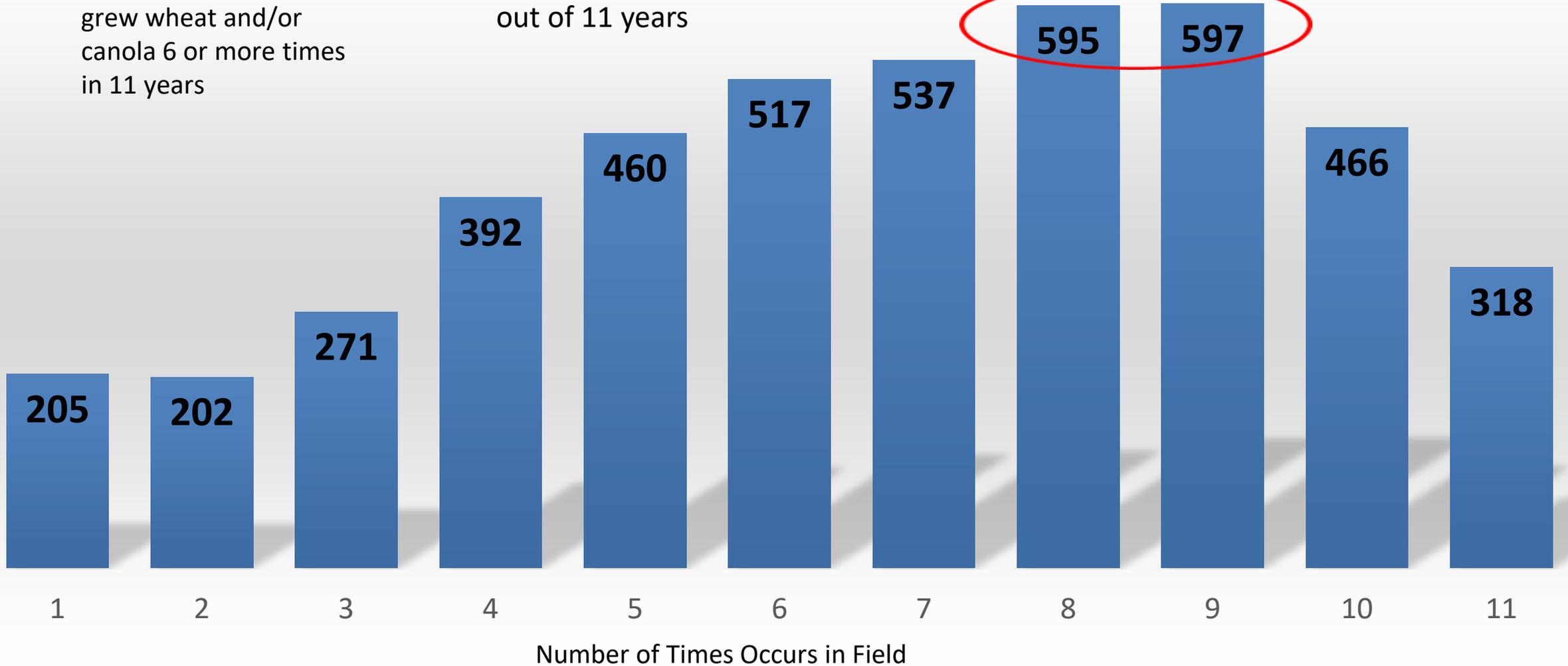


Frequency of Wheat and Canola Grown 2008 - 18 (9B)

Over half of fields grew wheat and/or canola 6 or more times in 11 years

Approximately quarter of fields had wheat and/or canola grown 8 or 9 times out of 11 years

Wheat or Canola 2008 - 2018 (9B)
n = 4595

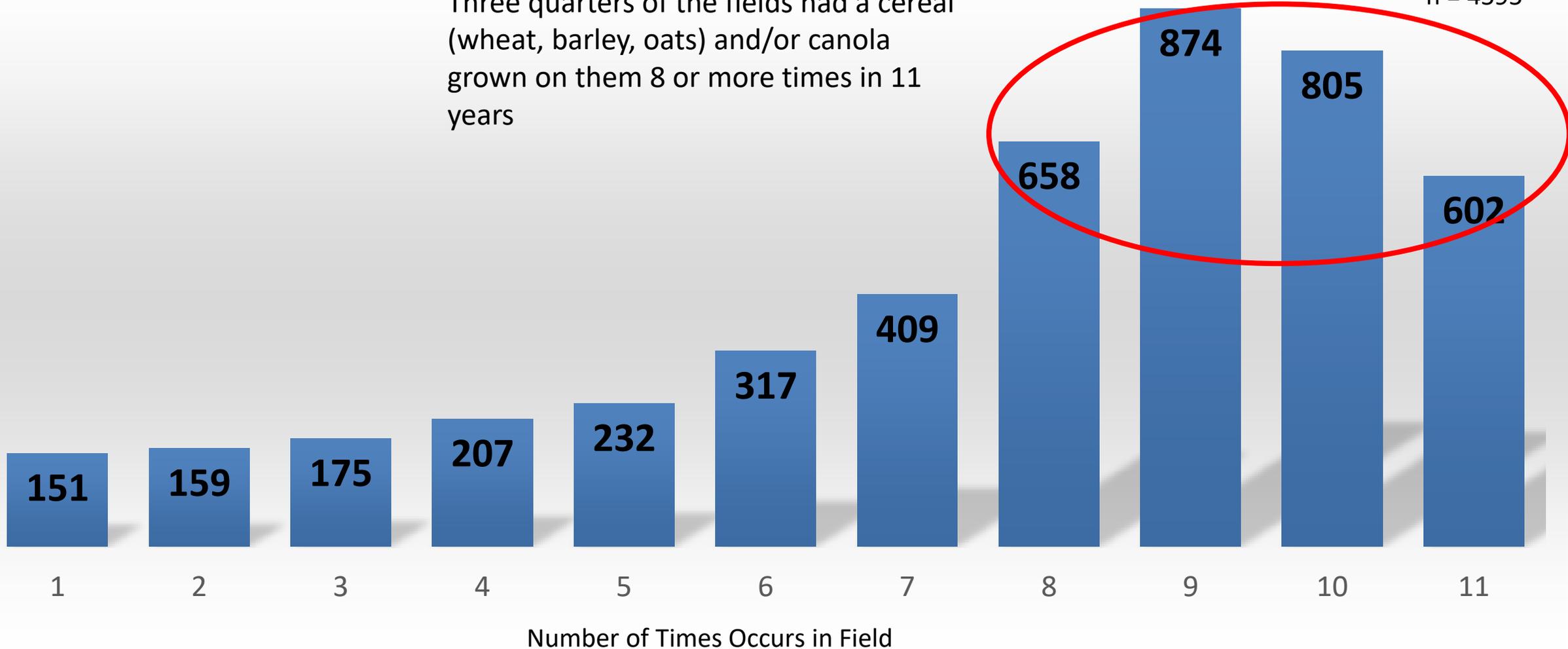


Frequency of Cereal and Canola Grown 2008 - 18 (9B)

Wheat Barley Oats Canola 2008 - 2018 (9B)

n = 4595

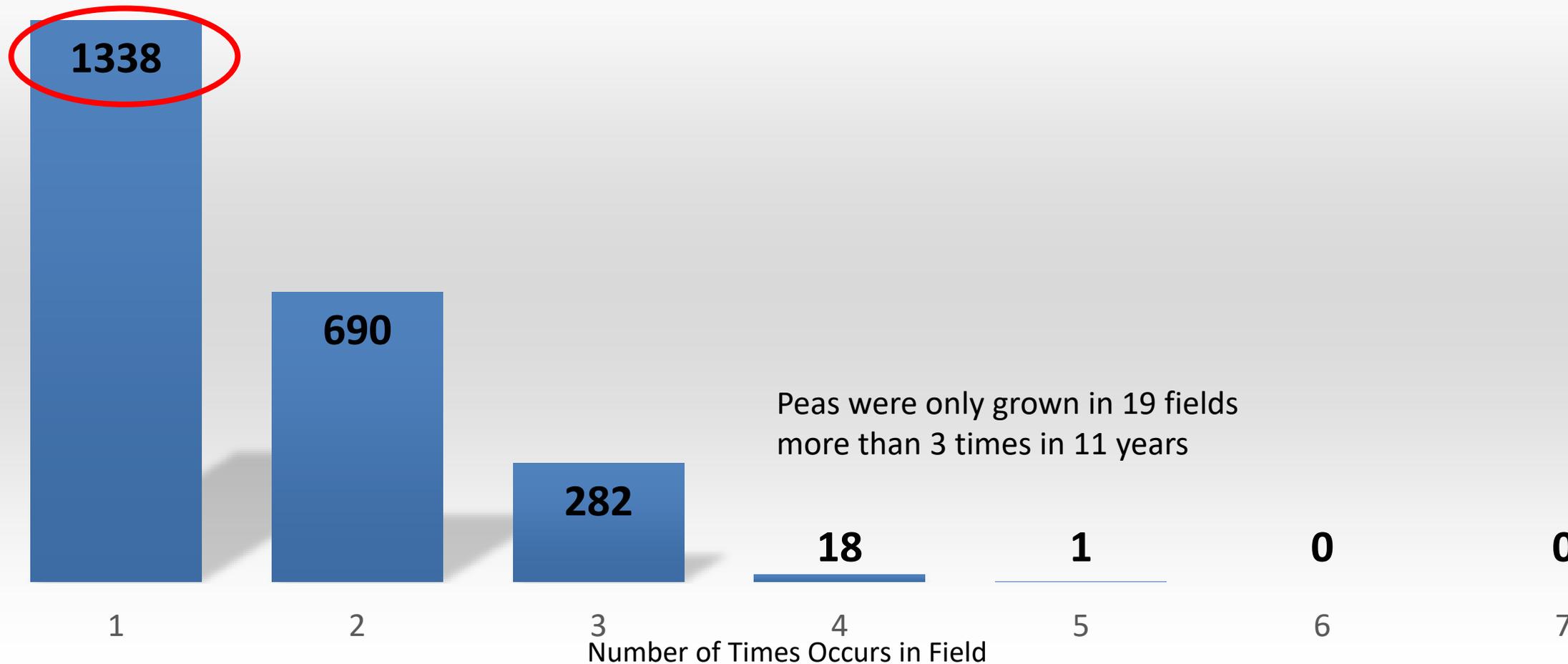
Three quarters of the fields had a cereal (wheat, barley, oats) and/or canola grown on them 8 or more times in 11 years



Frequency of Peas Grown 2008 - 18 (9B)

One third of fields had peas grown once in 11 years

Peas 2008 - 2018 (9B)
n = 4595

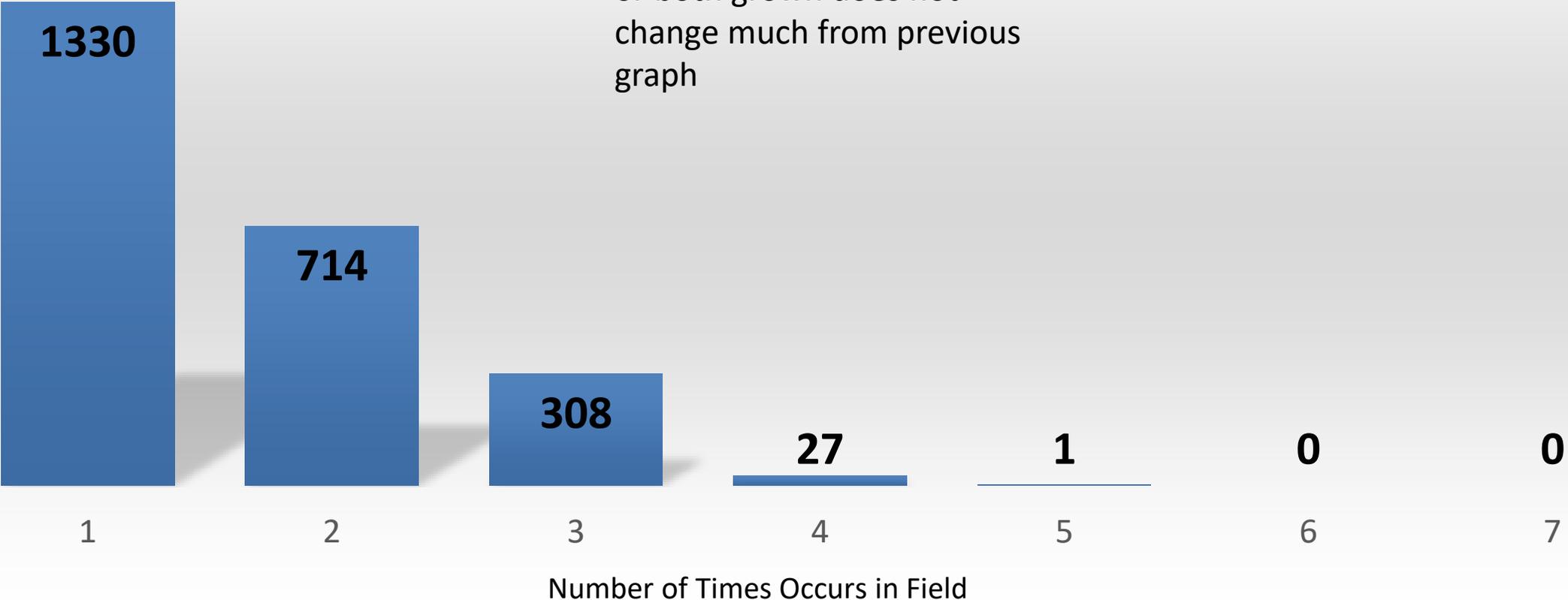


Frequency of Pulse Grown 2008 - 18 (9B)

Pea or Lentil 2008 - 2018 (9B)

n = 4595

When looking at pulse grown of either pea or lentil or both grown does not change much from previous graph

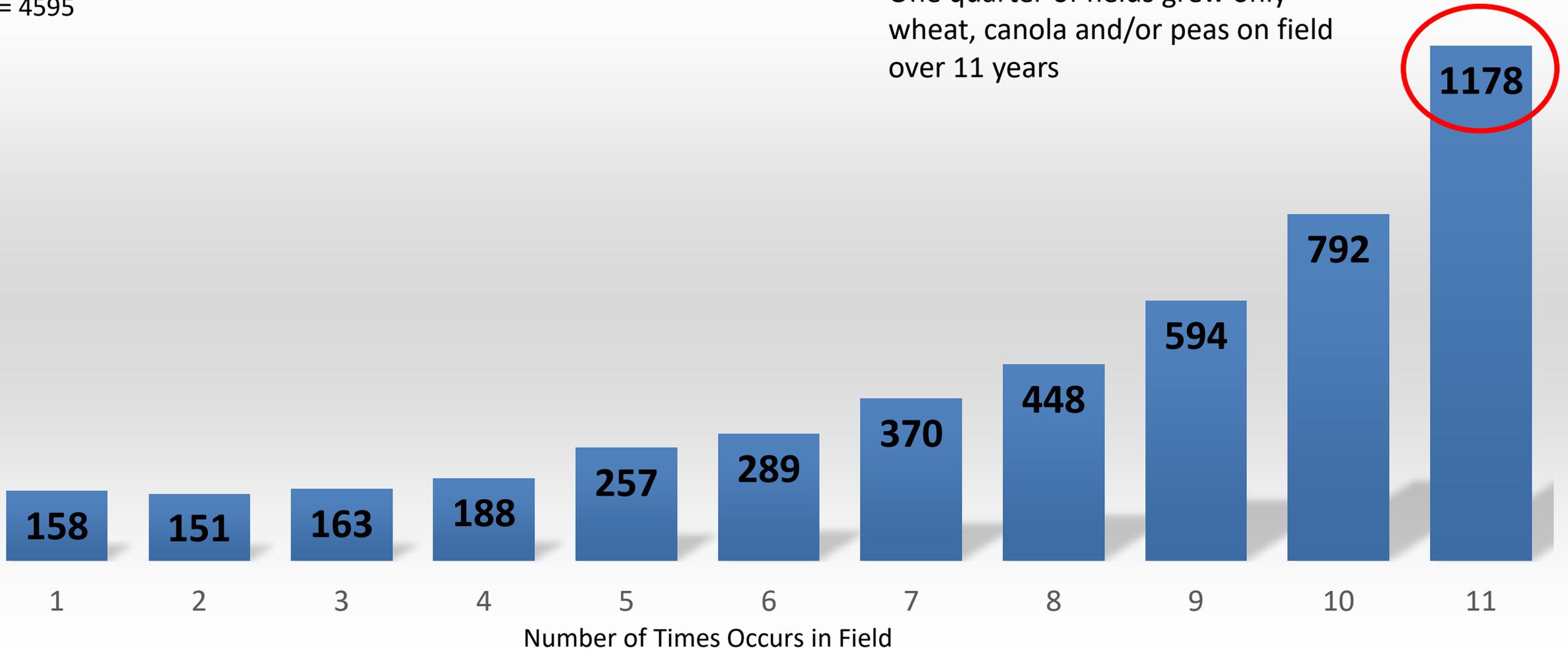


Frequency of Canola, Wheat or Peas Grown 2008 -18 (9B)

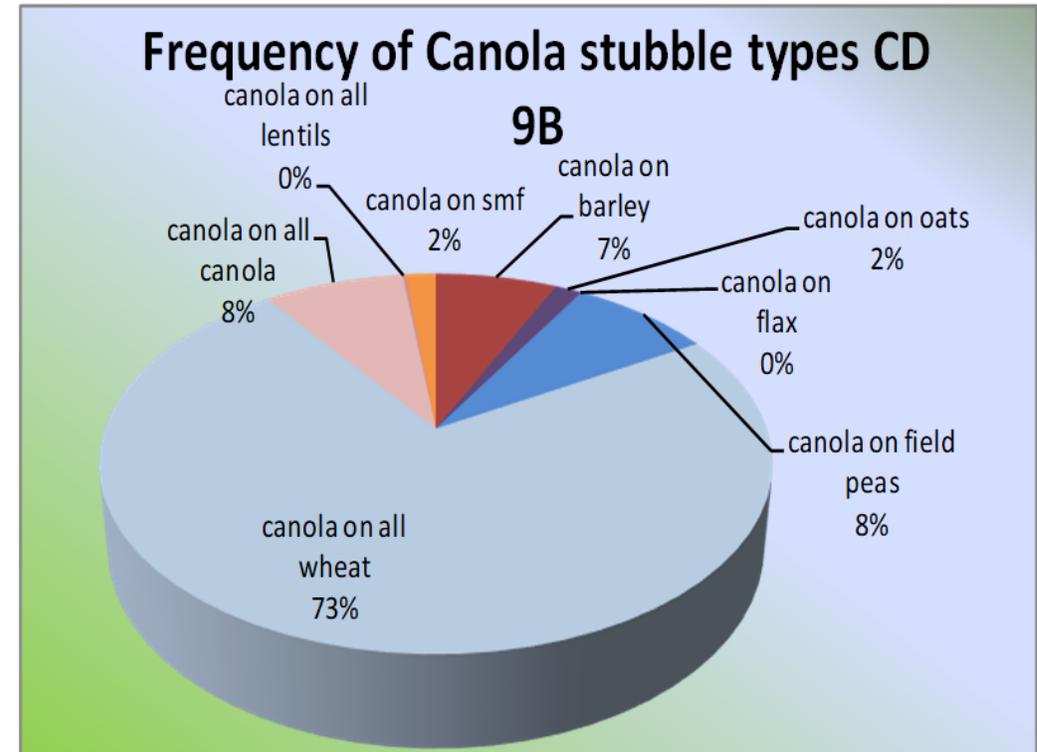
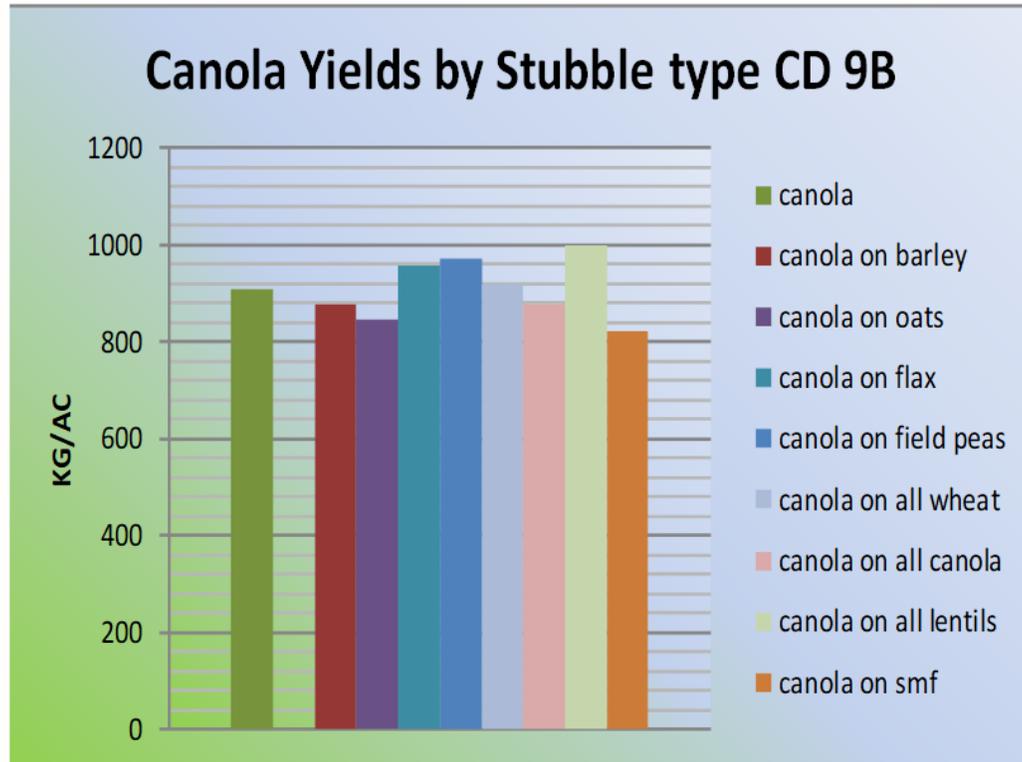
Canola, Wheat, Peas 2008 -2018 (SCIC)

n = 4595

One quarter of fields grew only wheat, canola and/or peas on field over 11 years

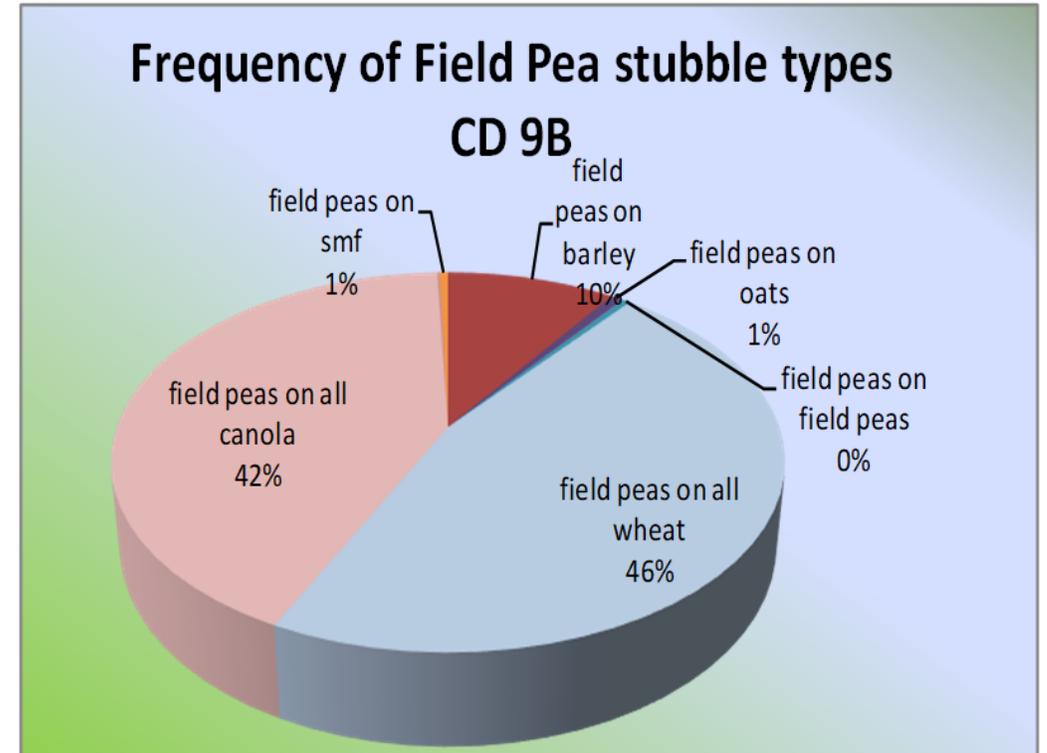
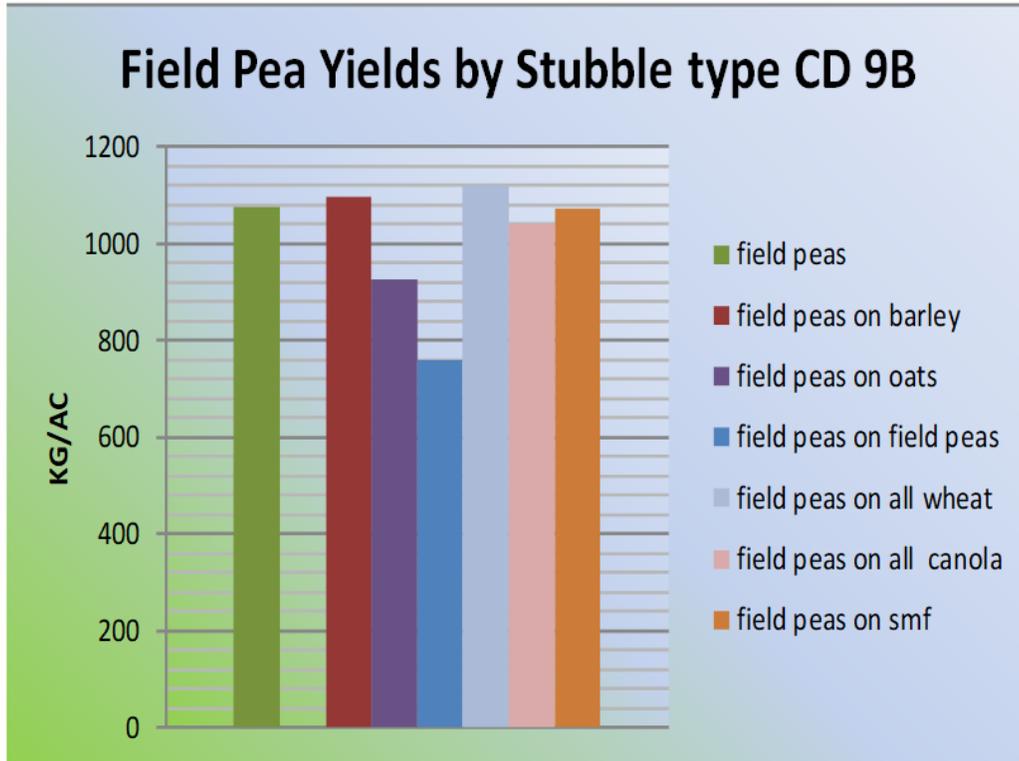


Calculated Yields – Canola (SCIC)



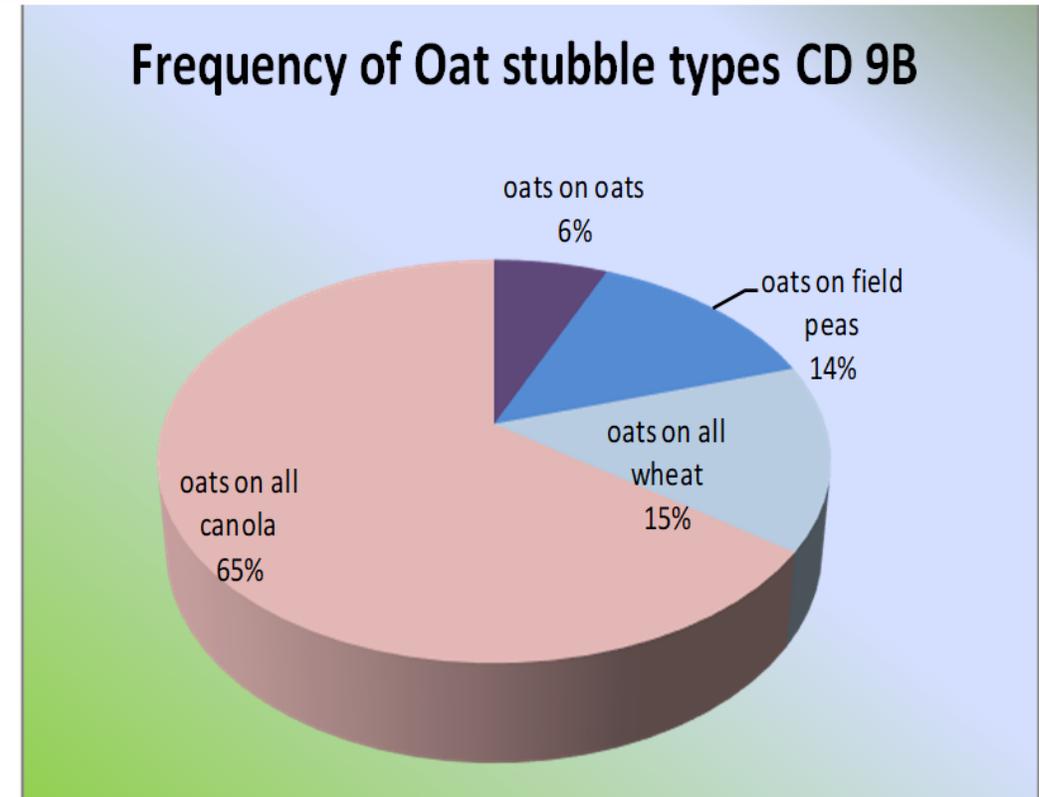
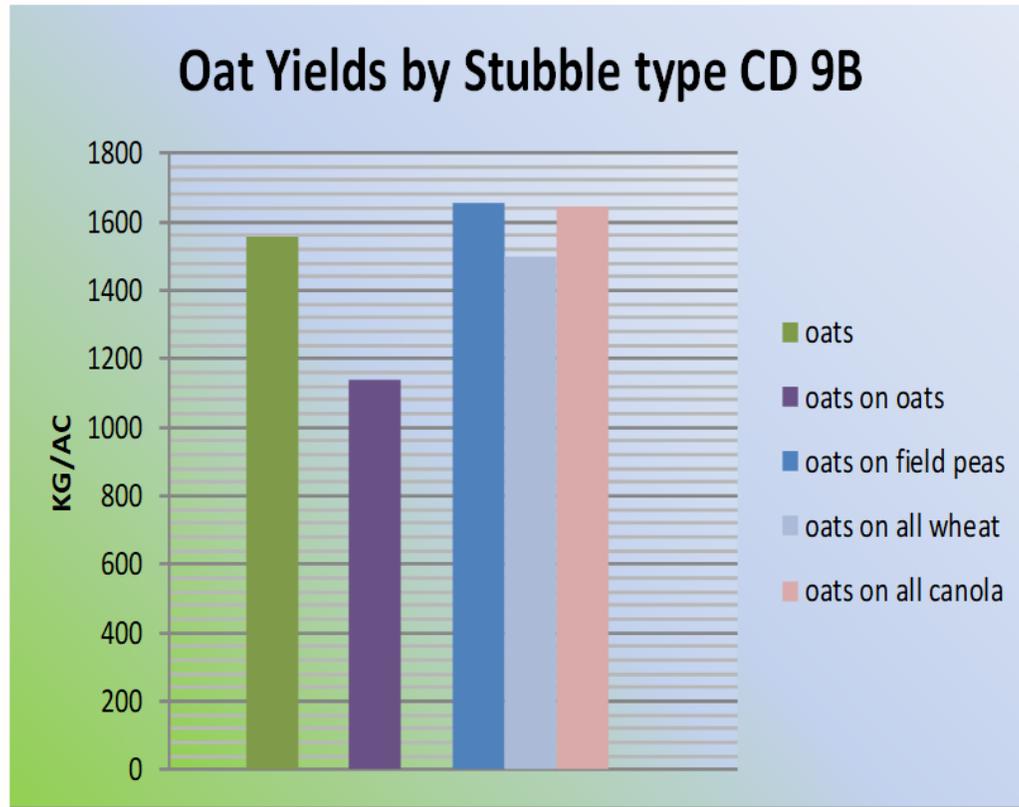
- Canola on canola stubble average to slightly lower yields
- Canola on lentil stubble best
- Canola on pea increased yield
- Canola on flax stubble has increased yield potential

Calculated Yields – Field Pea



- Pea on pea stubble lower yield
- Canola on wheat stubble or barley stubble best yields
- Pea on canola or oat stubble was lower

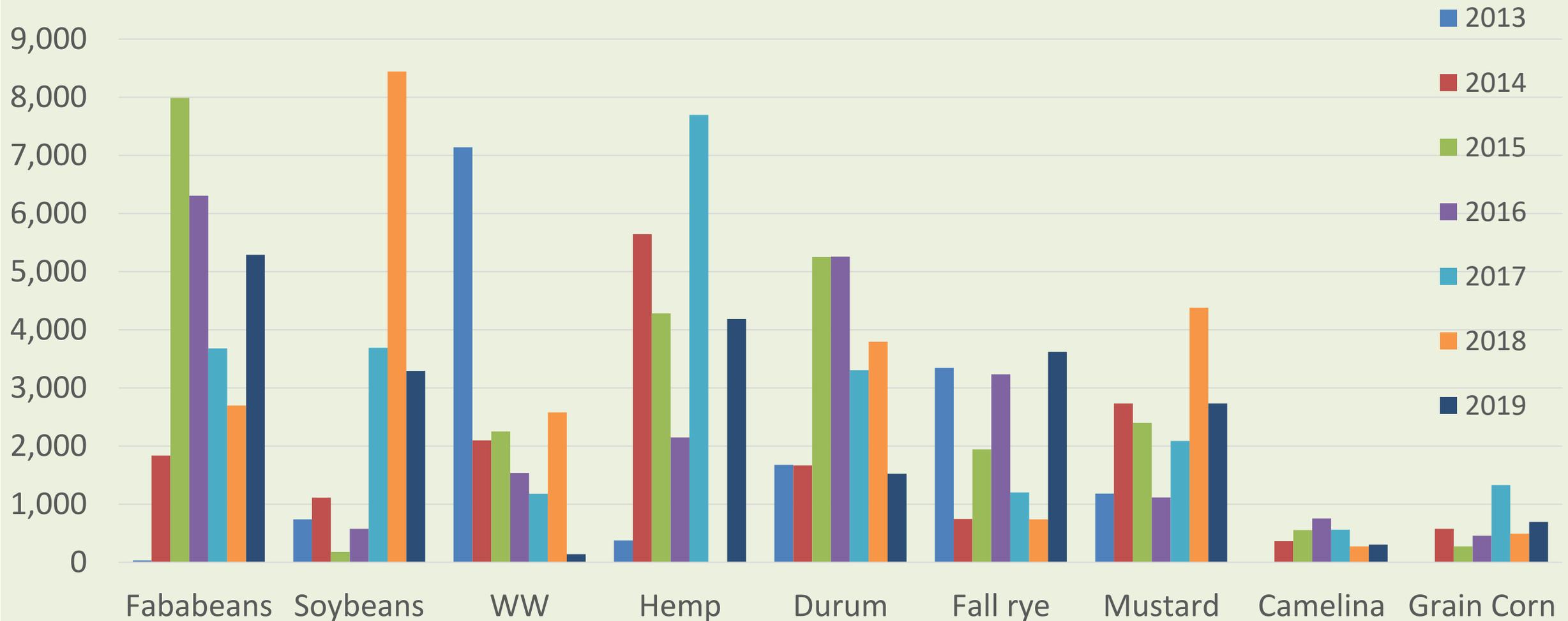
Calculated Yields – Oat (SCIC)



- Oat on oat stubble lower yields
- Oat on pea or canola stubble increased yield
- Oats on wheat stubble gave around average yields

What Other Cropping Opportunity Possible in NW?

Additional crops grown in NW (acres)



Economics of Other Cropping Options

New Crop Planning Guides



2020 Canola

Economics

Revenue Per Acre

	My Farm	Brown	Dark Brown	Black
Target Yield (bu./ac.) (A)	48.50	50.30	53.80	
Estimated Farm Gate Price (\$/bu.) (B)	10.70	10.70	10.70	
Estimated Gross Revenue (\$/ac.) (AxB)=(C)	518.95	538.21	575.66	

Return Per Acre

Return Over Variable Expenses (C-D)	230.01	199.82	223.86	
Return Over Total Expenses (C-G)	106.12	58.14	71.75	

Break Even Yield (bu./ac.)

To Cover Variable Expenses	27.00	31.63	32.88	
To Cover Total Expenses	38.58	44.87	47.09	

Break Even Price (\$/bu.)

To Cover Variable Expenses	5.96	6.73	6.54	
To Cover Total Expenses	8.51	9.54	9.37	

Yield Sensitivity (same expenses, but average yield)

Provincial Average Yield (bu./ac.)	35.30	40.80	41.90	
Return Over Variable Expenses	88.77	98.17	96.53	
Return Over Total Expenses	-35.12	-43.51	-55.58	

2020 Canola

Economics

Revenue Per Acre

	My Farm	Brown	Dark Brown	Black
Target Yield (bu./ac.) (A)		48.50	50.30	53.80
Estimated Farm Gate Price (\$/bu.) (B)		10.70	10.70	10.70
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		518.95	538.21	575.66

Expenses Per Acre

Variable Expenses/Acre				
Seed		66.19	66.19	66.19
- Seed Treatments/Inoculants		9.00	9.00	9.00
Fertilizer - Nitrogen		51.81	53.32	57.35
- Phosphorus (P ₂ O ₅)		24.86	25.76	27.57
- Sulphur and Other		7.00	7.00	7.59
Plant Protection - Herbicides		59.55	66.40	66.40
- Insecticides		8.00	8.00	8.00
- Fungicides		0.00	34.99	34.99
Machinery Operating - Fuel		13.05	16.31	20.39
- Repair		8.57	9.66	10.94
Custom Work and Hired Labour		20.80	21.05	21.05
Crop Insurance Premium		10.52	9.04	9.72
Utilities and Miscellaneous		3.13	4.11	4.75
Interest on Variable Expenses		6.46	7.56	7.86
Total Variable Expenses (D)		288.94	338.39	351.80
Other Expenses/Acre				
Building Repair		0.47	0.63	0.85
Property Taxes		3.91	5.11	7.75
Business Overhead		2.08	3.18	3.73
Machinery Depreciation		35.45	39.98	45.25
Building Depreciation		1.05	1.40	1.90
Machinery Investment		24.85	28.02	31.72
Building Investment		0.75	1.00	1.36
Land Investment		55.33	62.36	59.55
Total Other Expenses (E)		123.89	141.68	152.11
Labour and Management* (F)				
Total Expenses (D+E+F)=(G)		412.83	480.07	503.91

Return Per Acre

Return Over Variable Expenses (C-D)		230.01	199.82	223.86
Return Over Total Expenses (C-G)		106.12	58.14	71.75

Break Even Yield (bu./ac.)

To Cover Variable Expenses		27.00	31.63	32.88
To Cover Total Expenses		38.58	44.87	47.09
Break Even Price (\$/bu.)				
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Yield Sensitivity (same expenses, but average yield)

Provincial Average Yield (bu./ac.)		35.30	40.80	41.90
Return Over Variable Expenses		88.77	98.17	96.53
Return Over Total Expenses		-35.12	-43.51	-55.58

Agromics

Note: refer to the online calculator on saskatchewan.ca/agriculture for the "My Farm" column. Calculations provided are for the top 20 per cent yield.

Seeding: A seeding rate of 5 lb./ac. is used for each soil zone.

Fertilization: Fertility costs are based on nutrient removal rates given the targeted crop yield. These are: 114 lb./ac. N and 61 lb./ac. P₂O₅ and 18.4 lb./ac. S for the black soil zone, 106 lb./ac. N and 57 lb./ac. P₂O₅ and 17 lb./ac. S for the dark brown soil zone and 103 lb./ac. N and 55 lb./ac. P₂O₅ and 17 lb./ac. S for the brown soil zone. Producers are encouraged to use their own rates based on soil tests.

Crop Rotation: Crop rotation will help to reduce root maggot and pressure from diseases, such as clubroot, by reducing or maintaining low pathogen levels in the field.

Crop Protection

Insect control: Flea beetles, cutworms, lygus bugs, cabbage seedpod weevil, diamondback moth, bertha armyworm, alfalfa looper, cabbage looper, and occasionally imported cabbageworm, grasshoppers and slugs might require control. Seed treatments are available for flea beetle and cutworm control.

Disease control: Sclerotinia stem rot is the main disease managed with the application of foliar fungicides. This estimation includes the cost of a single fungicide application in the dark brown and black soil zones. Disease pressure will vary from year to year and field to field and is influenced by environmental conditions. Fungicide application decisions should be made based on disease risk when the crop is susceptible to infection.

Weed control: A soil-active herbicide to reduce competition from cleavers was included in brown and dark brown soils. This was exchanged for a foliar tank mix option in the black soils. Herbicide costs are based on the following herbicide timings. Please refer to general assumptions for details.

Application Timing Window Used									
Pre-harvest	Fall-applied	Pre-seed		Soil		In-crop			Desiccation
		1	2	1	2	1	2	3	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>							

*Farm managers need to determine their own actual labour and management costs and add it to total expenses.

Flax and Fababeans

2020 Canola

Economics	My Farm	Brown	Dark Brown	Black
Revenue Per Acre				
Target Yield (bu./ac.) (A)		48.50	50.30	53.80
Estimated Farm Gate Price (\$/bu.) (B)		10.70	10.70	10.70
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		518.95	538.21	575.66
Return Per Acre				
Return Over Variable Expenses (C-D)		230.01	199.82	223.86
Return Over Total Expenses (C-G)		106.12	58.14	71.75
Break Even Yield (bu./ac.)				
To Cover Variable Expenses		27.00	31.63	32.88
To Cover Total Expenses		38.58	44.87	47.09
Break Even Price (\$/bu.)				
To Cover Variable Expenses		5.96	6.73	6.54
To Cover Total Expenses		8.51	9.54	9.37
Yield Sensitivity (same expenses, but average yield)				
Provincial Average Yield (bu./ac.)		35.30	40.80	41.90
Return Over Variable Expenses		88.77	98.17	96.53
Return Over Total Expenses		-35.12	-43.51	-55.58

2020 Flax

Economics	My Farm	Brown	Dark Brown	Black
Revenue Per Acre				
Target Yield (bu./ac.) (A)		30.3	33.1	34.3
Estimated Farm Gate Price (\$/bu.) (B)		13.78	13.78	13.78
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		417.53	456.12	472.65
Return Per Acre				
Return Over Variable Expenses (C-D)		231.70	229.81	236.51
Return Over Total Expenses (C-G)		107.81	88.13	84.45
Break Even Yield (bu./ac.)				
To Cover Variable Expenses		13.49	16.42	17.13
To Cover Total Expenses		22.48	26.70	28.17
Break Even Price (\$/bu.)				
To Cover Variable Expenses		6.13	6.84	6.88
To Cover Total Expenses		10.22	11.12	11.32
Yield Sensitivity (same expenses, but average yield)				
Provincial Average Yield (bu./ac.)		20.10	22.00	22.80
Return Over Variable Expenses		91.15	76.85	78.09
Return Over Total Expenses		-32.74	-64.83	-74.02

2020 Edible Yellow Peas

Economics	My Farm	Brown	Dark Brown	Black
Revenue Per Acre				
Target Yield (bu./ac.) (A)		43.7	51.1	58.4
Estimated Farm Gate Price (\$/bu.) (B)		6.85	6.85	6.85
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		299.35	350.04	400.04
Return Per Acre				
Return Over Variable Expenses (C-D)		80.48	115.37	149.21
Return Over Total Expenses (C-G)		-43.41	-26.31	-2.90
Break Even Yield (bu./ac.)				
To Cover Variable Expenses		31.95	34.26	36.62
To Cover Total Expenses		50.04	54.94	58.82
Break Even Price (\$/bu.)				
To Cover Variable Expenses		5.01	4.59	4.29
To Cover Total Expenses		7.84	7.36	6.90
Yield Sensitivity (same expenses, but average yield)				
Provincial Average Yield (bu./ac.)		28.70	34.90	40.40
Return Over Variable Expenses		-22.27	4.40	25.91
Return Over Total Expenses		-146.16	-137.28	-126.20

2020 Fababean

Economics	My Farm	Black
Revenue Per Acre		
Target Yield (lb./ac.) (A)		3,651.20
Estimated Farm Gate Price (\$/lb.) (B)		0.12
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		438.14
Return Per Acre		
Return Over Variable Expenses (C-D)		152.26
Return Over Total Expenses (C-G)		0.15
Break Even Yield (lbs./ac.)		
To Cover Variable Expenses		2,382.34
To Cover Total Expenses		3,649.93
Break Even Price (\$/lb.)		
To Cover Variable Expenses		0.08
To Cover Total Expenses		0.12
Yield Sensitivity (same expenses, but average yield)		
Provincial Average Yield (lb./ac.)		2,352.00
Return Over Variable Expenses		-3.64
Return Over Total Expenses		-155.75

Black soil zone net returns on variable expenses

- Canola \$223.86

- Flax \$236.50

- Yellow Peas \$149.21

- Fababeans \$152.26

Rye, Oats and Canaryseed

2020 Spring Wheat

Economics	My Farm	Brown	Dark Brown	Black
Revenue Per Acre				
Target Yield (bu./ac.) (A)		38.9	57.0	64.7
Estimated Farm Gate Price (\$/bu.) (B)		6.42	6.42	6.42
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		249.74	365.94	415.37
Return Per Acre				
Return Over Variable Expenses (C-D)		61.07	147.23	176.44
Return Over Total Expenses (C-G)		-62.83	5.55	24.33
Break Even Yield (bu./ac.)				
To Cover Variable Expenses		29.39	34.07	37.22
To Cover Total Expenses		48.69	56.14	60.91
Break Even Price (\$/bu.)				
To Cover Variable Expenses		4.85	3.84	3.69
To Cover Total Expenses		8.04	6.32	6.04
Yield Sensitivity (same expenses, but average yield)				
Provincial Average Yield (bu./ac.)		34.20	42.60	49.60
Return Over Variable Expenses		30.89	54.78	79.50
Return Over Total Expenses		-93.01	-86.90	-72.61

2020 Hybrid Fall Rye

Economics	My Farm	Brown	Dark Brown	Black
Revenue Per Acre				
Target Yield (bu./ac.) (A)		48.8	63.8	66.9
Estimated Farm Gate Price (\$/bu.) (B)		5.23	5.23	5.23
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		255.22	333.67	349.89
Return Per Acre				
Return Over Variable Expenses (C-D)		49.39	114.32	122.33
Return Over Total Expenses (C-G)		-74.50	-27.36	-29.78
Break Even Yield (bu./ac.)				
To Cover Variable Expenses		39.36	41.94	43.51
To Cover Total Expenses		63.04	69.03	72.59
Break Even Price (\$/bu.)				
To Cover Variable Expenses		4.22	3.44	3.40
To Cover Total Expenses		6.76	5.66	5.68
Yield Sensitivity (same expenses, but average yield)				
Provincial Average Yield (bu./ac.)		31.50	39.40	42.50
Return Over Variable Expenses		-41.08	-13.29	-5.28
Return Over Total Expenses		-164.97	-154.97	-157.39

2020 Oats

Economics	My Farm	Brown	Dark Brown	Black
Revenue Per Acre				
Target Yield (bu./ac.) (A)		79.1	103.7	139.4
Estimated Farm Gate Price (\$/bu.) (B)		3.02	3.02	3.02
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		238.88	313.17	420.99
Return Per Acre				
Return Over Variable Expenses (C-D)		93.56	144.08	213.83
Return Over Total Expenses (C-G)		-30.33	2.40	61.72
Break Even Yield (bu./ac.)				
To Cover Variable Expenses		48.12	55.99	68.60
To Cover Total Expenses		89.14	102.90	118.97
Break Even Price (\$/bu.)				
To Cover Variable Expenses		1.84	1.63	1.49
To Cover Total Expenses		3.40	3.00	2.58
Yield Sensitivity (same expenses, but average yield)				
Provincial Average Yield (bu./ac.)		41.50	65.50	99.90
Return Over Variable Expenses		-19.99	28.72	94.54
Return Over Total Expenses		-143.88	-112.96	-57.57

2020 Canaryseed

Economics	My Farm	Dark Brown
Revenue Per Acre		
Target Yield (lbs./ac.) (A)		1,926.00
Estimated Farm Gate Price (\$/lb.) (B)		0.26
Estimated Gross Revenue (\$/ac.) (AxB)=(C)		500.76
Return Per Acre		
Return Over Variable Expenses (C-D)		268.28
Return Over Total Expenses (C-G)		126.60
Break Even Yield (lbs./ac.)		
To Cover Variable Expenses		894.14
To Cover Total Expenses		1,439.06
Break Even Price (\$/lb.)		
To Cover Variable Expenses		0.12
To Cover Total Expenses		0.19
Yield Sensitivity (same expenses, but average yield)		
Provincial Average Yield (lb./ac.)		1,299.00
Return Over Variable Expenses		105.26
Return Over Total Expenses		-36.42

Black soil zone net returns on variable expenses

- Wheat \$176.44

- Fall Rye \$122.33

- Oats \$213.83

- Fababeans \$268.28

Take Home Messages

- Most common rotation is wheat and canola in NW as predicted
- Half of the 4500 fields had canola grown 4 or 5 times out of 11 years (almost half the time)
- Wheat was grown most commonly every 2 to 3 years
- Over three quarters of fields had a canola and wheat grown on field 8 to 11 times over 11 year period
- One quarter of the fields out of approx. 4500 had wheat, pea and canola grown only on that field

Take Home Messages (cont.)

- Not a lot of diversity in fields and many diseases are present in one or more of these crops
 - (i.e. sclerotinia and fusarium spp.)
- Other crops can be grown in NW
- Wider rotation can increase yields – different stubble types
- Economics for other crops are just as good as canola and wheat

Questions?

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