

CROP ROTATION

Economic Opportunity

Slippery Slope

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Crop Industry Development

Farm Production Extension

Manitoba Agriculture

Manitoba



Things to Consider

- Rotational Effects between Crops
 - Crop on Crop Stubble
- Yield Potential and Returns
- Pest Buildups/Breaks
- Fertility Use and Depletion
- Water Use
- Other

Assumptions: Crop Sequence Yields

Previous Crop	Crop Planted								
	Spring Wheat	Oat	Barley	Canola	Flax	Field Pea	Soybean	Sunflower	Grain Corn
Sp Wheat	85	94	95	102	104	103	102	103	96
Oat	91	79	78	95	92	93	100	102	99
Barley	88	90	82	100	102	91	100	96	92
Canola	100	101	103	87	86	98	100	92	99
Flax	96	90	107	103	83	91	98	88	85
Field Pea	102	110	106	104	148	-	95	-	98
Soybean	107	108	107	103	107	90	93	103	103
Sunflower	102	102	106	90	99	85	93	82	97
Grain Corn	98	110	94	110	-	90	101	115	88
<i>Yield/ac</i>	<i>50 bu</i>	<i>101 bu</i>	<i>65 bu</i>	<i>36 bu</i>	<i>21 bu</i>	<i>38 bu</i>	<i>35 bu</i>	<i>1607 lb</i>	<i>121 bu</i>

Source: Yield response of Manitoba crops sown on large (>120 acre) fields of various previous crop (stubble) in rotation 2010-2016 (MASC)

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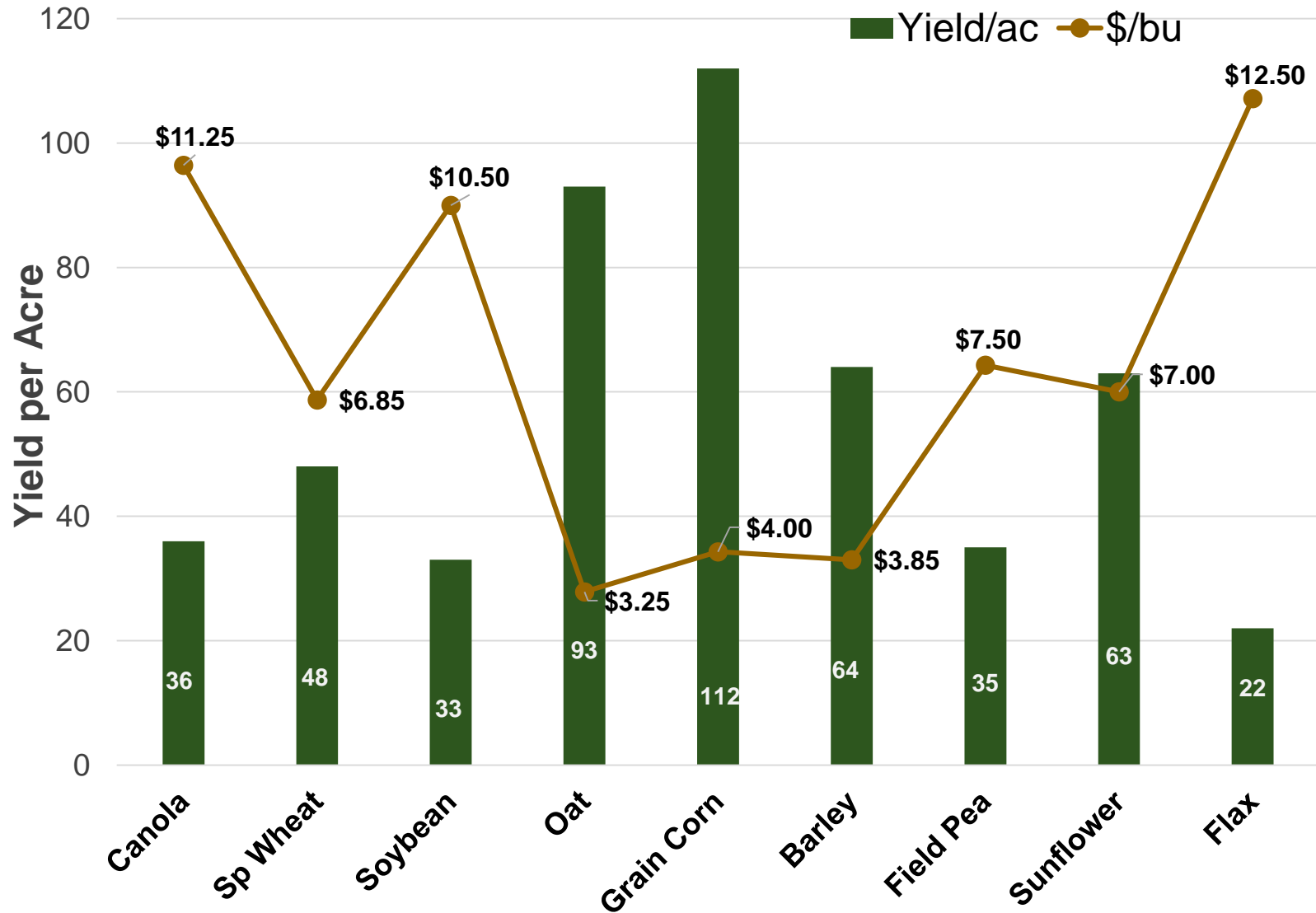
Source: Yield response of Manitoba crops sown on large (>120 acre) fields of various previous crop (stubble) in rotation 2010-2016 (MASC)

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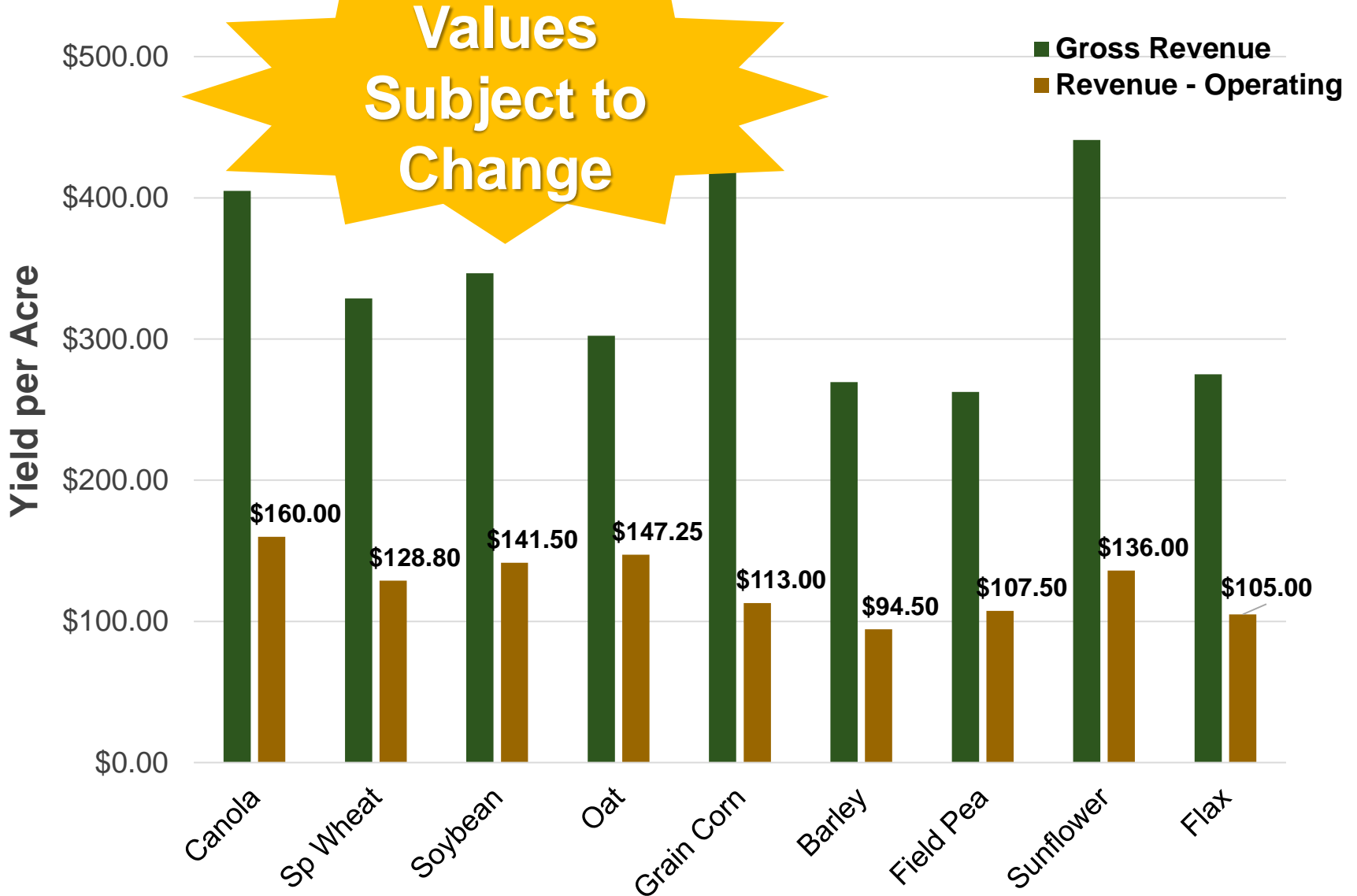
Source: Yield response of Manitoba crops sown on large (>120 acre) fields of various previous crop (stubble) in rotation 2010-2016 (MASC)

Assumptions: Crop Yield & Pricing

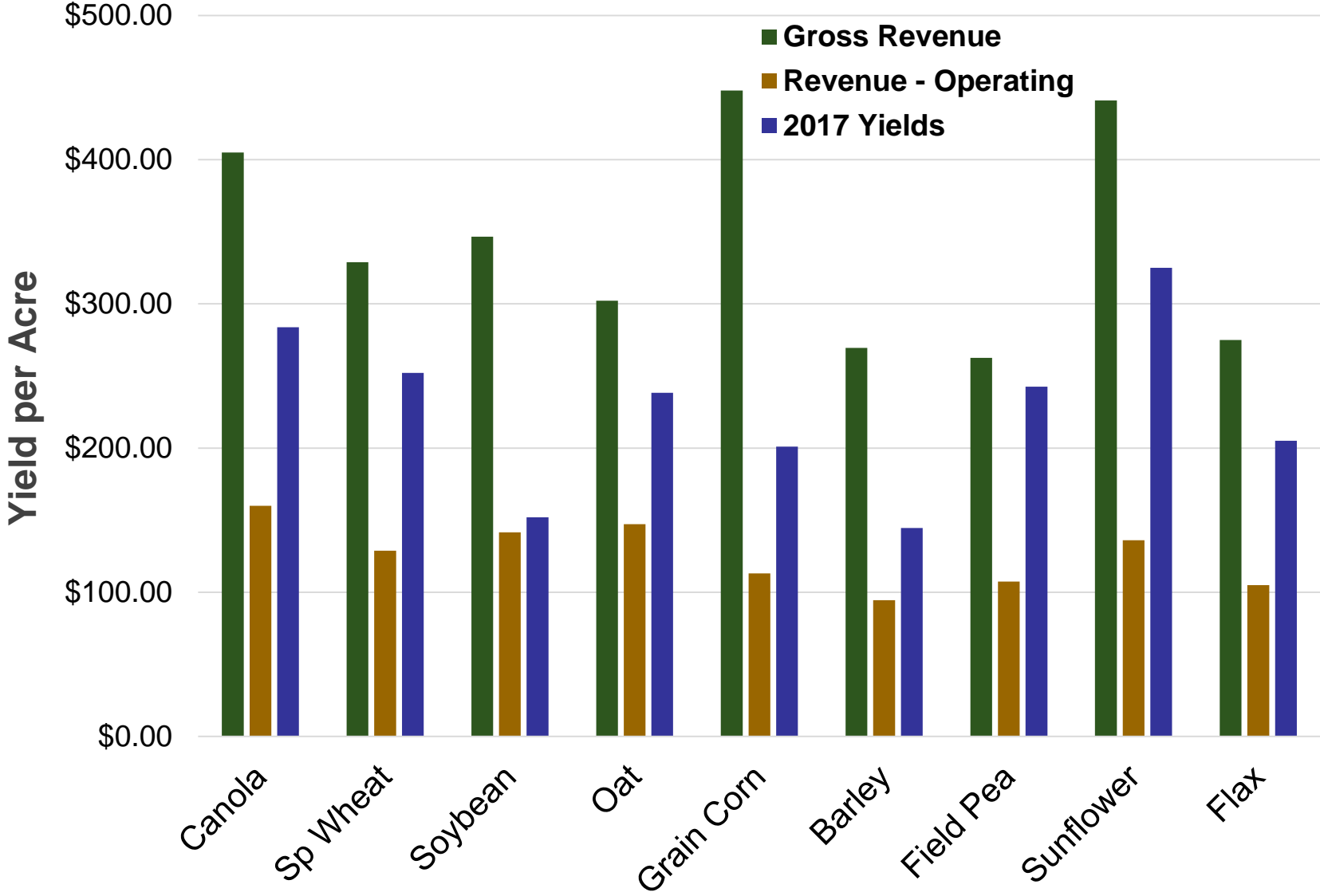


Source: 2008-2017 Harvest Acreage Report (MASC), Guidelines for Estimating Crop Production Costs 2018 (MB Ag)

Assumptions: Marginal Returns/ac



Assumptions: Marginal Returns/ac



Source: 2008-2017 Harvest Acreage Reports (MASC), Guidelines for Estimating Crop Production Costs 2018 (MB Ag)

Economic Opportunity – Crop Sequence

	Year 1	Year 2	Year 3	Year 4	Year 5	Economic Returns
1	Sp.Wheat	Canola	Sp.Wheat	Canola	Sp.Wheat	\$142.56
		+2%	0%	+2%	0%	
2	Soybean	Corn	Soybean	Corn	Soybean	\$132.02
		+3%	+1%	+3%	+1%	
3	Canola	Oat	Soybean	Canola	Oat	\$152.75
		+1%	0%	+3%	+1%	
4	Soybean	Corn	Canola	Sp.Wheat	Field Pea	\$134.68
		+3%	+10%	0%	+3%	

Note: Yields based on 10yr average from MASC Harvest Acreage Report

Economic Opportunity – Crop Sequence

	Year 1	Year 2	Year 3	Year 4	Year 5	Economic Returns
1	Sp.Wheat	Canola	Sp.Wheat	Canola	Sp.Wheat	\$142.56
		+2%	0%	+2%	0%	\$264.40
2	Soybean	Corn	Soybean	Corn	Soybean	\$132.02
		+3%	+1%	+3%	+1%	\$174.40
3	Canola	Oat	Soybean	Canola	Oat	\$152.75
		+1%	0%	+3%	+1%	\$241.70
4	Soybean	Corn	Canola	Sp.Wheat	Field Pea	\$134.68
		+3%	+10%	0%	+3%	\$234.60

Note: Yields based on 10yr average from MASC Harvested Acreage Report

Yields based on 2017 MASC Harvested Acreage Report

Slippery Slope – Pest Buildup

	Fus Head Blight	Root Rots	Net Blotch	Goss Wilt	Sclerotinia	Rhizoctonia RR	Fusarium RR	Pasmo	Phytophthora	Blackleg	Ascochyta	Aphanomyces	Clubroot
BREAK	2	3+	2	2	3+	3+	3+	3	3+	2	3	3+	3+
Sp.Wheat	+++	++											
Oat	+	+											
Barley	+	+++	+++										
Grain Corn	+	+		+++									
Canola					+++	++				++ +			+++
Flax					+	++		+++					
Field Pea					+	+					+++	+++	
Soybean					++	+	++		+++				
Sunflower					++++	+							

Disease Pressures

	Year 1	Year 2	Year 3	Year 4	Year 5	Economic Returns
Slippery Slope	Sp.Wheat	Canola	Sp.Wheat	Canola	Sp.Wheat	\$142.56
		+2% -5%	0% -5%	+2% -10%	0% -10%	\$132.04
3	Soybean	Corn	Soybean	Corn	Soybean	\$132.02
		+3% -5%	+1% -5%	+3% -10%	+1% -10%	\$122.38
Economic Opportunity	Canola	Oat	Soybean	Canola	Oat	\$152.75
		+1%	0%	+3%	+1%	
4	Soybean	Corn	Canola	Sp.Wheat	Field Pea	\$134.68
		+3%	+10%	0%	+3%	

Note: Yields based on 10yr average from MASC Harvested Acreage Report

Slippery Slope – Pest Buildup

	Wild Oat	Gr/y Foxtail	Barnyardgrass	Vol Corn	Canada fleabane	Cleavers	Hemp Nettle	Kochia	RRt Pigweed	Lady's Thumb	P. Sowthistle, Canada Thistle	Vol Canola
Sp.Wheat	HT	HT		x		HT	HT	HT				
Oat	x	x	x	x								
Barley	HT	HT		x		HT	HT	HT				
Grain Corn*				RR/ LL	RR			HT RR				RR
Canola				RR	RR	HT	HT	HT 2/RR				
Flax+	HT	HT	x		x		x	x	x	x	x	
Field Pea+	HT	HT			x		HT	x	x		x	CL
Soybean*					RR			RR				RR
Sunflower+	HT	HT			x	HT	HT	x	x	x	x	x

x= general limitations, HT=known resistance issues causing imitations, RR/LL/CL=specific herbicide group limitations

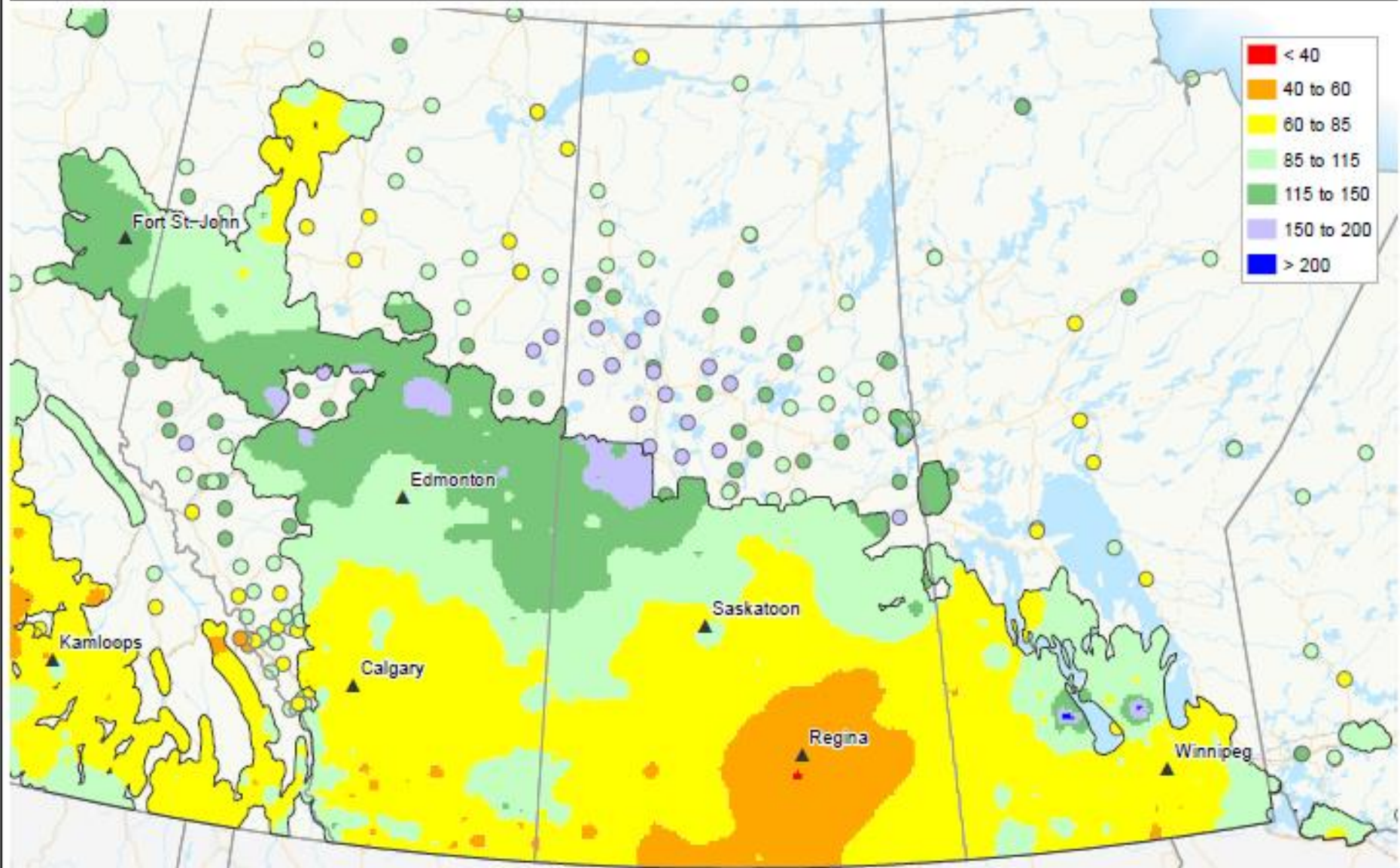
Weeds – Incidence, Selection

	Year 1	Year 2	Year 3	Year 4	Year 5	Weed
Slippery Slope	Sp.Wheat	Canola	Sp.Wheat	Canola	Sp.Wheat	Gp1
	Gp1,4	LL/Gp1	Gp1,4	LL/Gp1	Gp1,4	WO, GF
	Soybean	Corn	Soybean	Corn	Soybean	RR Kochia
	RR	RR	RR	RR	RR	RR Fleabane
3 Economic Opportunity	Canola	Oat	Soybean	Canola	Oat	?
	RR	Gp 2,4*,6	RR	LL/Gp1	Gp 4,6	
	Soybean	Corn	Canola	Sp.Wheat	Field Pea	?
	RR	RR	LL/Gp1	Gp 2,4,6	Gp 1,4, 14	



Percent of Average Precipitation

April 1, 2017 to October 31, 2017



Re-cropping Restrictions for Residual Herbicides:

Figures listed are the number of cropping seasons before each crop can be grown ("1" means that the crop can be grown the year following application). For plant-back restrictions less than one season; the delay is indicated with a "d" for number of days or with "mths" for the number of months. A blank space means that there are no recommendations given on the product label and a field bioassay is recommended by many product manufacturers to determine if these crops are safe to plant. A field bioassay is a strip of a test crop that covers an area of the field that is representative of the field variation and should include an untreated area.

PRODUCT	Alfalfa	Barley	Canaryseed	Clearfield canola	Non-Clearfield canola	Fababeans	Field corn	Dry beans	Field Peas	Flax	Forage grasses	Lentils	Mustard†	Oats	Potatoes	Rye	Soybeans	Sunflowers	Wheat (durum)	Wheat (spring)	Wheat (winter)
2,4-D*	1	1	1	1	1		1	1	1	1	1	1		1		1			1	1	1
Accent	10 mths	10 mths		10 mths	10 mths		10 mths										10 mths			1	4 mths
Altitude FX/FX2		1		1	1				1	1		1	2	1				1		1	3 mths
Amitrol 240		1d	1	1d	1d		10d*	10d*	5d*	1		1	1	1			6d	1	1d	1d	1d
AAtrex, Primextra II Magnum						1*	1		1*	"											
Ares		1	1	1	2		1		1	2		1		1				2	2	1	
Authority / Authority Charge	1	1		1	1	0	1		0	0		2	0				0	0	1	1	1
Avadex	0	0	0	0	0	1	1	1	0	0		1	0	2		1	1	1	0	0	0
Barricade, Predicade, Retain, Signal FSU, TraxosTwo	2	1	2	1	1	2	2	2	1	1	1	1	1	1	2	1	2	2	1	1	1
Battalion		1					1														1
Command 360 ME	2	2	2	1	1	2	1	1	2	2	2	2	2	2	1	2	1	2	2	1	16 mnth
Curtail M, Prestige XC	2	1	2	1	1	2	1	2	1*	1	1	2	1	1		1	2	2	1	1	1

See MB Ag Guide to Field Crop Protection – book or online .pdf

Soil Fertility – Build or Deplete?

	Yield Target	Nutrient Removal Rate (lb/ac)			
		Nitrogen	Phosphorus	Potassium	Sulphur
Sp.Wheat	40	54-66	21-26	16-19	4-5
Oat	100	55-68	23-28	17-20	4-5
Barley	80	70-85	30-37	23-28	6-8
Grain Corn	100	87-107	39-48	25-30	6-7
Canola	35	61-74	33-40	16-20	10-12
Flax	24	46-56	14-17	13-16	5-6
Field Pea	50	105-129	31-38	32-39	6-7
Soybean	35	130-140	28-30	48-50	4
Sunflower	2000 lb	48-59	14-18	11-13	4-5

Source: Manitoba Soil Fertility Guide

E12 : X ✓ fx 40

Phosphorus Balance Calculation for a Rotation (Version 4 - October 1, 2014)							Notes: Does not account for nutrients removed when straw or chaff is removed or burned
Crop	Typical Yield	Yield Units	P Applied	P Removed* per unit	P Removed* per acre	Annual Balance	
----- (lb P ₂ O ₅ /ac) -----							
HR Spring wheat		bu/ac		0.59	0	0	
Winter wheat		bu/ac		0.51	0	0	
Barley		bu/ac		0.42	0	0	
Oats	100	bu/ac	40	0.26	26	14	
Canola	40	bu/ac	20	1.04	42	-22	
Soybeans	40	bu/ac	0	0.84	34	-34	
Peas		bu/ac		0.69	0	0	
Flax		bu/ac		0.65	0	0	
Corn (grain)	110	bu/ac	40	0.44	48	-8	
Other**				0.00	0	0	
Total for Rotation			100		150	-50	

Fill in any of the blue cells for typical rotation, yields, and P appl'n

*P removal figures are estimates from the Manitoba Soil Fertility Guide.

See: Phosphorus Balance Calculator for a Rotation – MB Ag website

<http://www.manitoba.ca/agriculture/crops/soil-fertility/phosphorus-balance-calculator-for-a-rotation.html>

Water Use – Use or Leave?

	Days to Maturity	Water Use	Rooting Depth
Sp.Wheat	90-100	420-480 mm	48 in
Oat	85-88	420-480 mm	48 in
Barley	60-90	380-430 mm	48 in
Grain Corn	110-120	500-800 mm	40 in
Canola	92-102	100-480 mm	66 in
Flax	85-100	340-440 mm	30 in
Field Pea	90-100	300-370 mm	32 in
Soybean	110-120	450-700 mm	40 in
Sunflower	120-130	600-1000 mm	66 in

Source: Agricultural Climate of Manitoba, Manitoba Agriculture

Source: Ross McKenzie, Shelley Woods. Crop Water Use and Requirements,
[www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex12726](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex12726)

Source: Food and Agriculture Organization of the United Nations.

Other Considerations

- Soil residues
- Winter annual crops
- Perennial crops
- Cover crops
- **RECORD KEEPING**

Questions ?

For more information

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