

Fertilizer Use Patterns in Manitoba



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AgVise Seminar 2020
March 2020



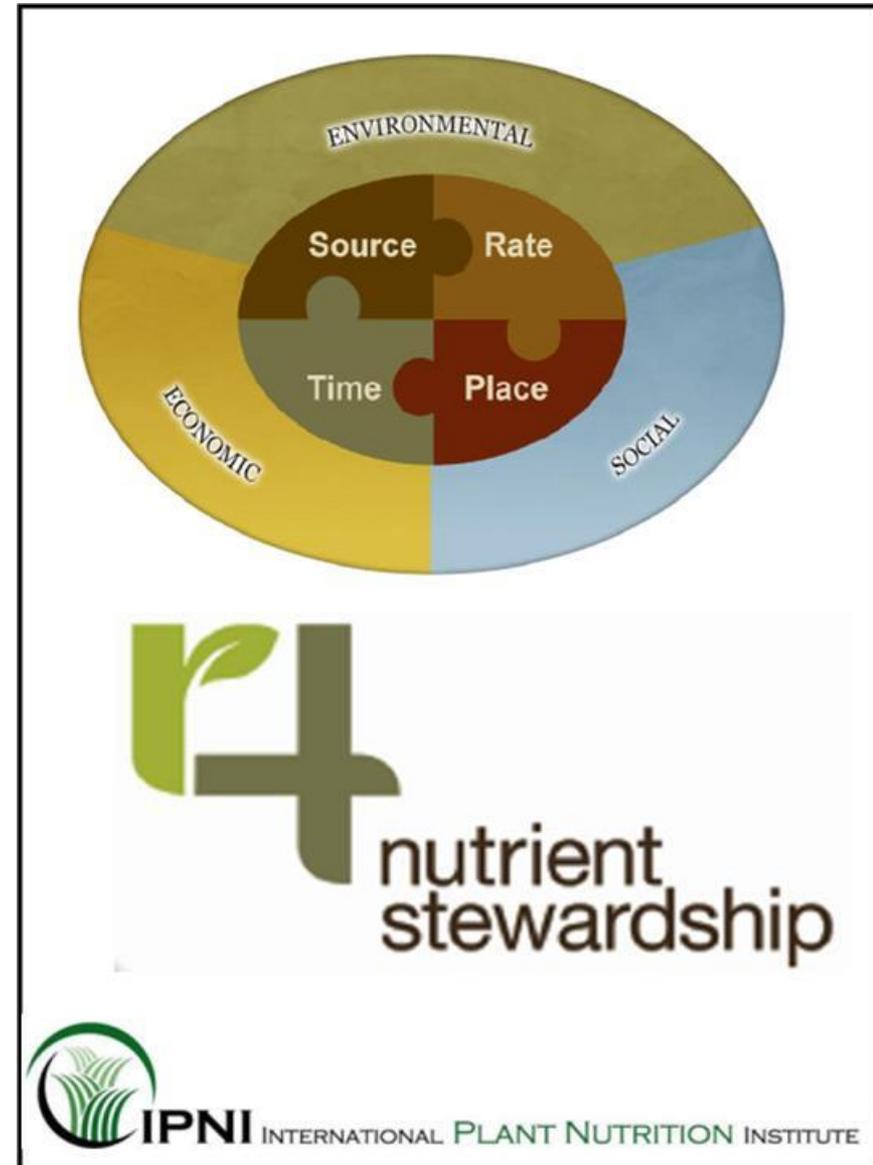
Recent surveys of fertilizer use have been completed:

- Nutrient Balance
- General Fertilizer Practices and 4R
 - Adoption, info, advice,
 - Sources, Timing and Placement
- Fertilizer rates (MASC)

4R Nutrient Stewardship

- ✓ Right rates
- ✓ Right sources
- ✓ Right placement
- ✓ Right timing

Choose the proper combination for crop and environment



How 4R are you? 4R Nitrogen

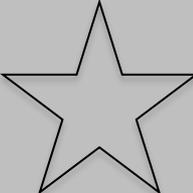


LEVEL	SOURCE	RATE	TIME	PLACE
BASIC 	NH ₄ ⁺ forms for fall apps Any form in spring	Field specific rates using soil tests based on N balance, response curves or prov. guides	Late fall Spring before or at seeding NOT on frozen soil or snow	In soil banded Spring broadcast and incorp. Fall broadcast with EEF
INTER-MEDIATE 	Above plus: EEF when risk of loss	Above plus: Apply according to field variability Annual soil testing, 0-6", 6-24"	Above plus: In-season applications	Above plus: EEF to avoid volatilization of surface apps
ADVANCED 	Same as Inter-mediate	Prescription rate VRN In-season or post harvest N monitoring	Same as Silver (but EEFs used for fall application)	No fall broadcast N Limit surface N apps to in-season with EEFs or UAN dribbled

Adapted from: 4R Practices for Spring Cereal, Oilseed and Pulse Rotations in the Canadian Prairies. 4R Practices – Guidance Document Table

How 4R are you? 4R Phosphorus



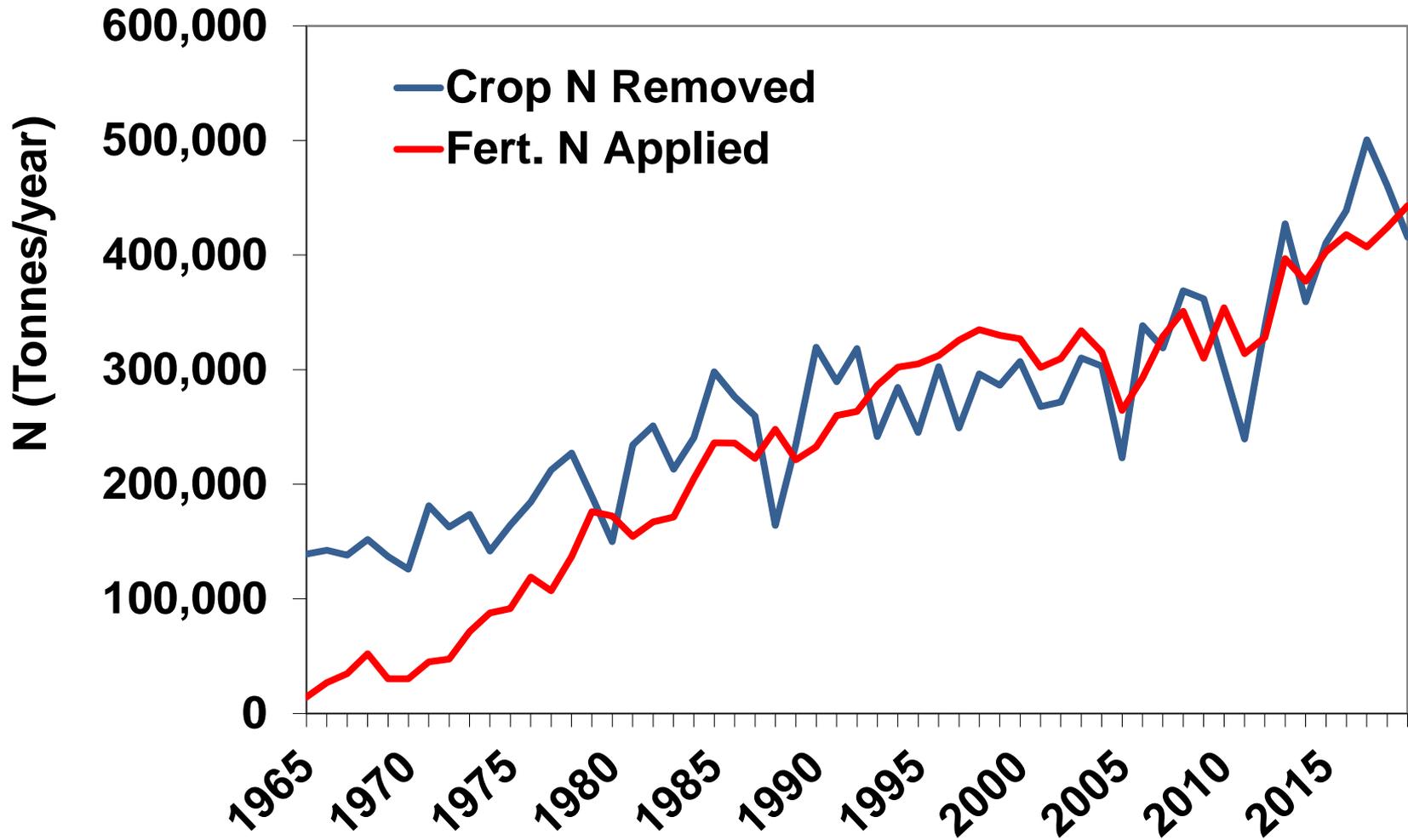
LEVEL	SOURCE	RATE	TIME	PLACE
BASIC 	P with guaranteed analysis (citrate + water soluble P)	Recent soil test Prov. guidelines Field specific rates Drawdown P rates in VH test fields	Spring: before or at seeding Fall: incorporated or banded or co-banded with N	With seed at safe rates Side-banded Preplant band or midrow band Surface broadcast only if low runoff risk
INTER-MEDIATE 	Same as Basic	Assess in-field variability Consider rotational fertilization Variable rate P based on yield potential and/or STP	Same as Basic	Same as Basic but no broadcast application
ADVANCED 	Same as Basic	Same as Intermediate	Only spring applications	Seedplace, side band or mid-row banding

Adapted from: 4R Practices for Spring Cereal, Oilseed and Pulse Rotations in the Canadian Prairies. 4R Practices – Guidance Document Table 4

1) Nutrient Balances

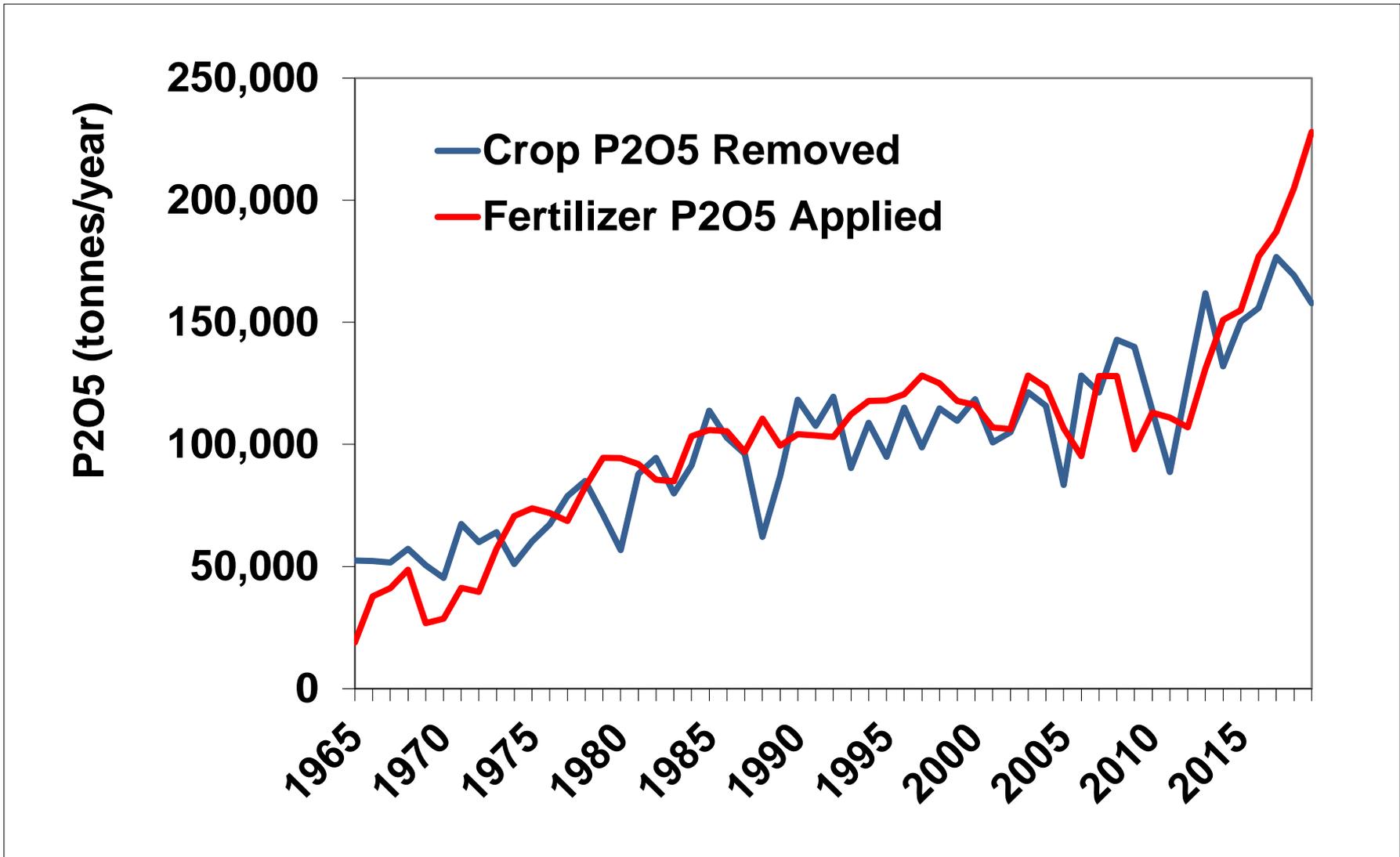
- **Fertilizer amounts** : Statistics Canada. Table 32-10-0039-01 Fertilizer shipments to Canadian agriculture markets, by nutrient content and fertilizer year, cumulative data (x 1,000)
- **Nutrients Removed:**
 - **Yield** : Statistics Canada Table 001-0010 Estimated areas, yield production and average farm price of principle field crops
 - **Nutrient Concentration: CFI Tables**

Nitrogen Use



Note – does not include contributions from legume or manure sources

Phosphorus Use



Note – does not include contributions from legume or manure sources

Coming up with a “P rate for a Long-term Sustainability” Option?

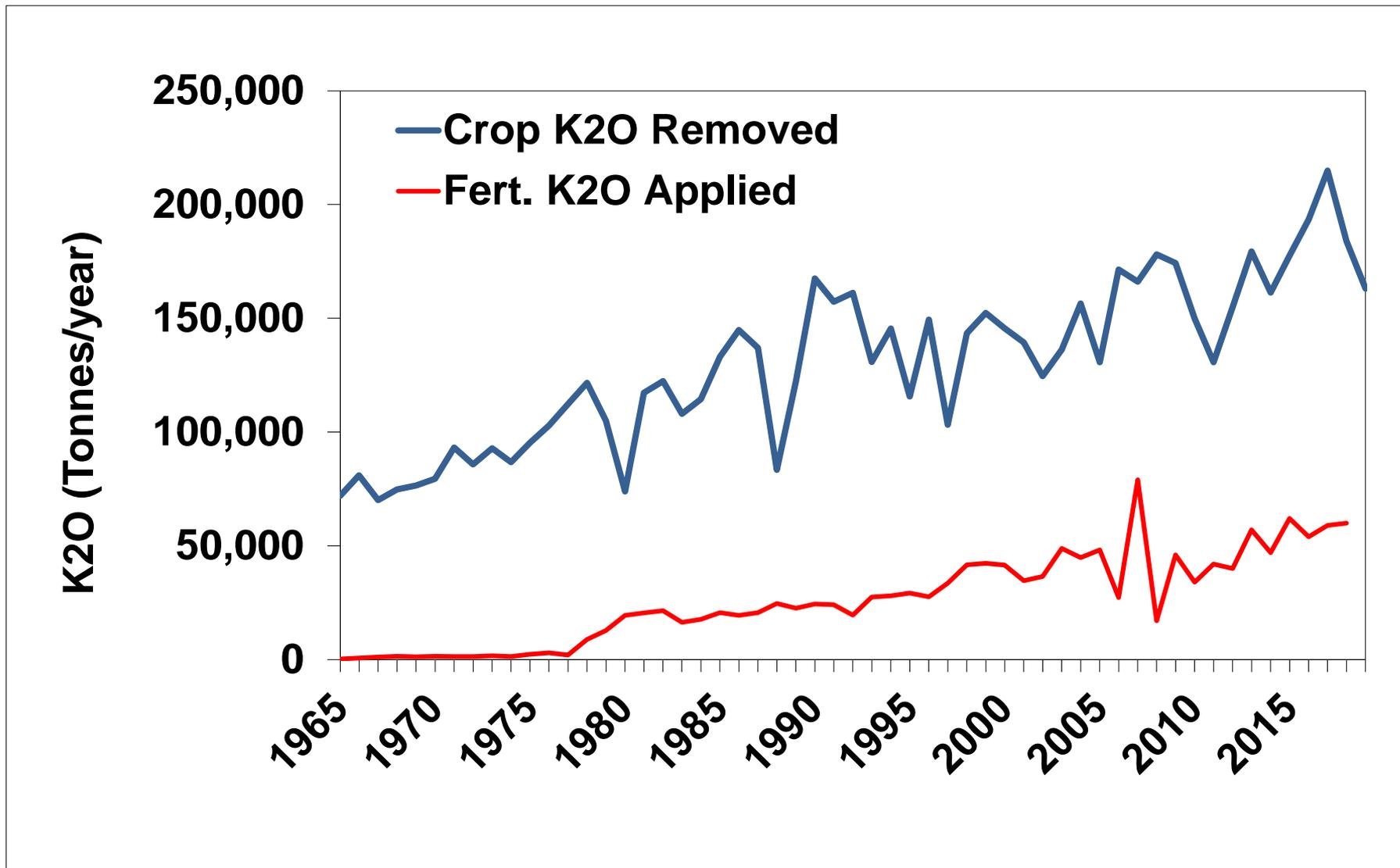
$$\text{Application rate} = \frac{(\text{Target STP} - \text{Current STP}) \times \text{BC} + \text{CR}}{\text{Years to Build}}$$

Example: for 60 bu/ac wheat

- Target STP = 15 ppm, current STP = 5 ppm
- Buffering Capacity (BC) by soil characteristics (assuming 25 lb P₂O₅ /ac to increase 1 ppm STP) (16-20 for neutral pH sand loam vs 30-40 for calcareous, clay loam soils)
- Crop removal (CR) = yield x P concentration = 60 bu/ac x 0.6 lb P₂O₅/bu
- Years to Build = flexible, for example 5.

$$= \frac{(15-5) \times 25}{5} + 36 = \frac{(250)}{5} + 36 = 86 \text{ lb P}_2\text{O}_5 \text{ ac}$$

Potassium Use



Note – does not include contributions from legume or manure sources

2) Fertilization Practices



FERTILIZER USE

CANADA 2015

Data used with permission of Fertilizer Canada

Navigation

CANOLA	PEAS	SPRING WHEAT	CORN	SOYBEAN	GENERAL FERTILIZER PRACTICES
Fertilizer Program	Sources of Fertilizer Advice				
Nitrogen Fixing Crop in Previous Year	Frequency of Soil Testing Nitrogen				
Fertilizer Use - by Nutrient and Fertilizer Type	Fertilizer Use - by Nutrient and Fertilizer Type	Fertilizer Use - by Nutrient and Fertilizer Type	Fertilizer Use - by Nutrient and Fertilizer Type	Fertilizer Use - by Nutrient and Fertilizer Type	Reasons for Not Soil Testing for N Every Year
Fertilizer Source	Frequency of Soil Testing P, K or S				
Fertilizer Placement	Familiarity with 4R Concept				
Fertilizer Timing	Sources of Fertilizer Information				
Fertilizer Rates	Reasons Some Farmers Do Not Adopt 4R Practices				
Use of Manure					
Use of Legume Green Manure	DEMOGRAPHICS				
Use of Micronutrients	Rented Land				
Approaches Used To Decide Fertilizer Rate	Irrigated Land				
Use of Nitrogen Stabilized /Slow Release Products	Tile Drainage				
Target Yield vs. Actual Yield	Zero Tillage				
					Use of Buffer Zones
					Types of Farming Operation
					Age Categories

METHODOLOGY

General Fertilizer Practices

Answering Key Questions:

- ✓ Where do farmers get advice about fertilizer management?
- ✓ How often do they do soil testing?
- ✓ Why do some farmers not do soil testing for nitrogen every year?
- ✓ How familiar are farmers with the 4R nutrient stewardship program?
- ✓ What are the sources that farmers would use to get information about the 4R program?
- ✓ Why do some farmers not implement the 4R nutrient stewardship program?

Sources of Fertilizer Advice

Frequency of Soil Testing
Nitrogen

Reasons for Not Soil
Testing for N Every Year

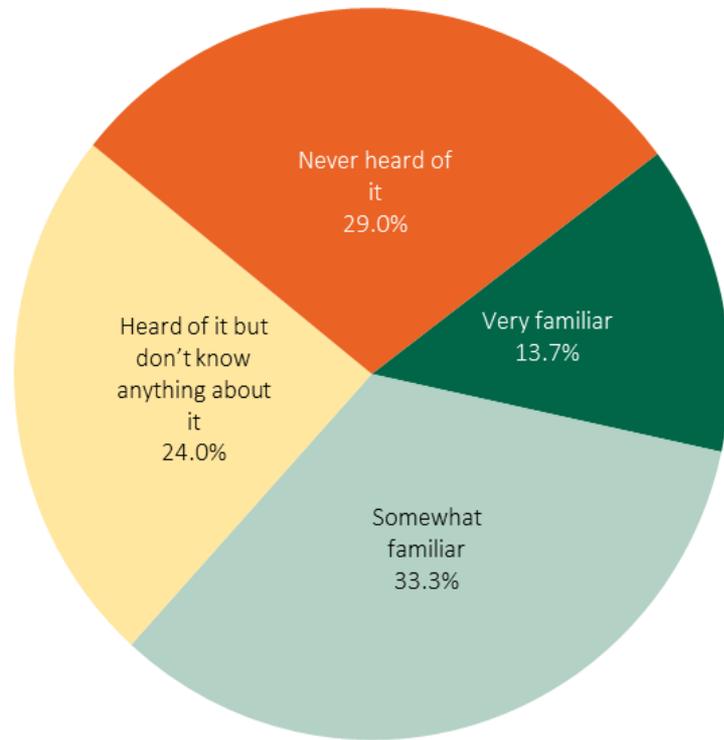
Frequency of Soil Testing
P, K or S

Familiarity
with 4R Concept

Sources of Fertilizer
Information

Reasons Some Farmers Do
Not Adopt 4R Practices

Familiarity With 4R Concept



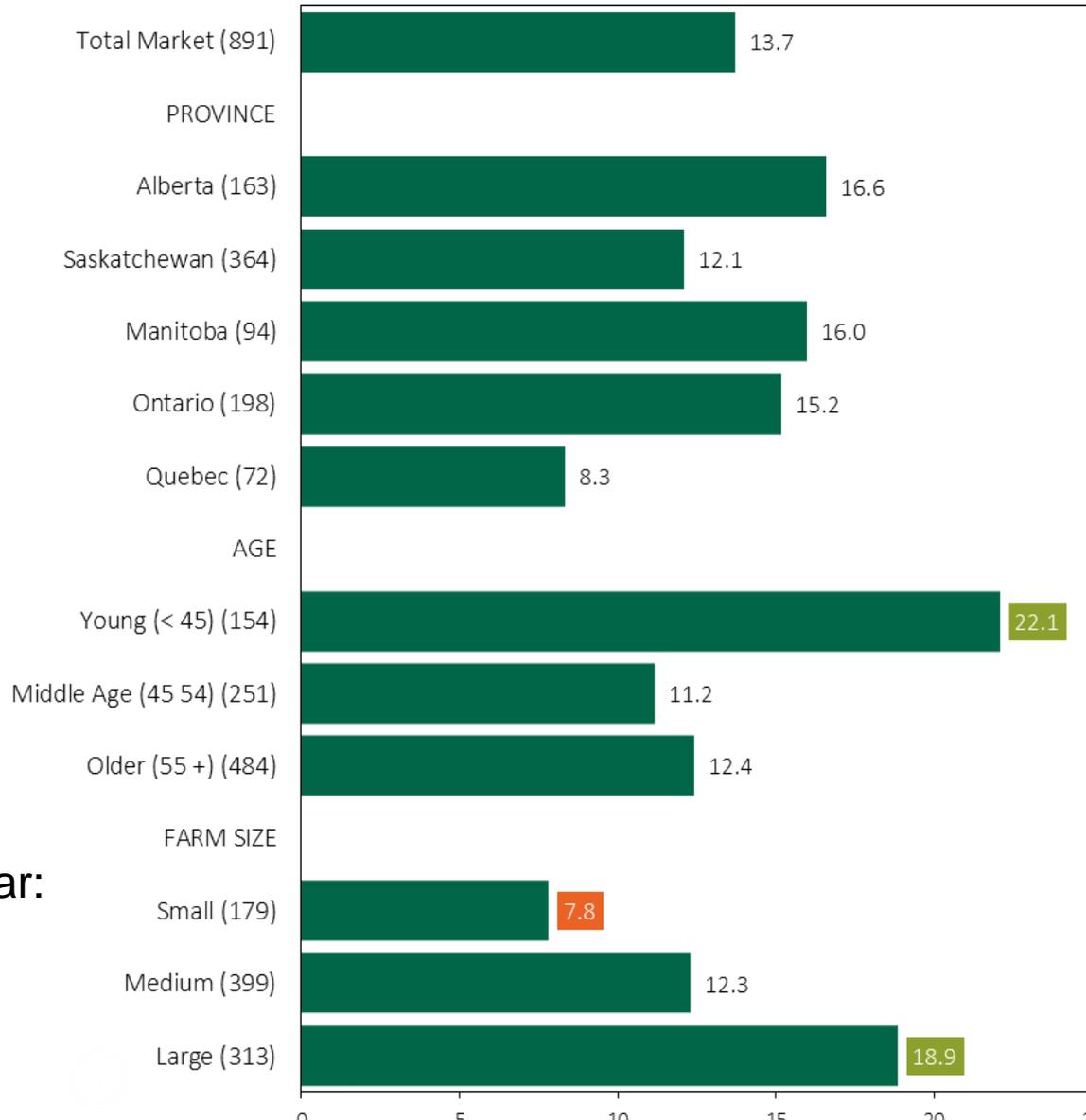
% of total respondents (n = 891)

Manitoba Farmers Very Familiar:

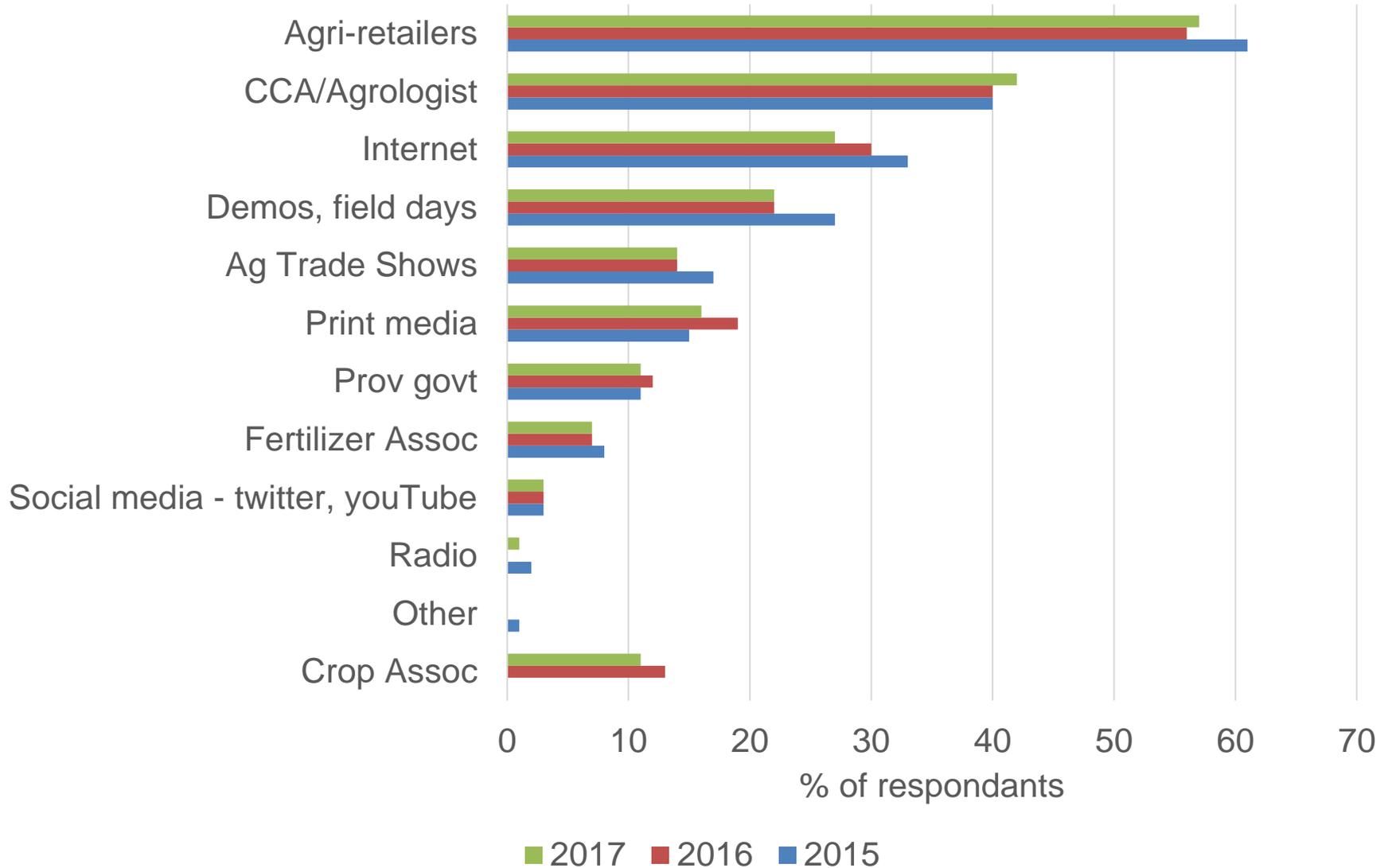
2015 = 16%

2016 = 21.7%

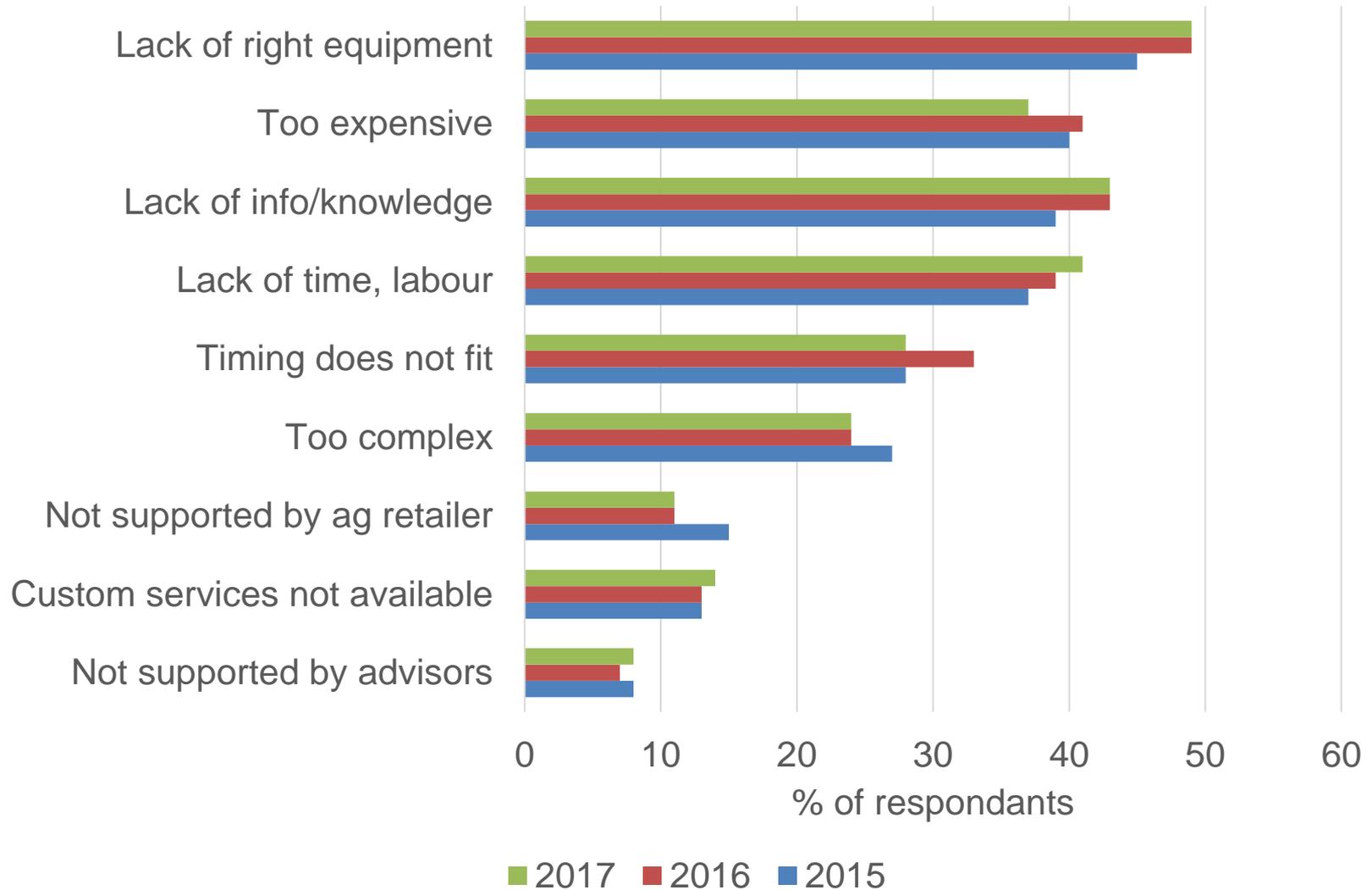
2017 = 22.1%



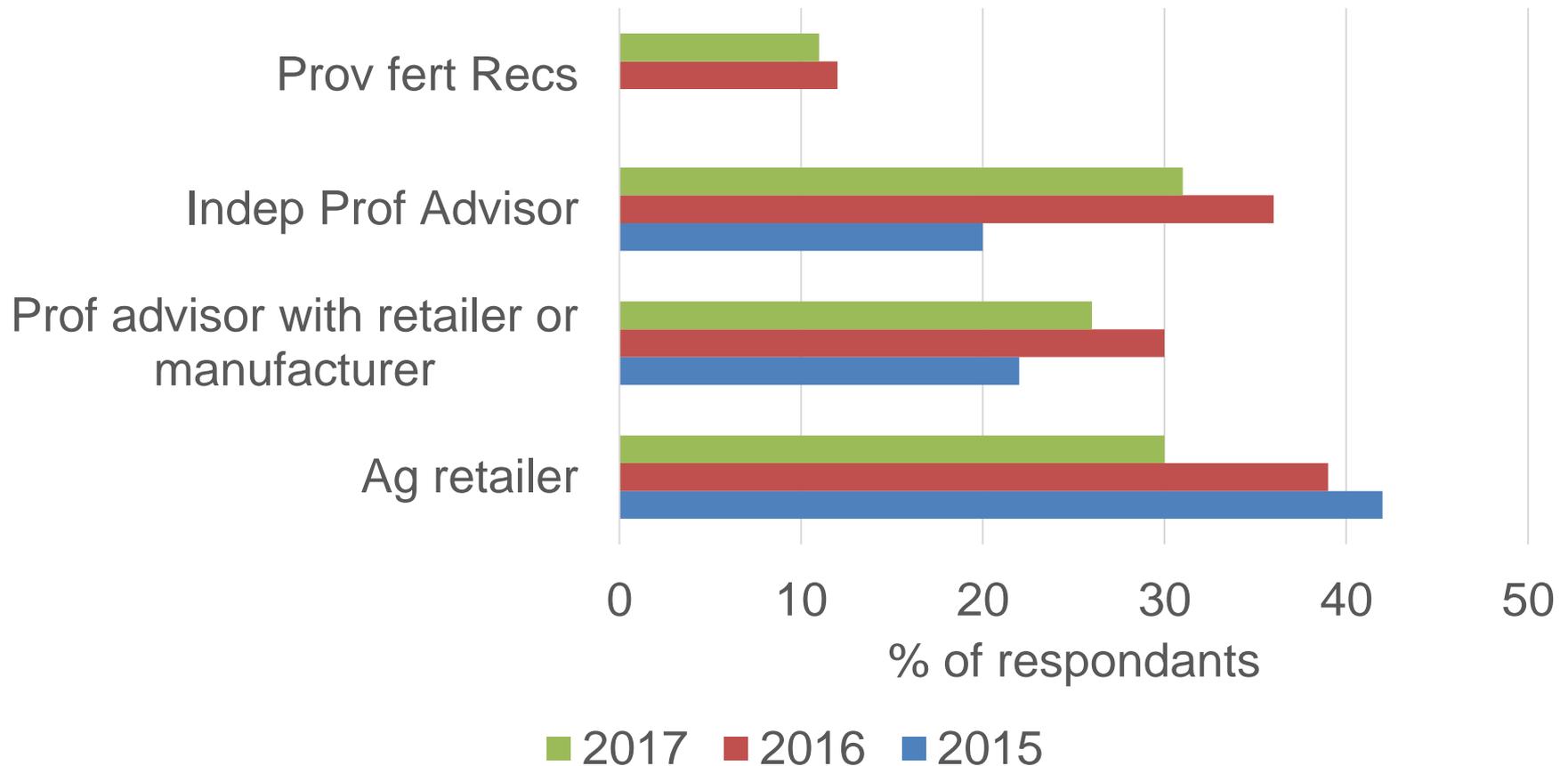
Sources of Information About 4R Nutrient Stewardship Program



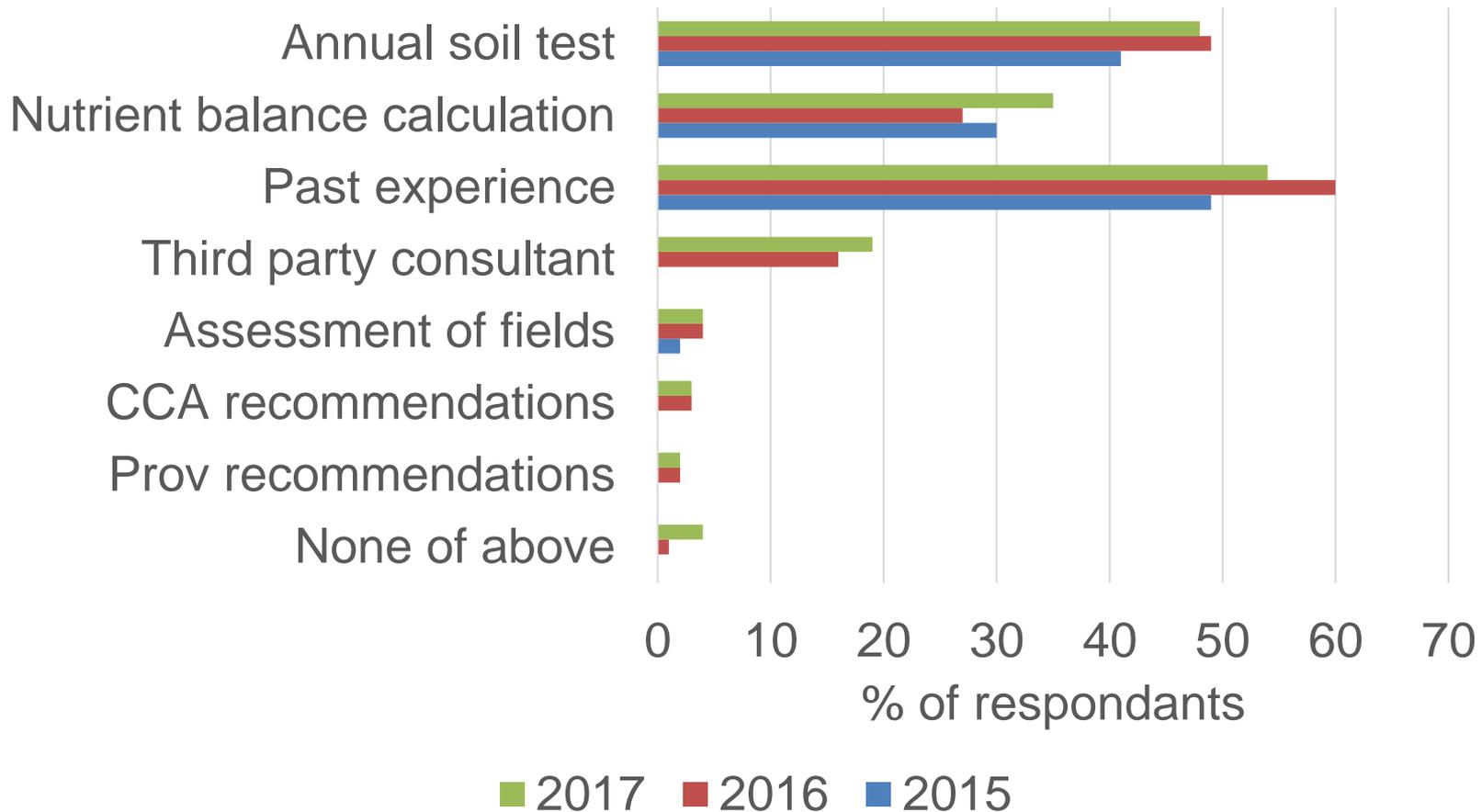
Reasons mentioned for NOT Adopting 4R Practices



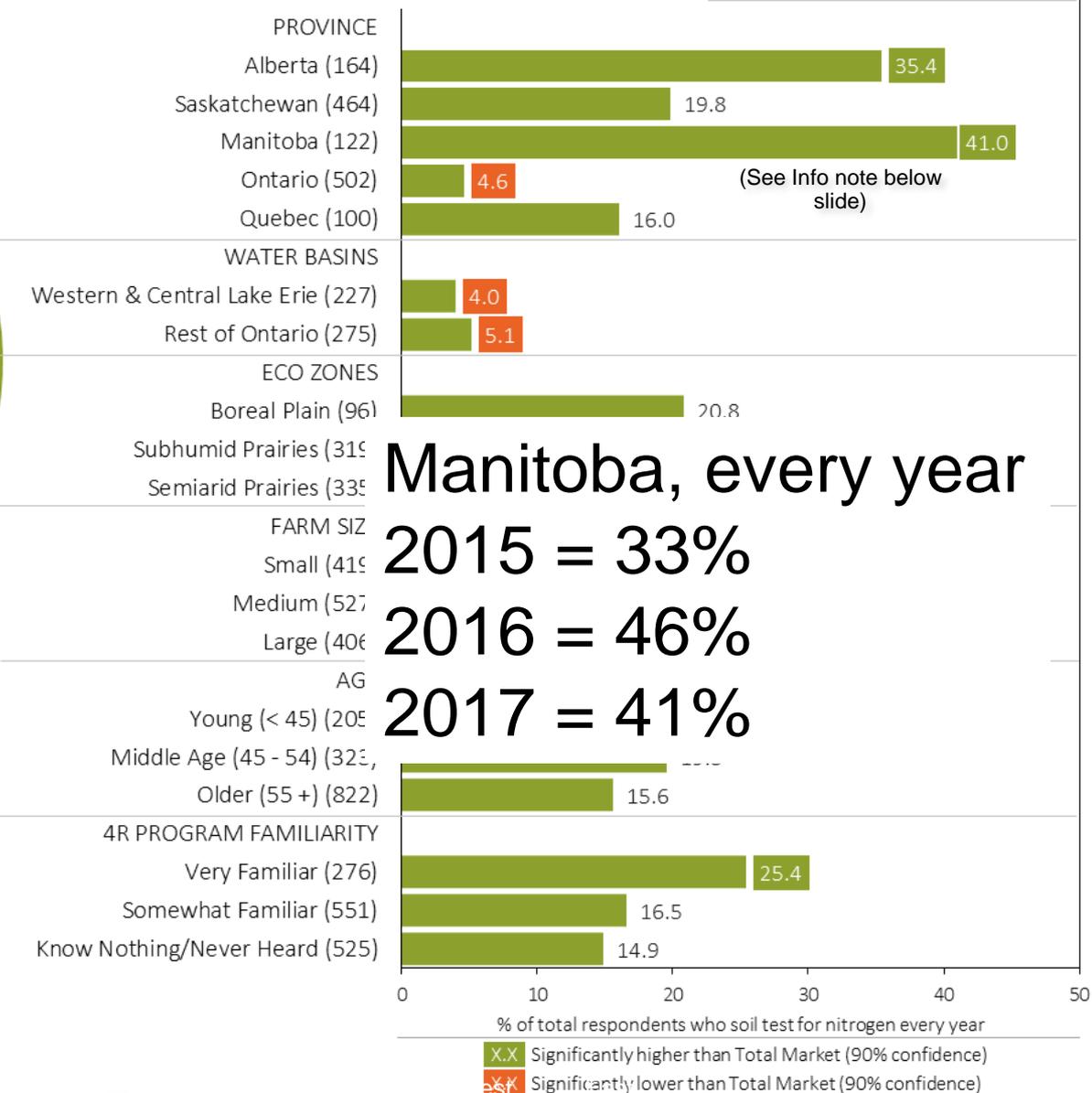
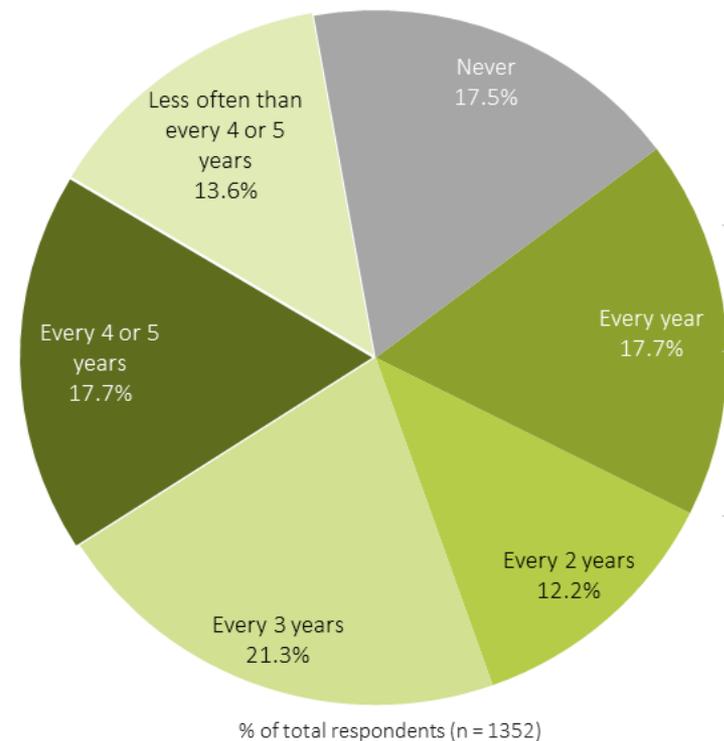
Sources of Fertilizer Advice (Manitoba)



Approaches Used to Decide Nitrogen Fertilizer Rate in Canola (Prairies)



Frequency of Soil Testing - Nitrogen



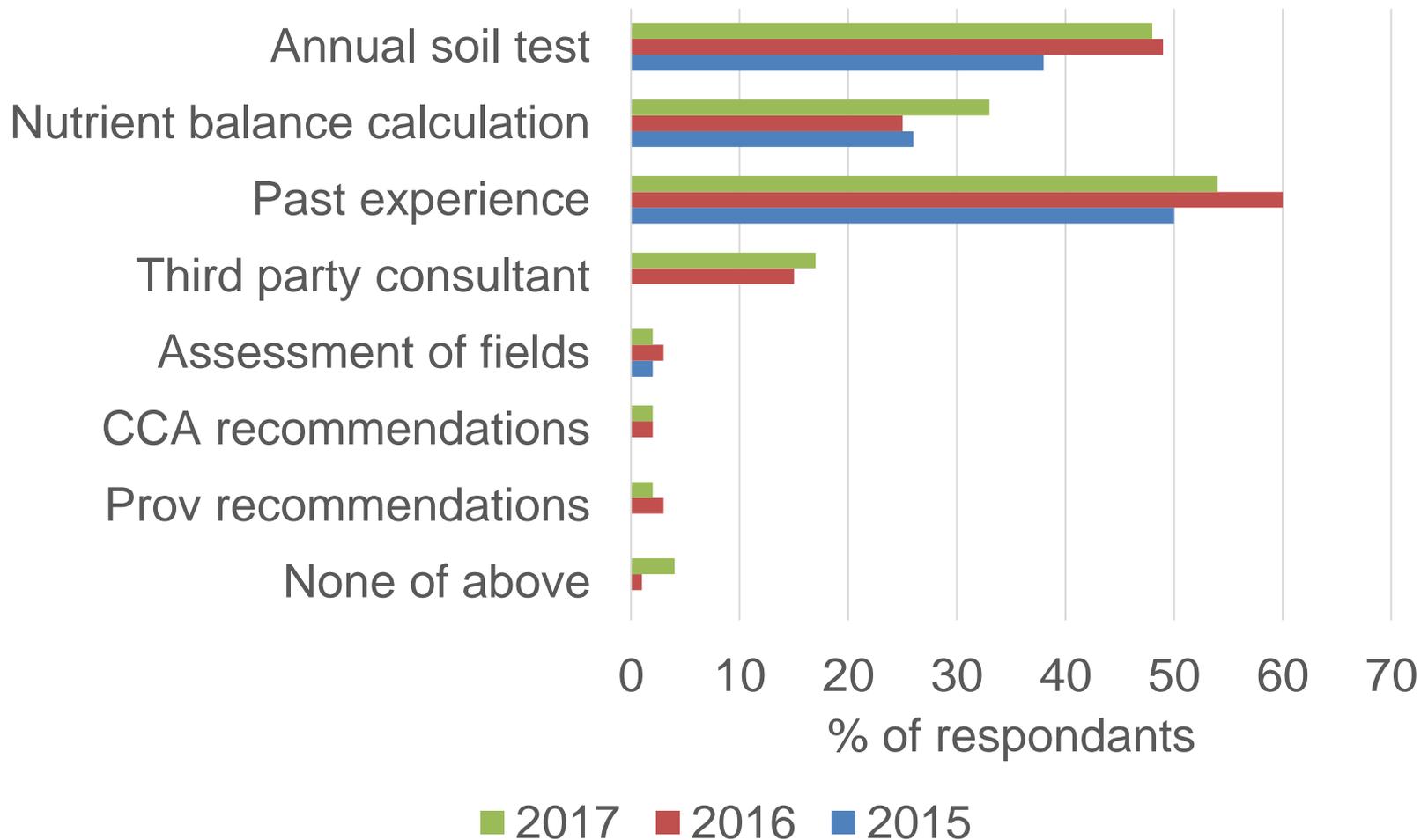
Manitoba, every year
2015 = 33%
2016 = 46%
2017 = 41%

% of total respondents who soil test for nitrogen every year

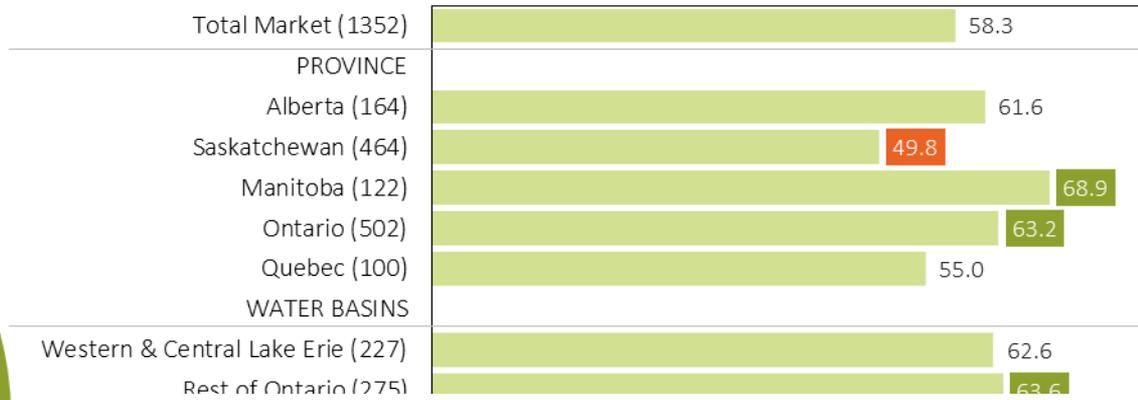
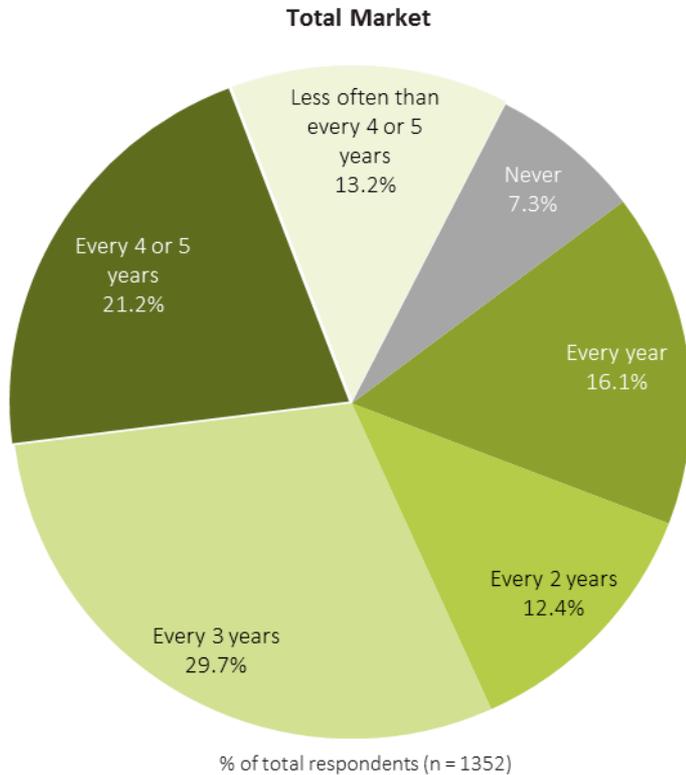
XX Significantly higher than Total Market (90% confidence)

XX Significantly lower than Total Market (90% confidence)

Approaches Used to Decide Phosphorus Fertilizer Rate in Canola (Prairies)

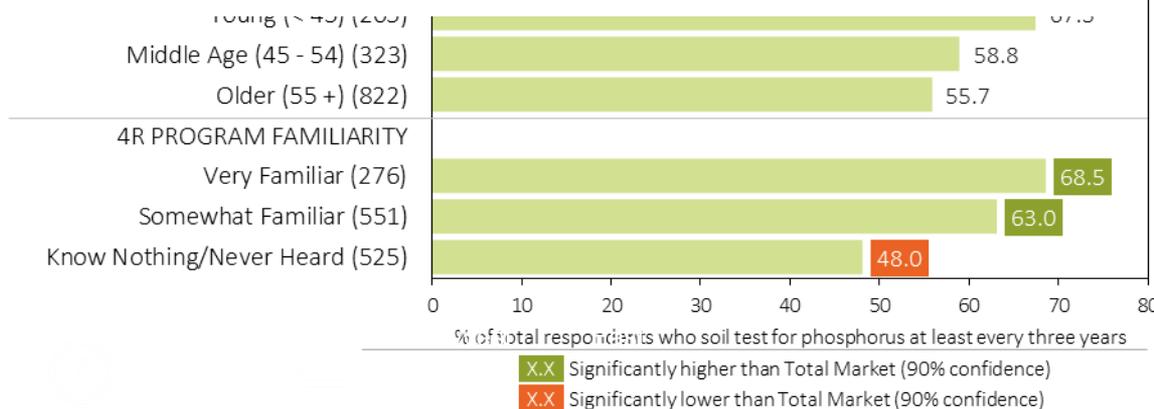


Frequency of Soil Testing - Phosphorus **Manitoba**

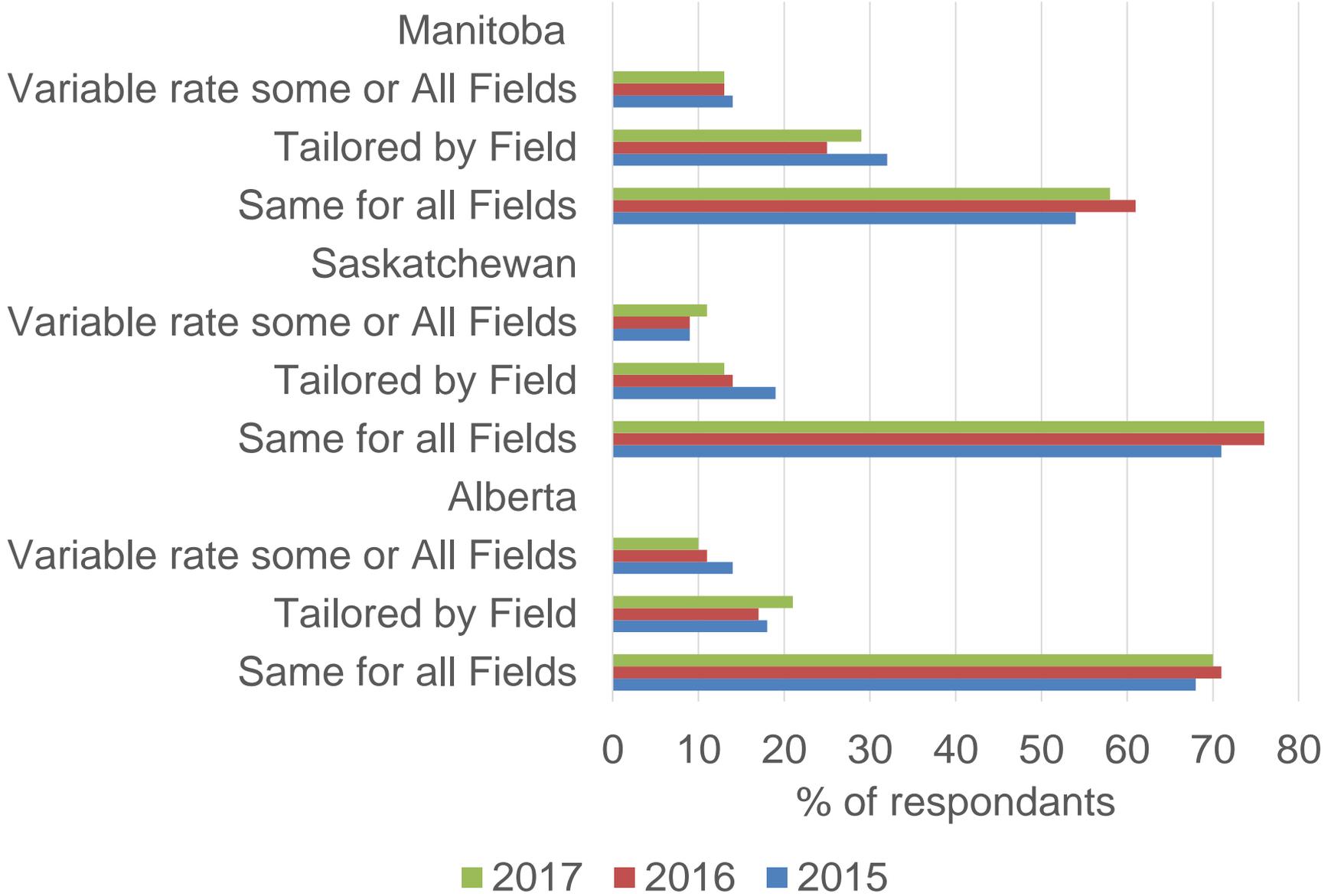


Manitoba

2015 = 33% every yr
 2016 = 73% every 3rd yr
 2017 = 63% every 3rd yr



Fertilizer Program in Canola



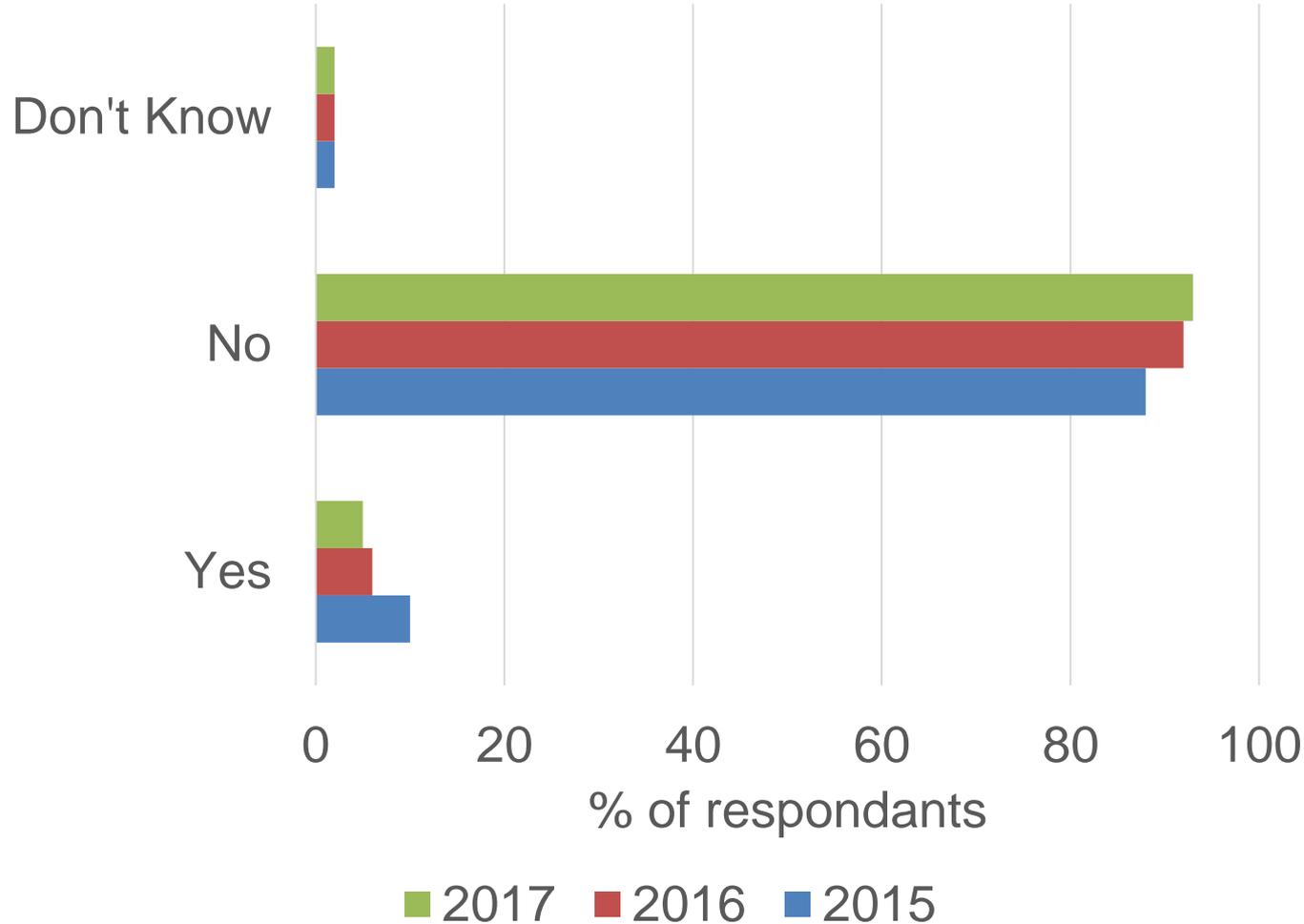
Variable Rate Use in Prairie Crops (some or all fields)



	Canola	Wheat	Corn	Soybeans
2015	11.5%	12.8%		
2016	10.8%			5.1%
2017	11.1%	12.8%		
2018			21%	
E Canada			9%	8.4%

% of growers using variable rate

Use of N Stabilizer/Controlled Release Products in Canola (Prairies)



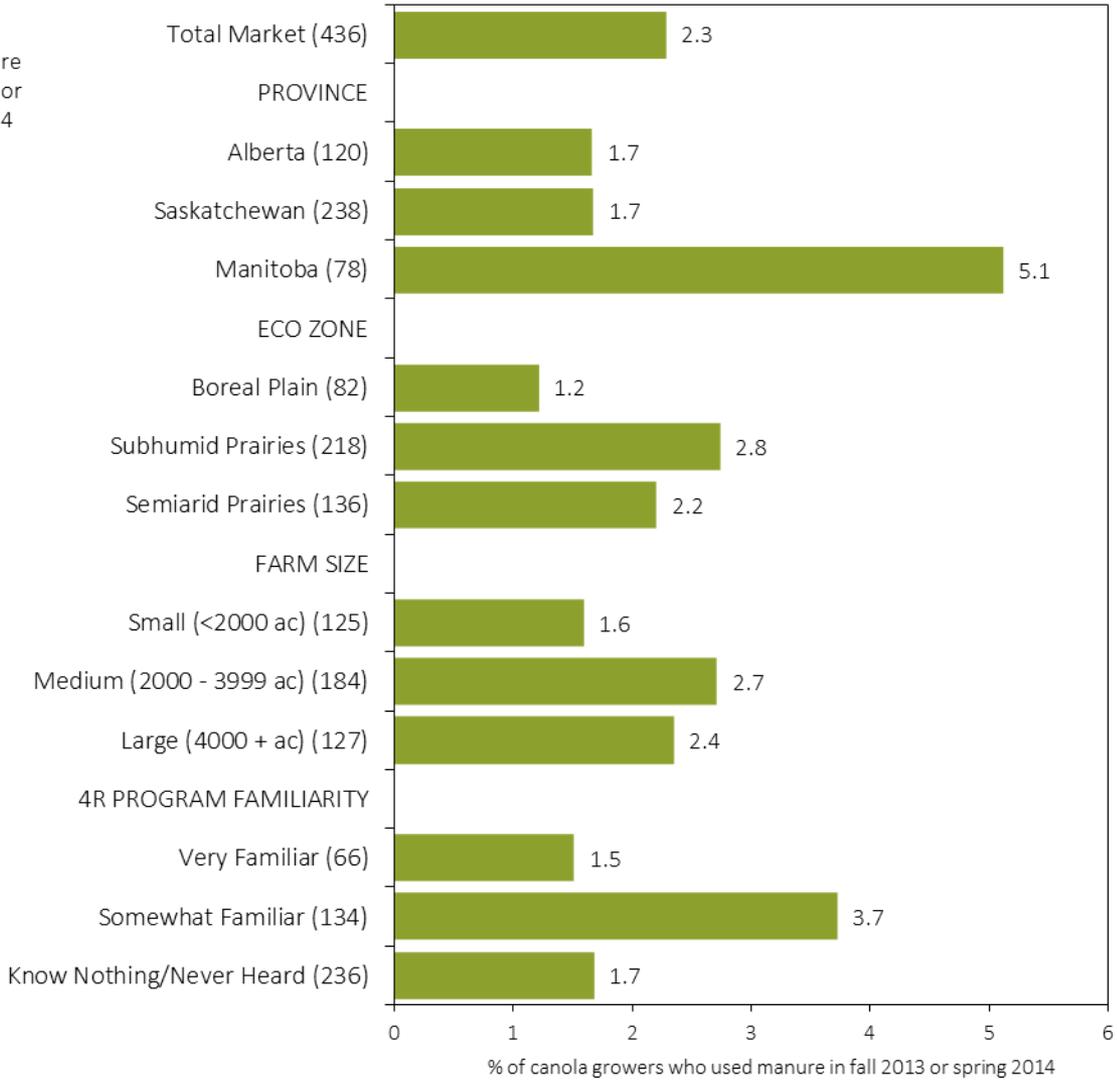
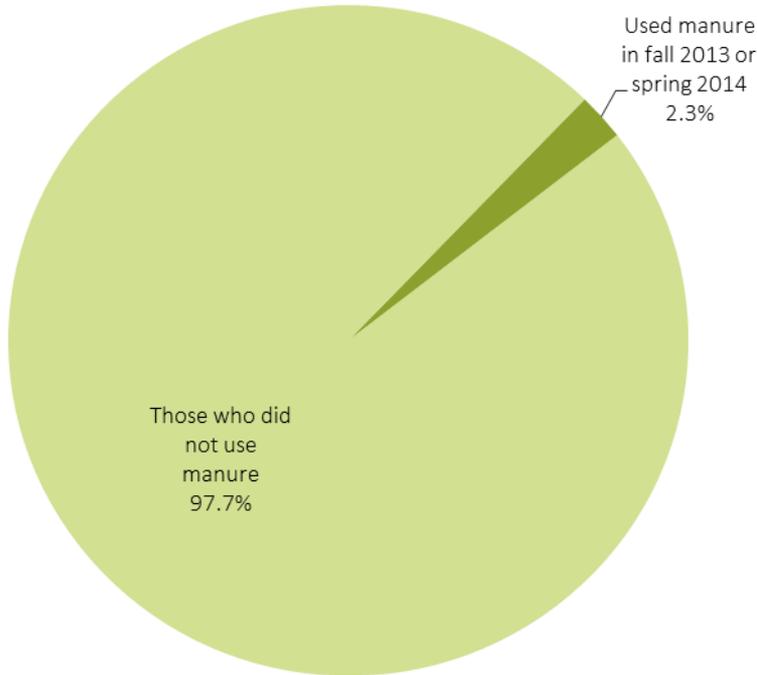
EEF (N Stabilizer) Use in Prairie Crops



	Canola	Wheat	Corn	Soybeans
2015	10 %	10%		
2016	6.2%			0
2017	5 %	4 %		
2018			12 %	
E Canada			20%	

% of growers using N stabilizers

Use of Manure in Canola

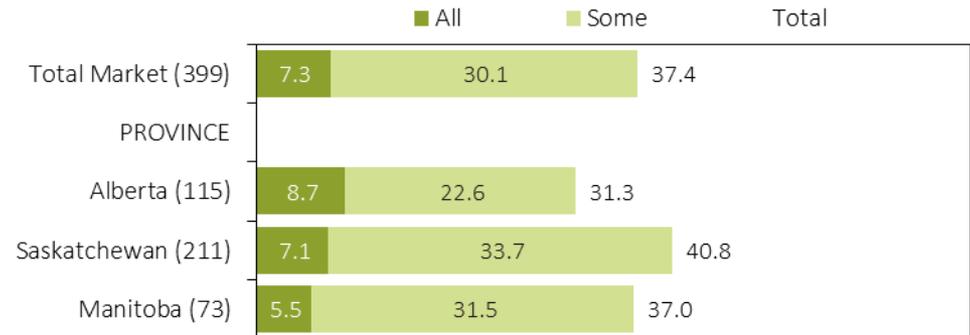
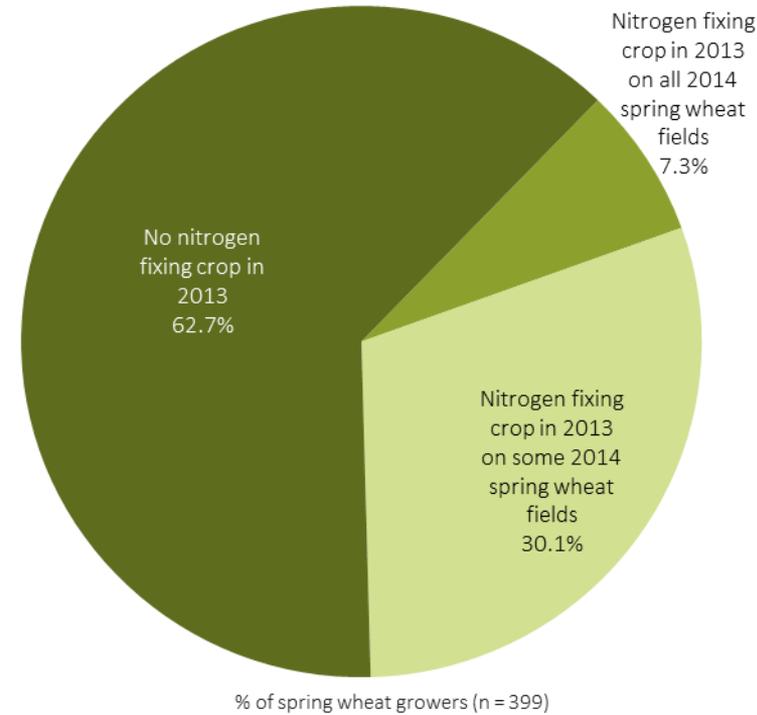


MB Manure Use

- More than SK, AB
- 5.1% canola
- 6.9 % wheat
- (in contrast Ontario = 22% of corn)

X.X Significantly higher than Total Market (90% confidence)
X.X Significantly lower than Total Market (90% confidence)

Use of Nitrogen Fixing Crop in Previous Year - Spring Wheat



Previous N crops - Manitoba Canola:

2015: some = 18% .

2016 all = 3% , some = 22%

Wheat:

2015: all = 6%, some = 32%

2016: all = 8%, some = 30%

Corn:

2017: all = 19%, some = 26%

Note: green manures = 0%

X.X Significantly higher than Total Market (90% confidence)
X.X Significantly lower than Total Market (90% confidence)

Micronutrient Use in Prairie Crops



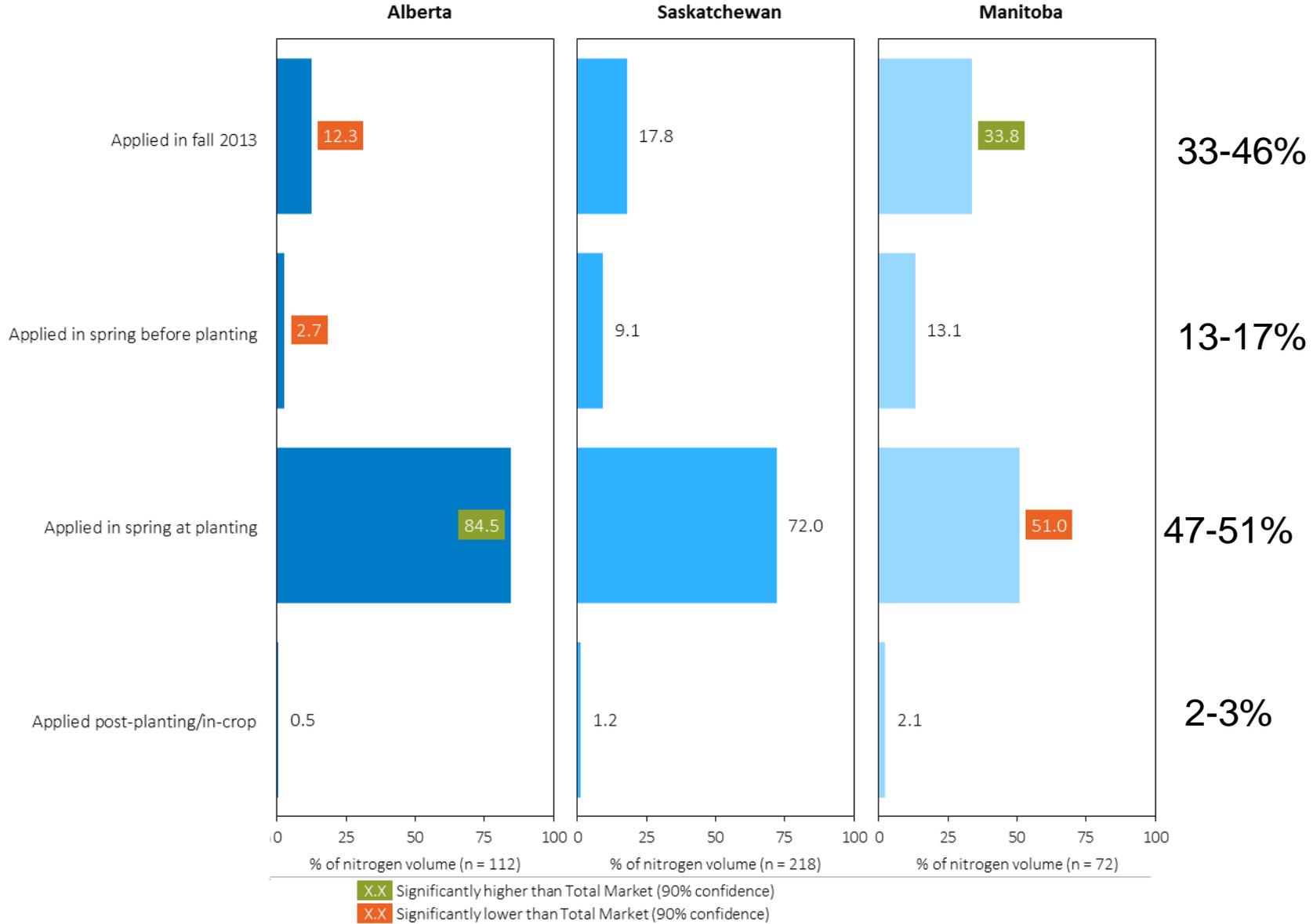
	Canola (403 -569)*	Wheat (437)	Corn (100)	Soybeans (223)
Boron	4.3-7.7%	1.8%	2 %	1.4%
Copper	0.5 – 2.3%	9.9%	1%	0.9%
Manganese	0.8 – 3.5%	1.3%		1.4%
Zinc	2.8-5.3%	2.4%	5%	1.8%
Calcium	0.5 – 2.3%	0.9%		0.9%
Magnesium	1.0-2.3%	1.3%		1.4%

% of growers using micronutrients. * number of growers surveyed

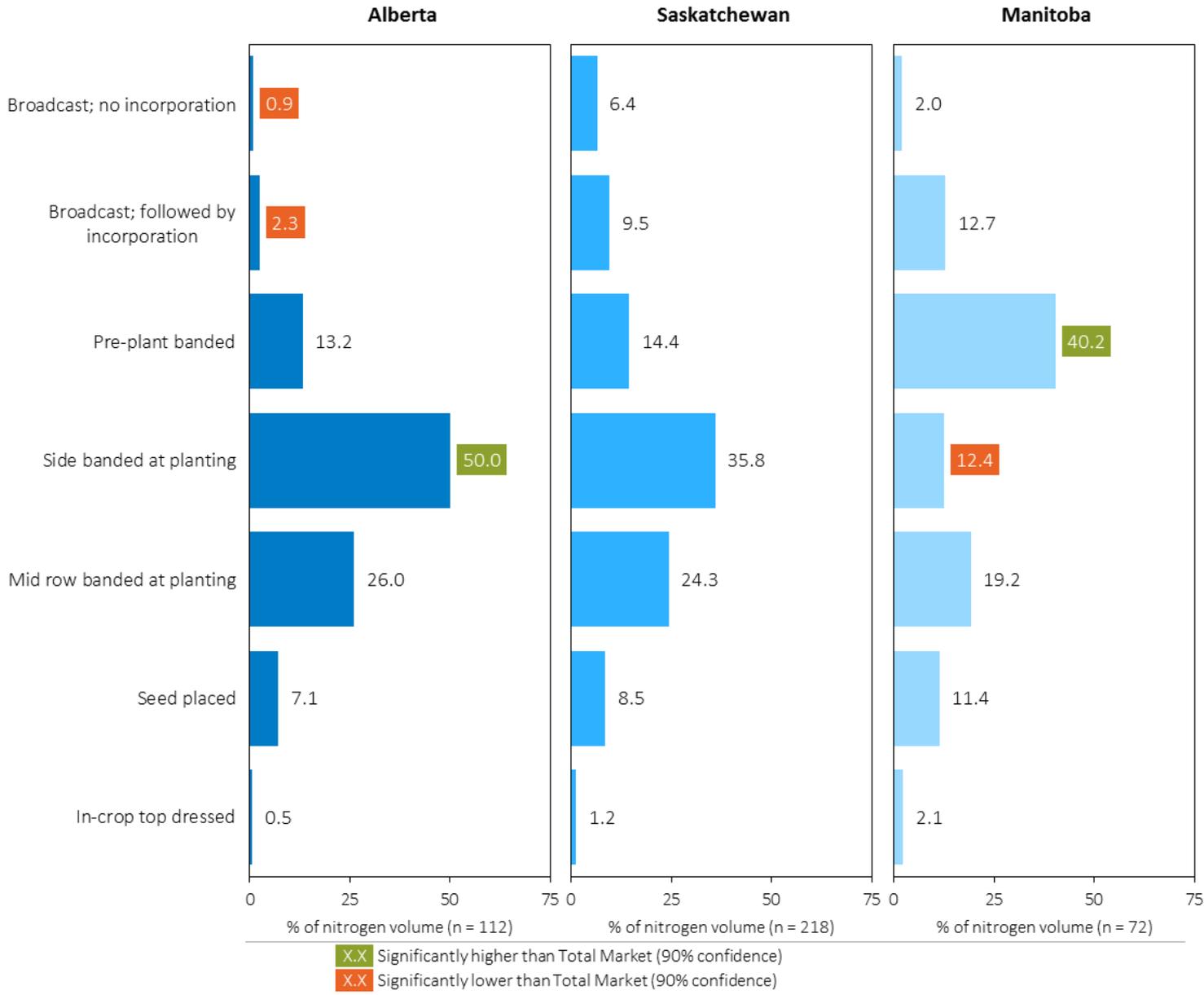
Fertilizer Placement and Timing (Source)

- Summarize for MB, vs 4R and contrast to other provinces:
- To Prairies for canola and wheat
- To Eastern Canada for corn and soys

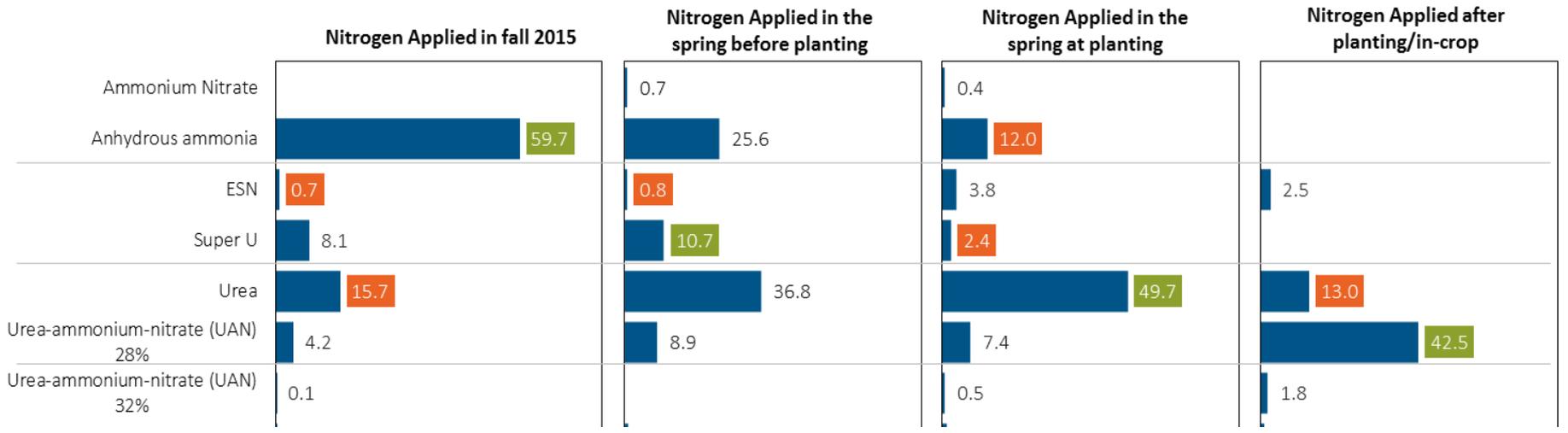
Nitrogen Fertilizer Timing in Canola



Nitrogen Fertilizer Placement in Canola



Nitrogen Fertilizer Sources in Canola by Timing

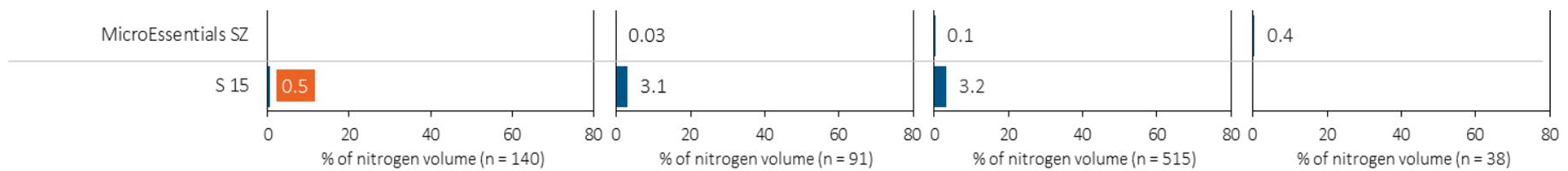


NH₃>> urea

urea>NH₃

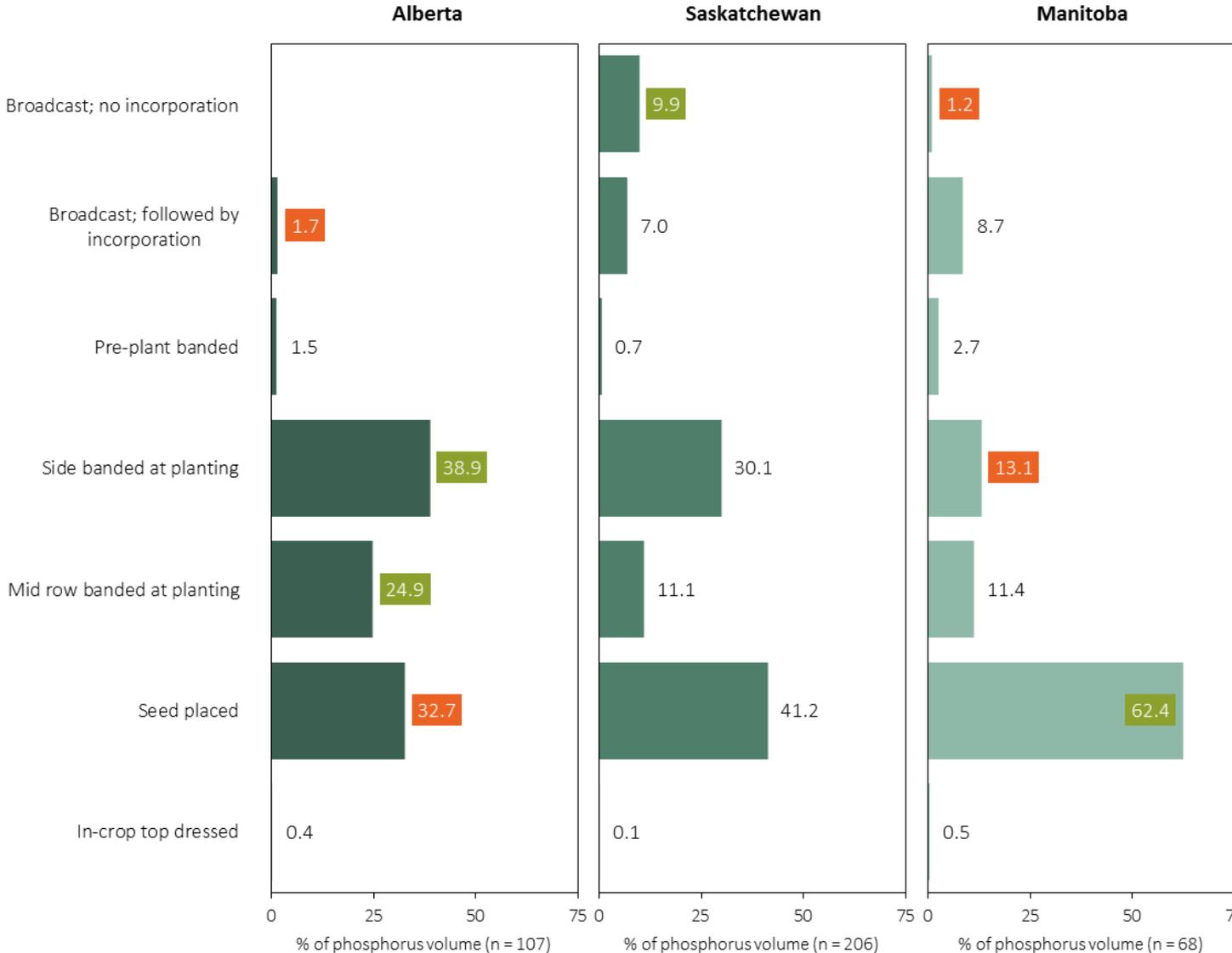
urea>>NH₃

UAN>urea



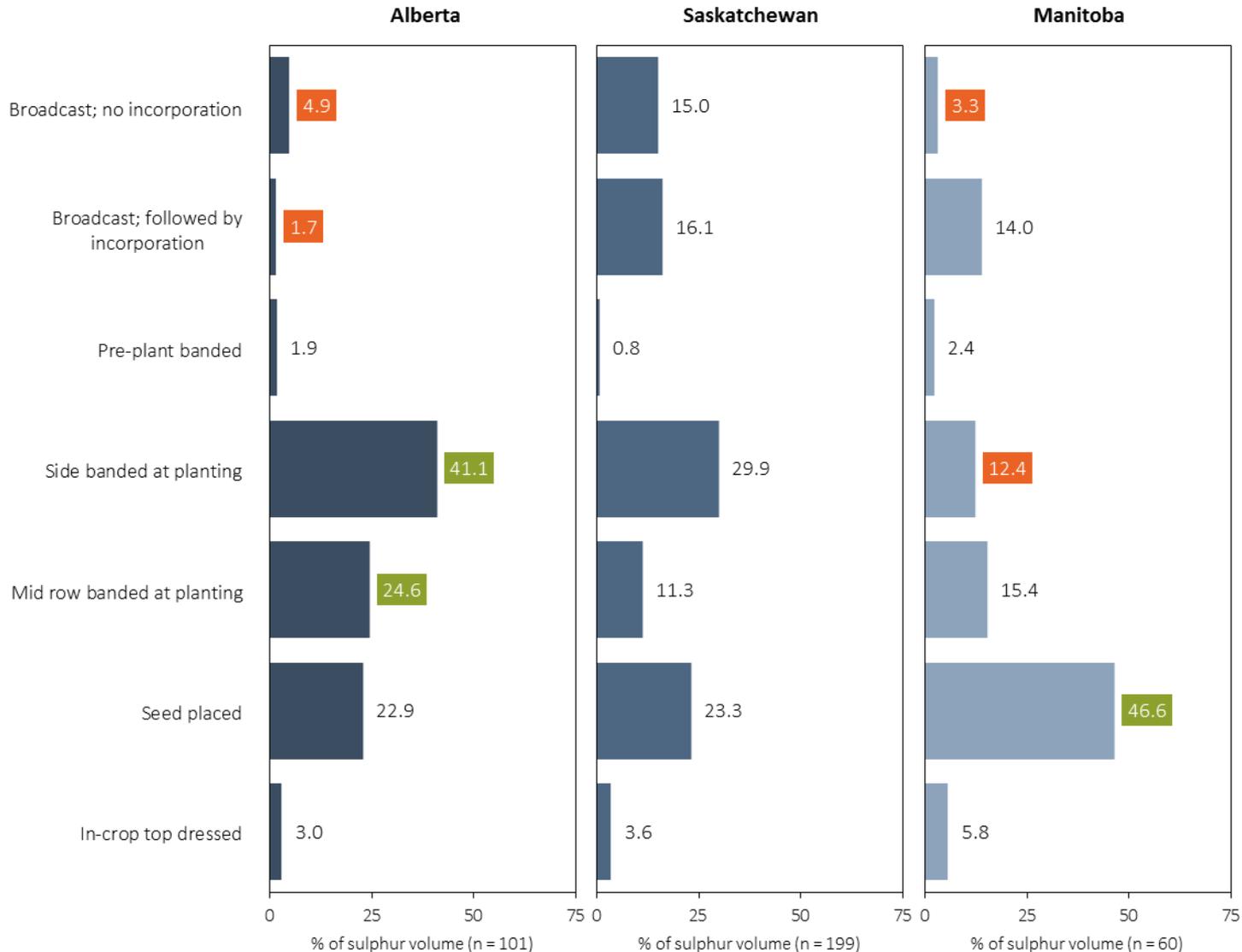
X.X Significantly higher than Net All Timings (90% confidence)
 X.X Significantly lower than Net All Timings (90% confidence)

Phosphorus Fertilizer Placement in Canola



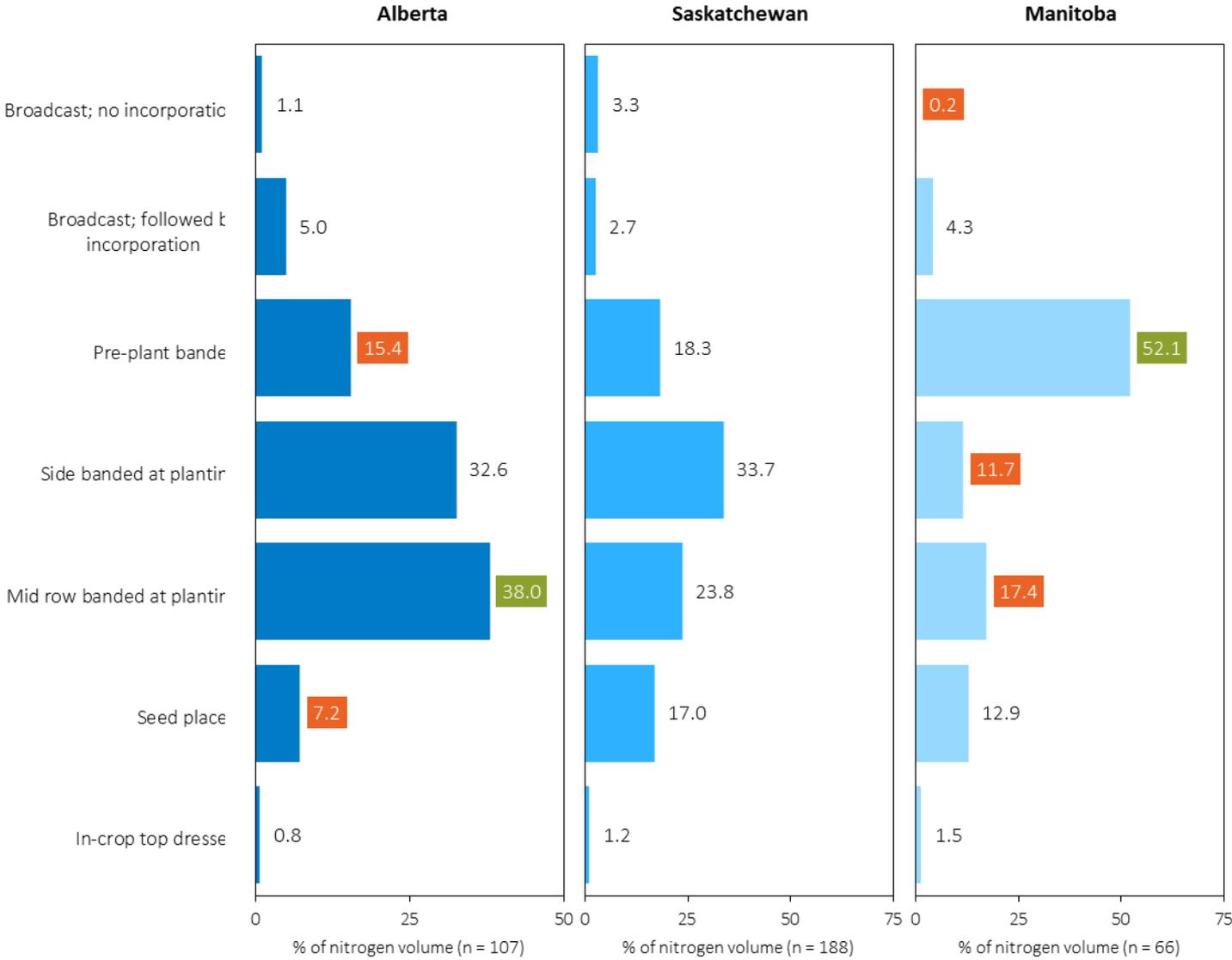
X.X Significantly higher than Total Market (90% confidence)
X.X Significantly lower than Total Market (90% confidence)

Sulphur Fertilizer Placement in Canola



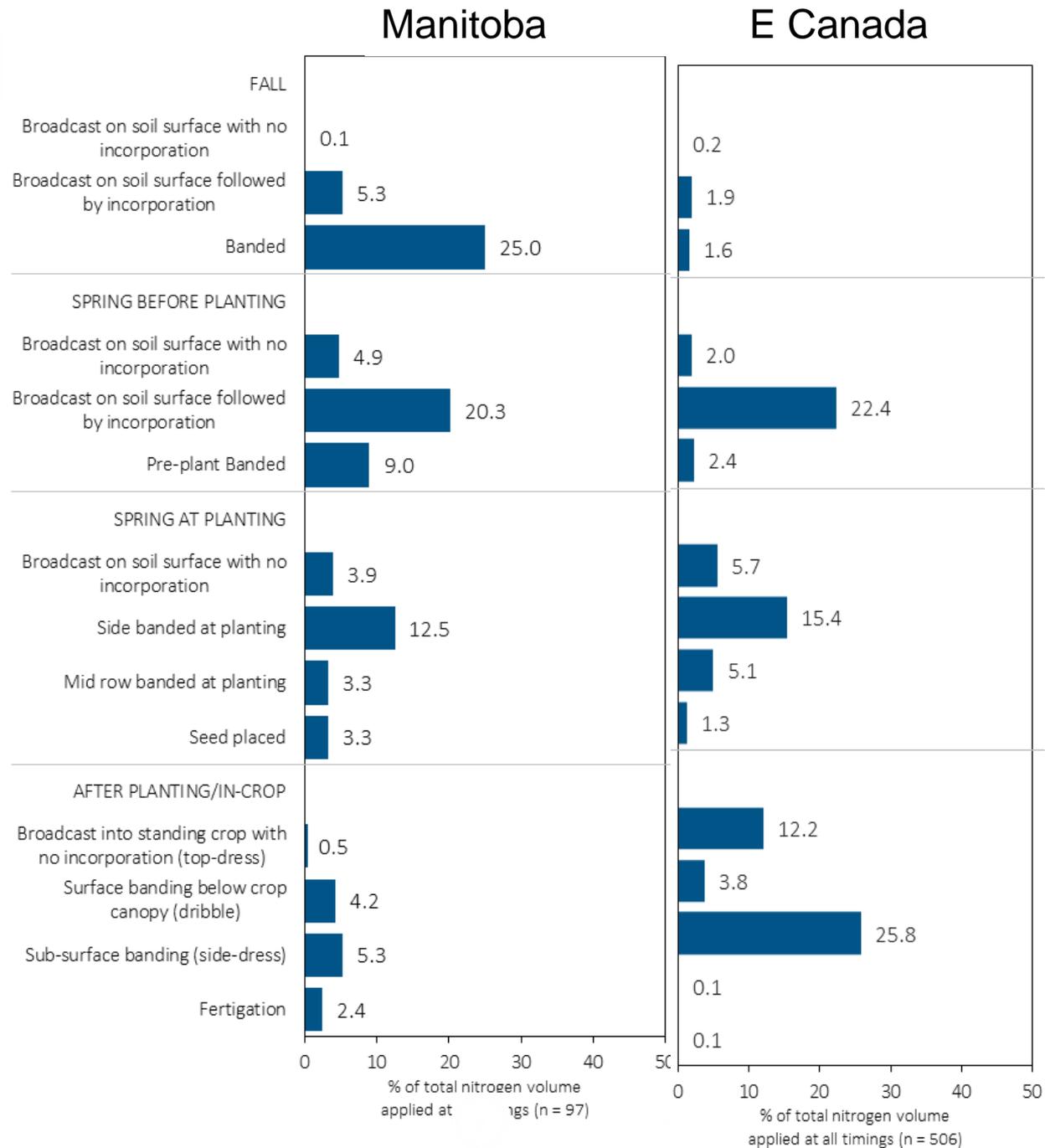
X.X Significantly higher than Total Market (90% confidence)
X.X Significantly lower than Total Market (90% confidence)

Nitrogen Fertilizer Placement in Wheat

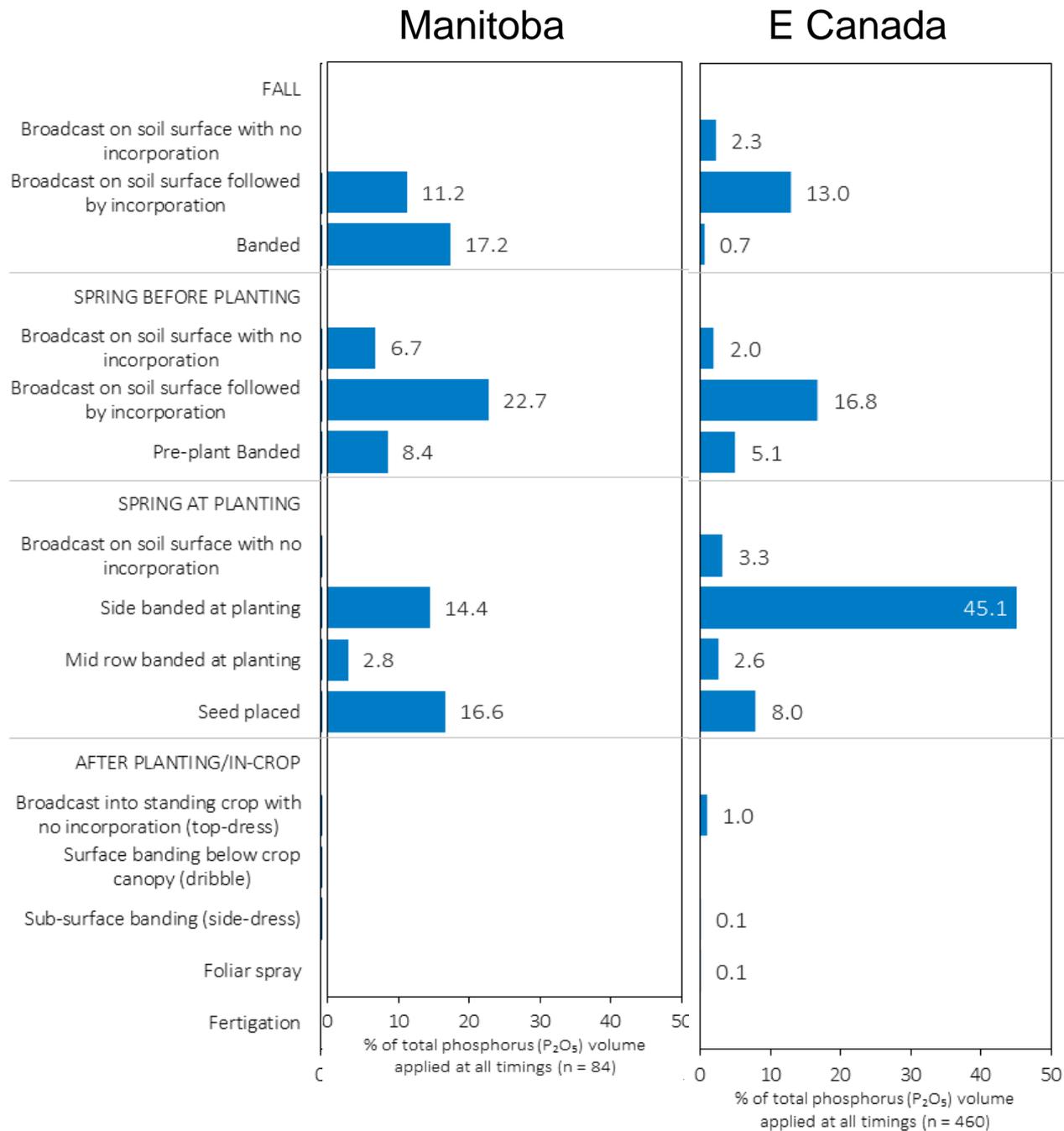


X.X Significantly higher than Total Market (90% confidence)
X.X Significantly lower than Total Market (90% confidence)

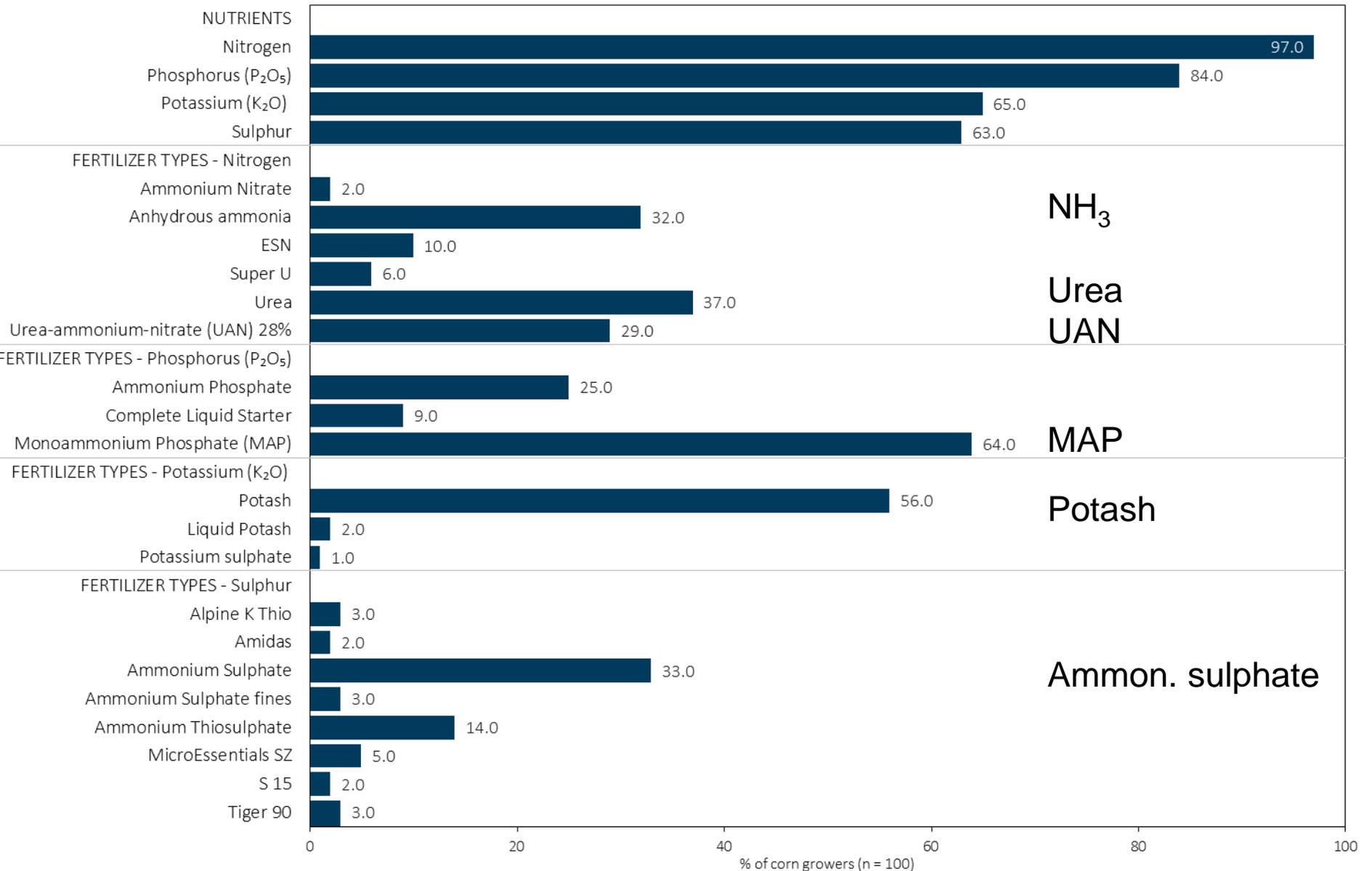
Nitrogen Fertilizer Placement for Corn



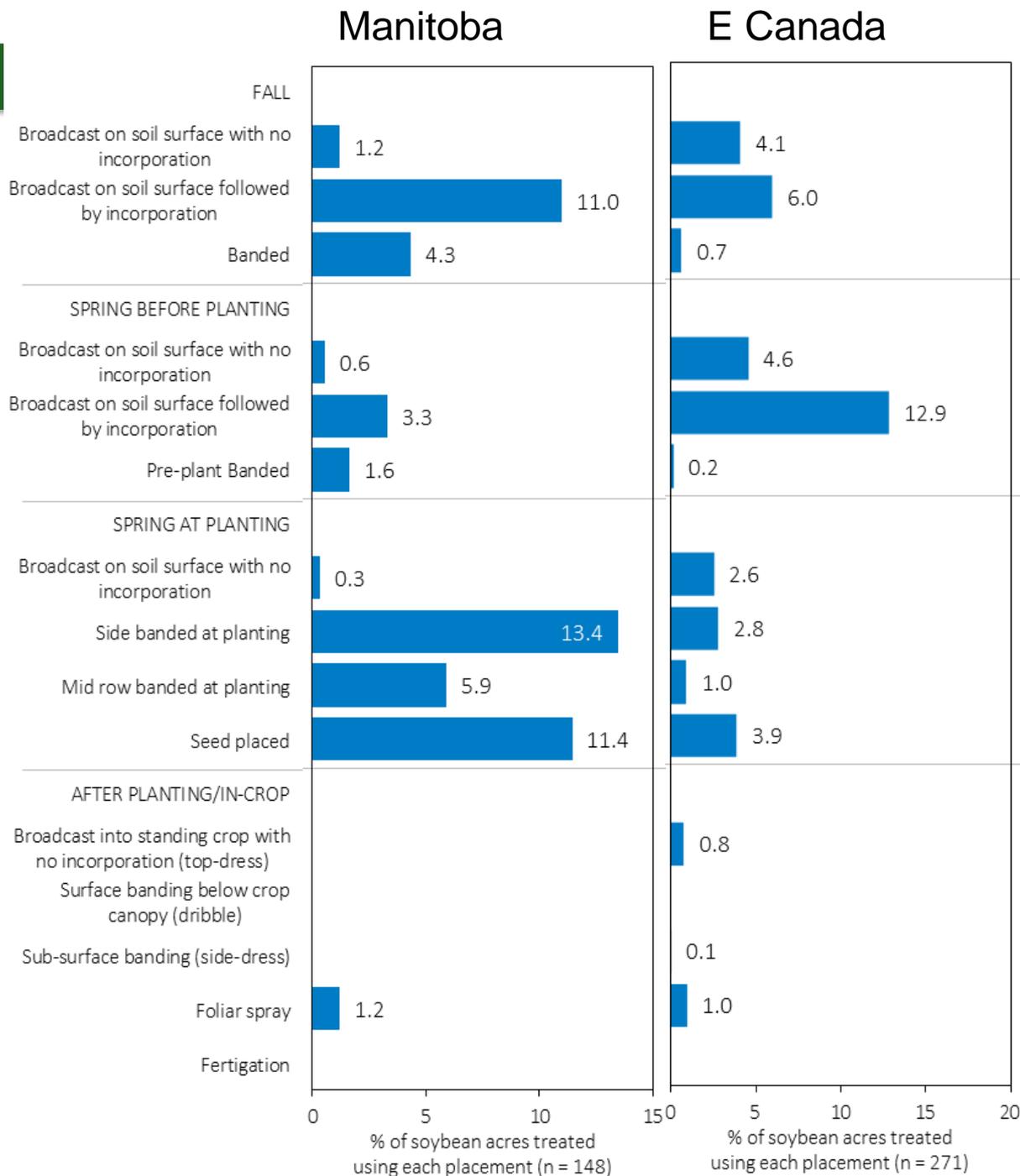
Phosphorus Fertilizer Placement for Corn



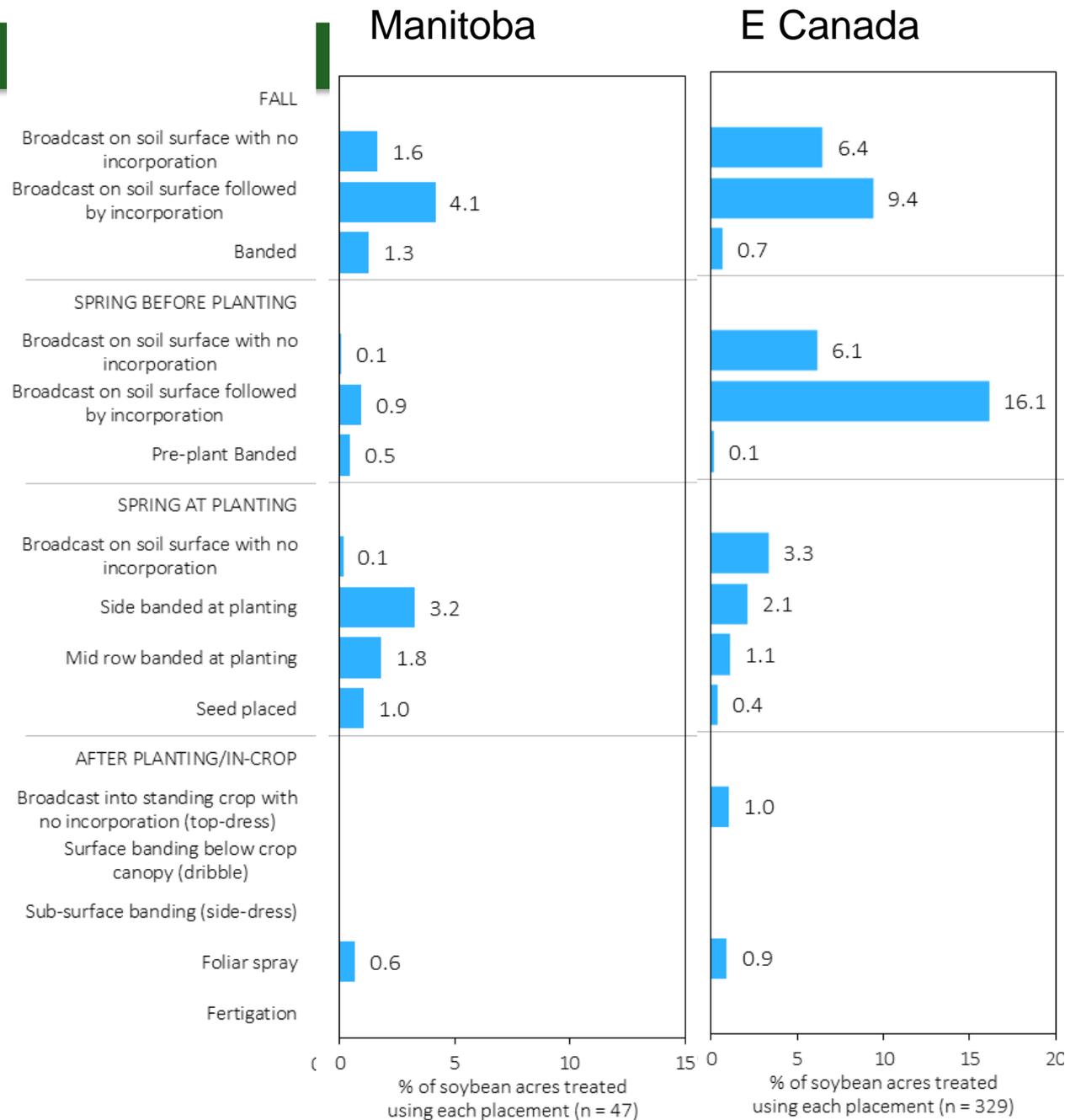
Fertilizer sources for Corn



Phosphorus Fertilizer Placement for Soybeans



Potassium Fertilizer Placement for Soybeans



CORPORATE ▶

INSURANCE ▶

LENDING ▶

OTHER PROGRAMS ▶

Manitoba Agricultural Services Corporation

MMPP - Fertilizer Data Browser

 Share

Select Municipalities or MASC Risk Areas

Tip: Click or touch the 'X' (at right) in these tip balloons to hide them permanently. 

Tip: Click or touch the button below to select Municipalities or MASC Risk Areas. 

Municipalities

Tip: Click or touch in the select boxes (below) to select at least one item from each list. Click or touch the  icon to clear all selected items. 

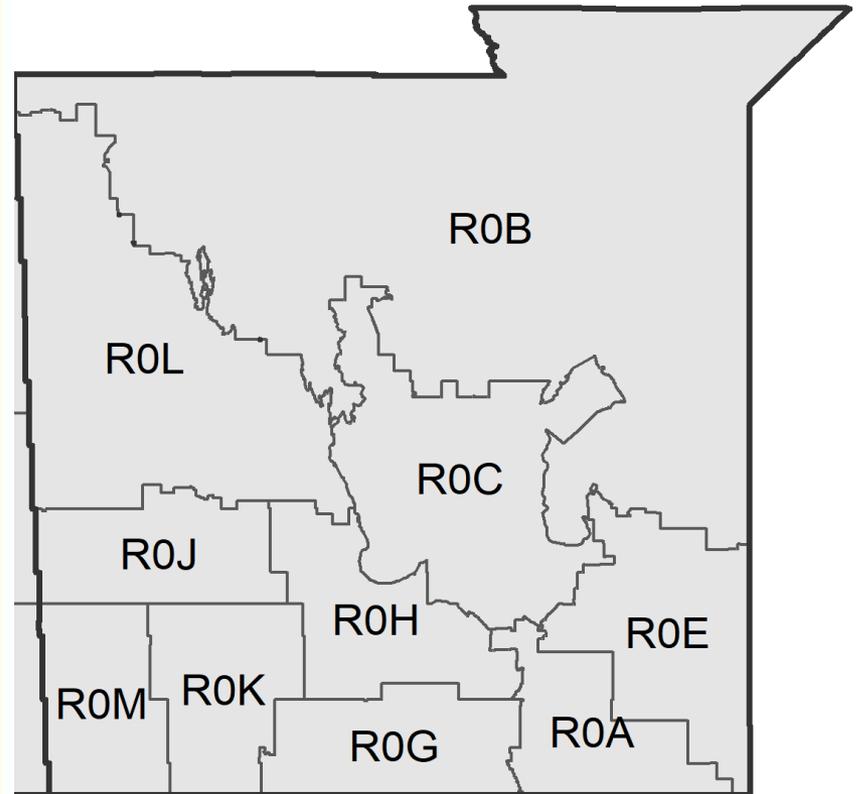
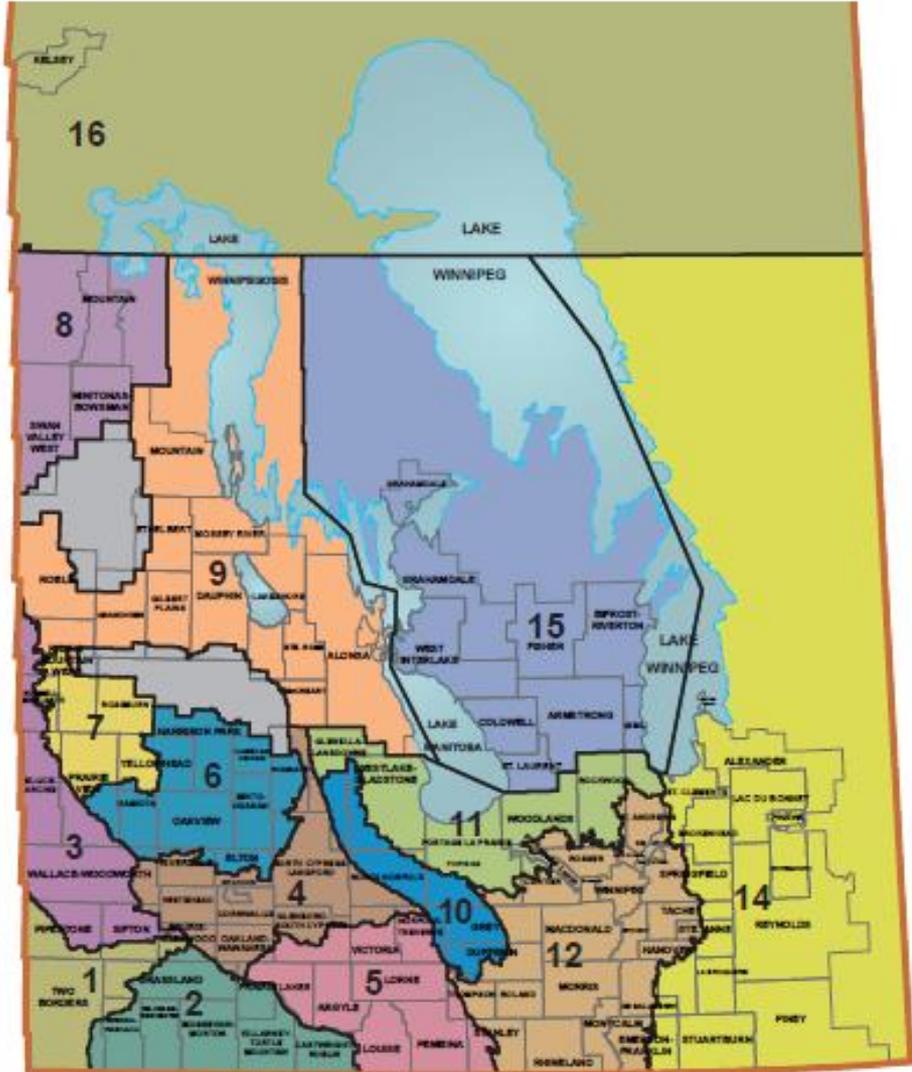
Select One or More Municipalities ▶ 

Select Crop(s)

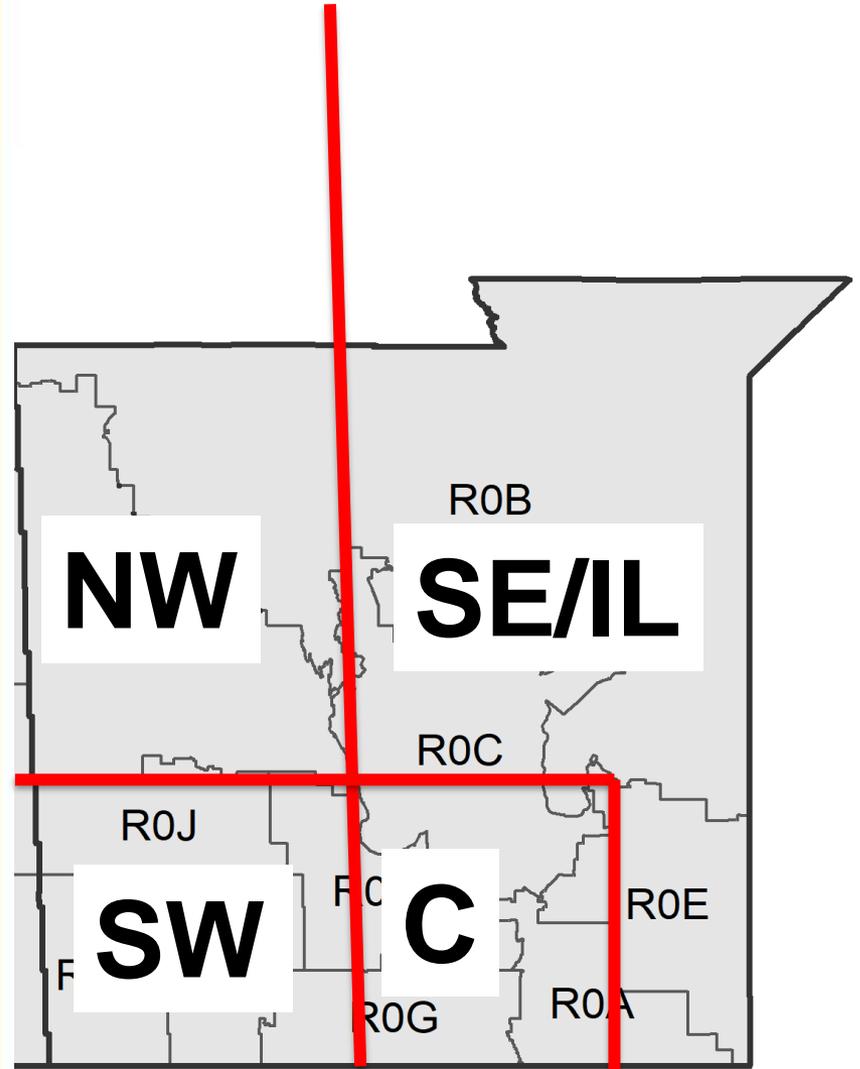
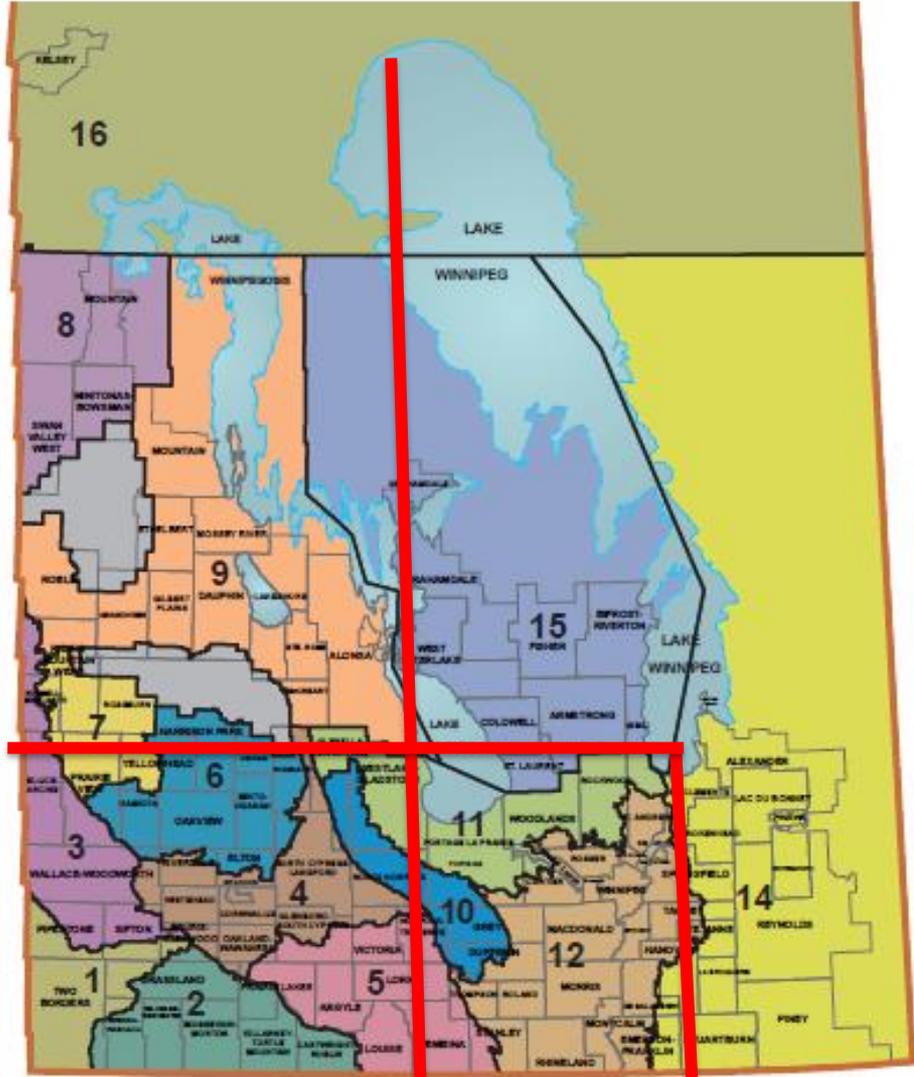
Select One or More Crops ▶ 

Data collection ended 2018

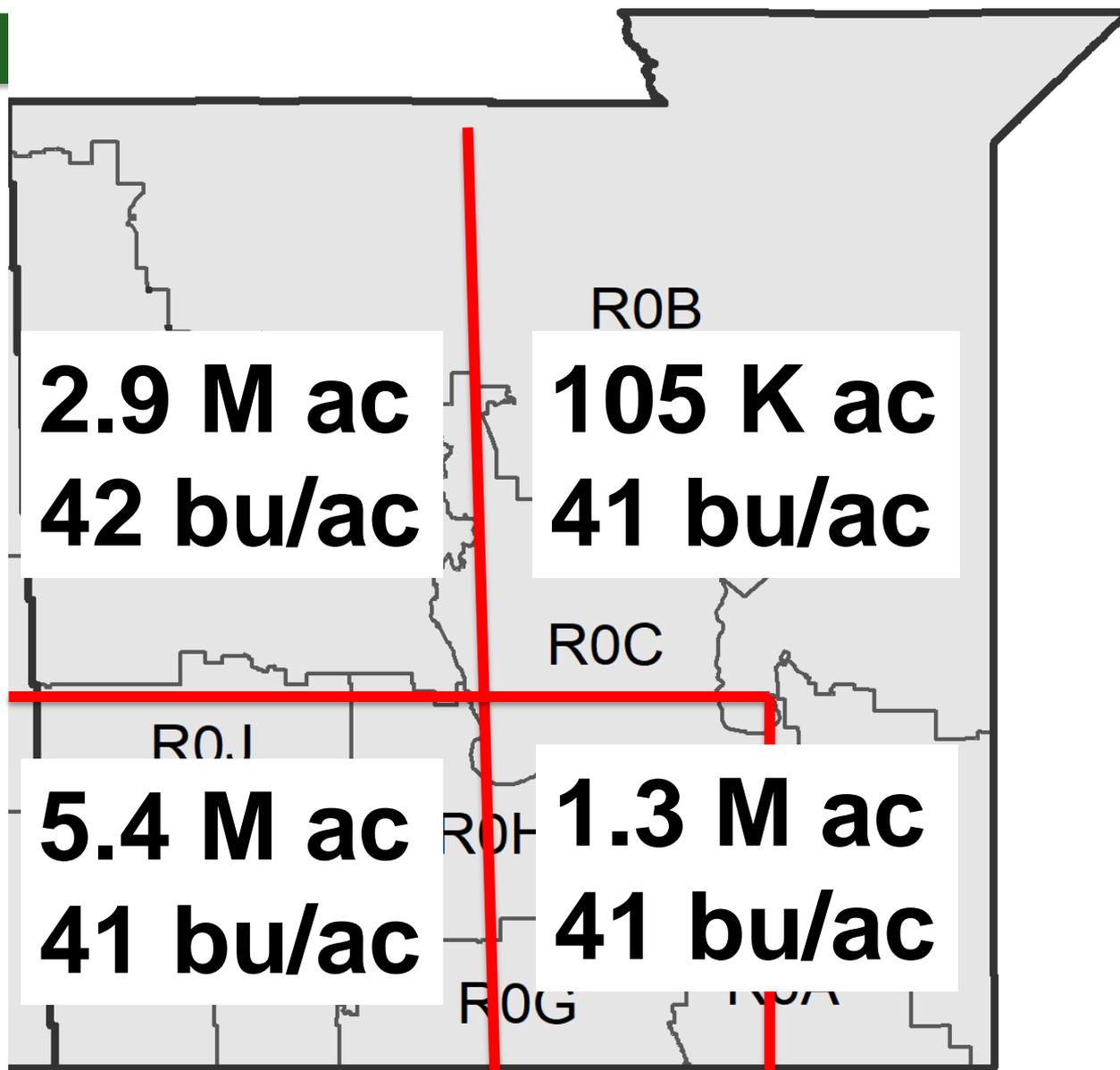
RISK AREAS



RISK AREAS



Canola 2014-17



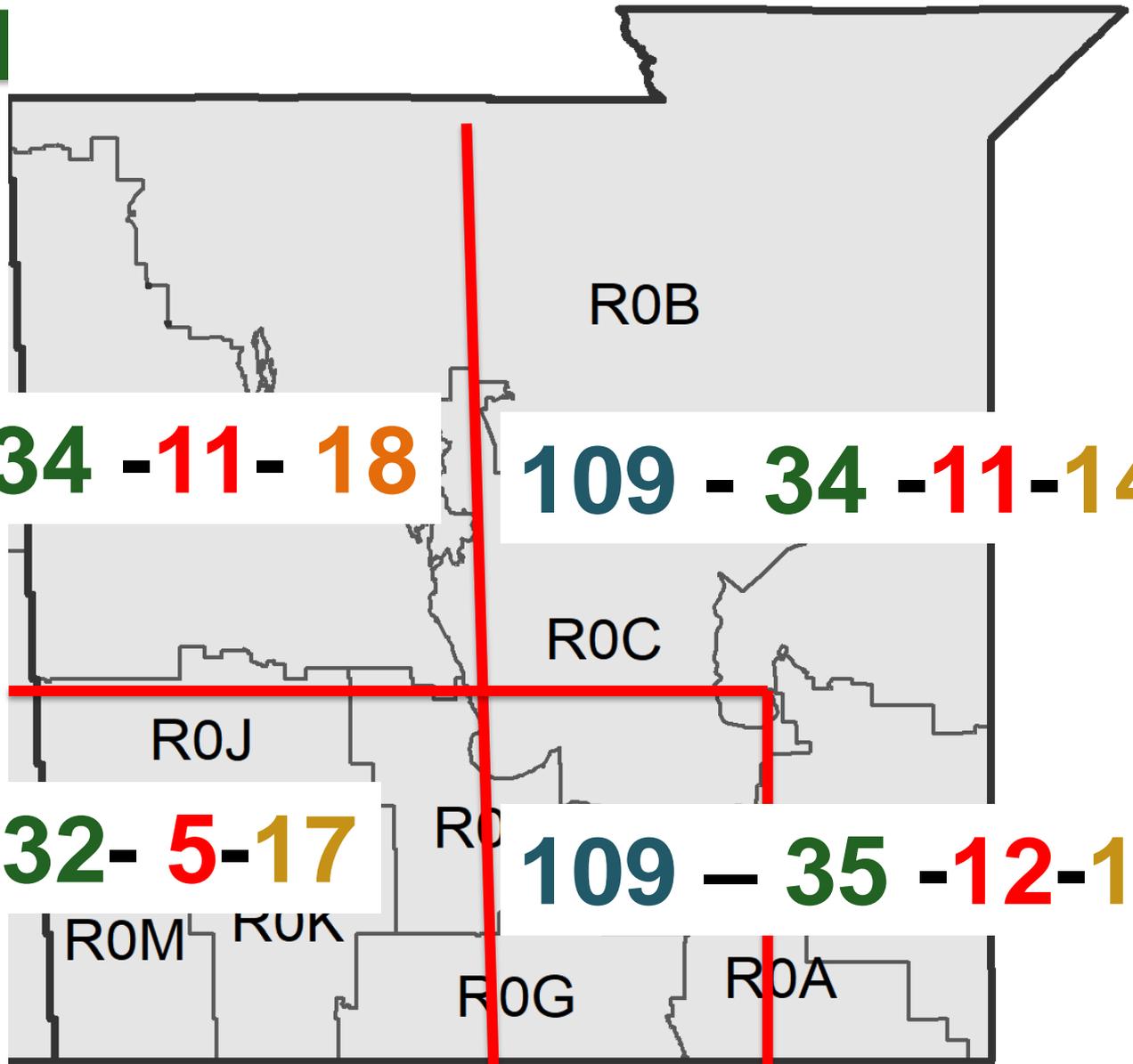
Canola 2014-17

104 - 34 - 11 - 18

109 - 34 - 11 - 14

99 - 32 - 5 - 17

109 - 35 - 12 - 16



**HRS Wheat
2014-17**

**1.9 M ac
51.4 bu/ac**

**307 K ac
52.2 bu/ac**

**4.3 M ac
53.5 bu/ac**

**916 K ac
60.1 bu/ac**

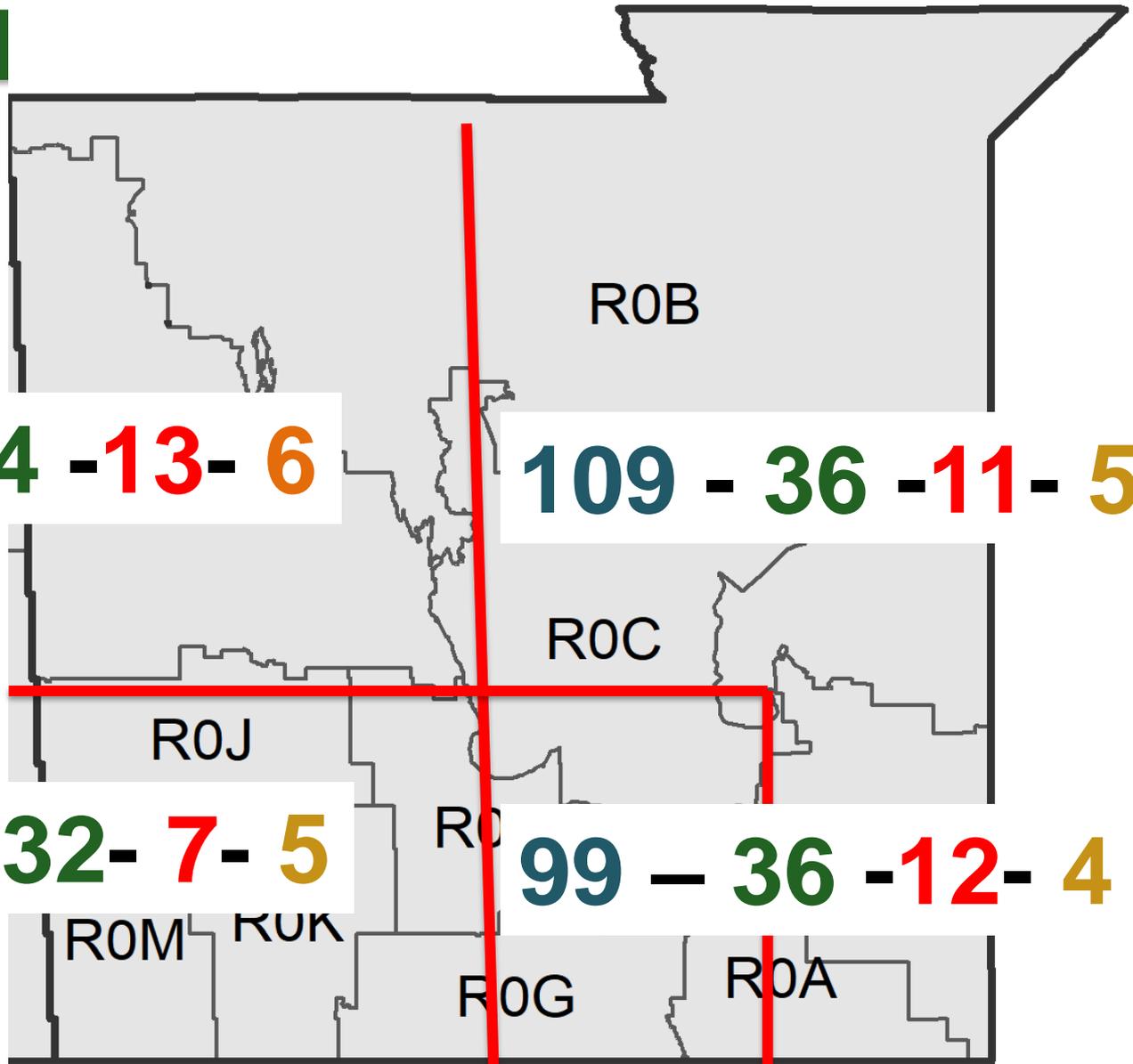
HRS Wheat 2014-17

95 - 34 - 13 - 6

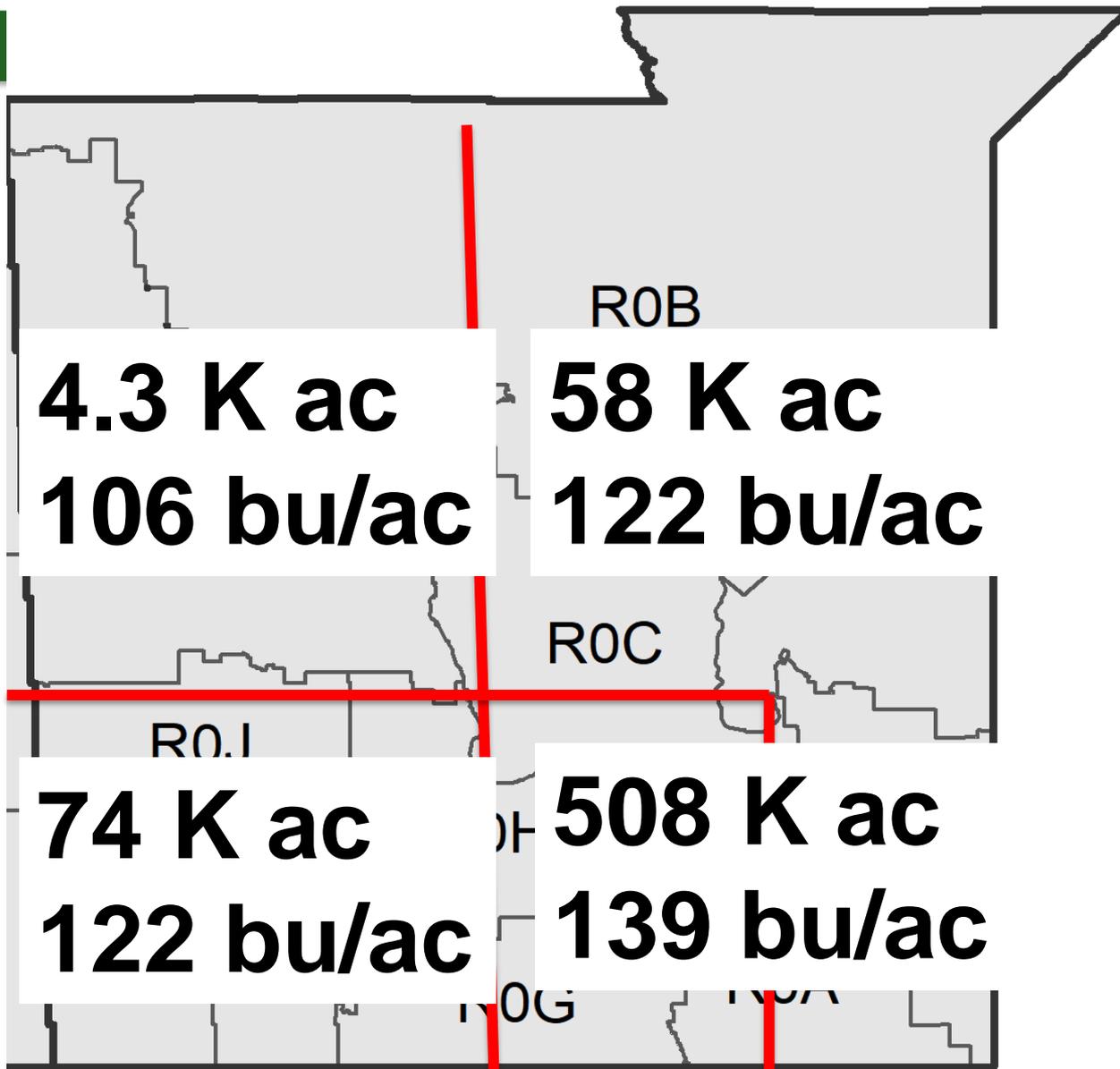
109 - 36 - 11 - 5

88 - 32 - 7 - 5

99 - 36 - 12 - 4



**Corn
2014-17**



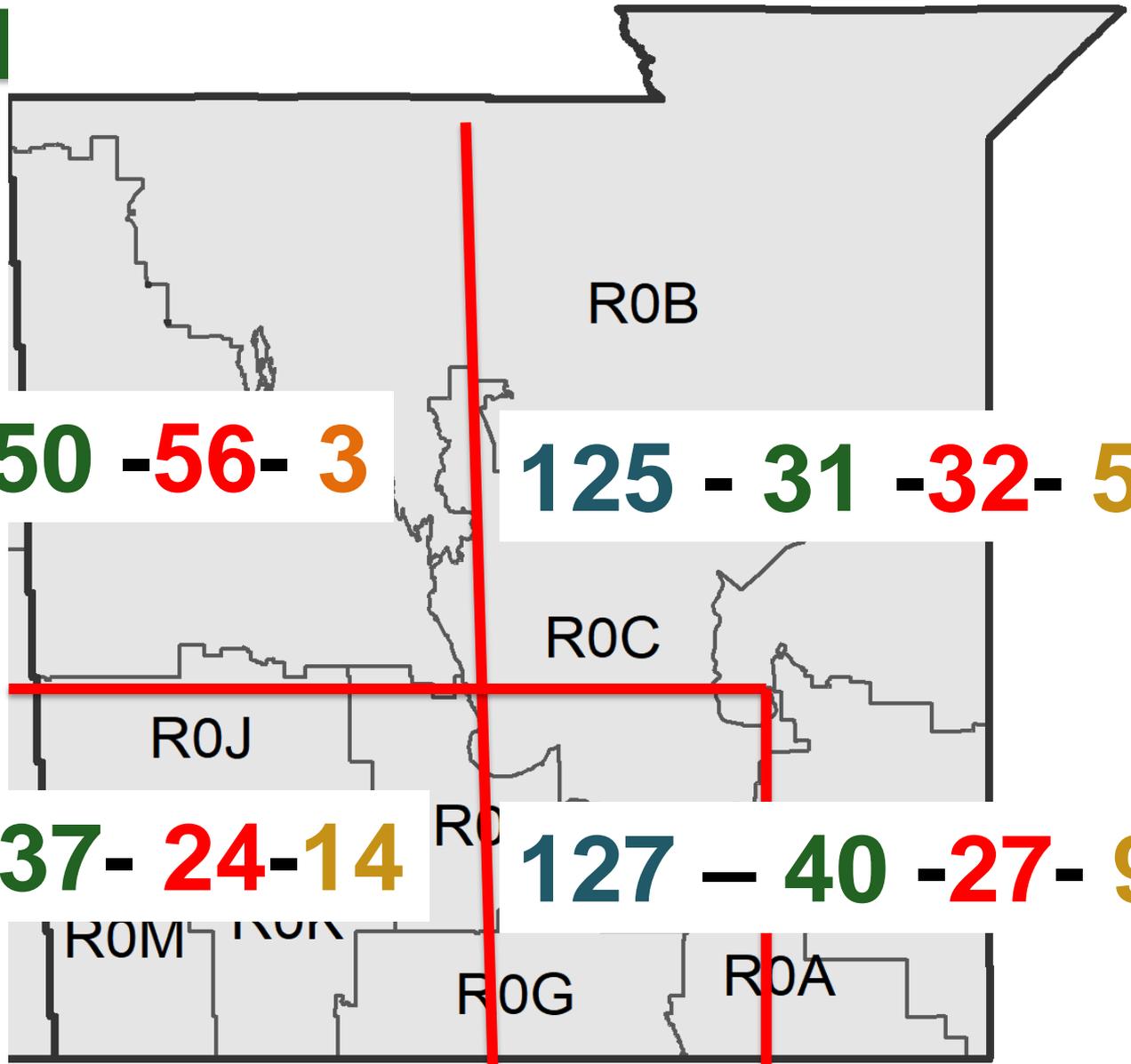
**Corn
2014-17**

130 - 50 - 56 - 3

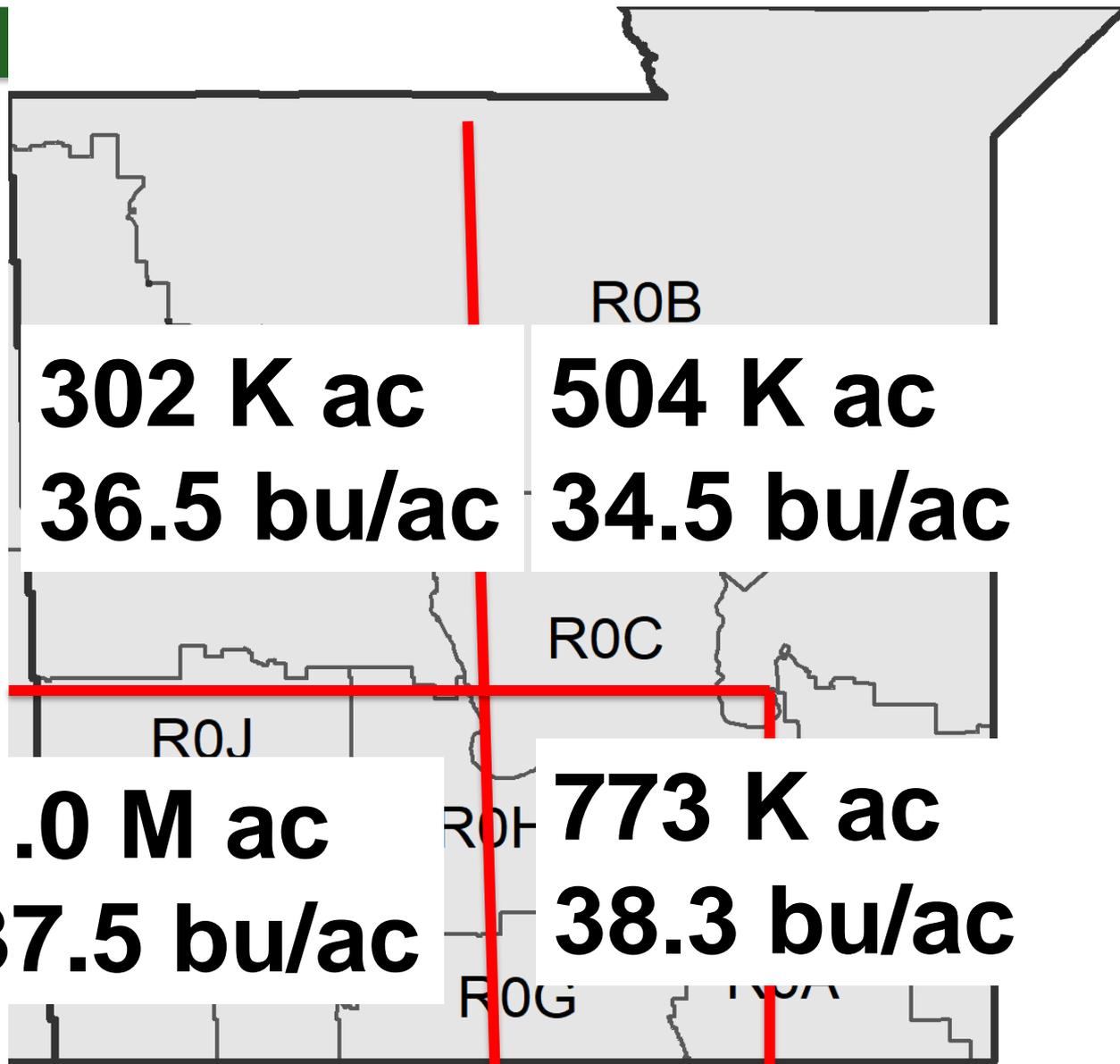
125 - 31 - 32 - 5

126 - 37 - 24 - 14

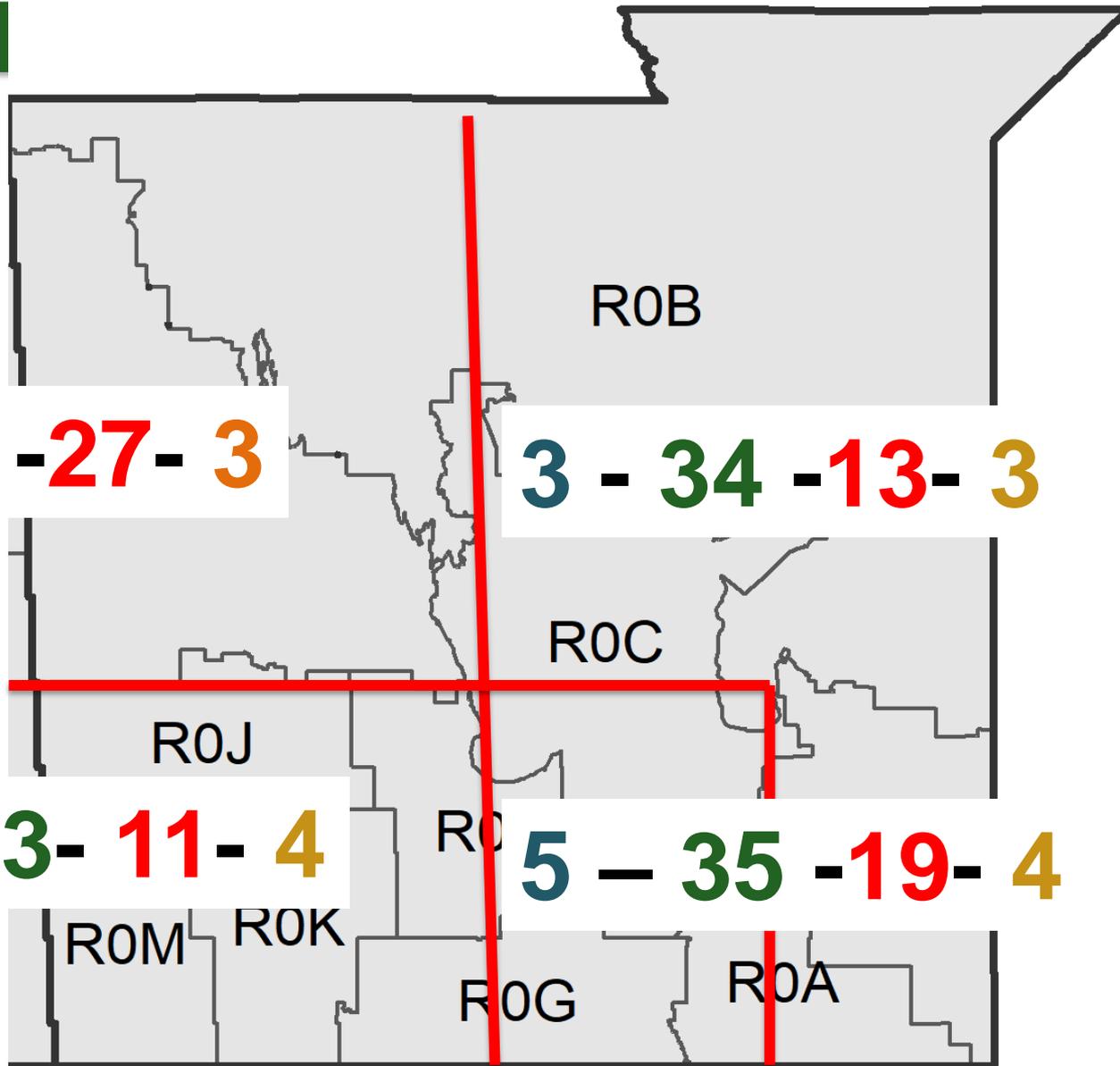
127 - 40 - 27 - 9



Soybeans 2014-17



Soybeans 2014-17



Summary

4R practices being used across Canada

Most Manitoba practices rate very well

- Soil test use
- Banded fertilizer use

Concerns

- Reliance on fall N banding in years such as 2019
- More reliant on seed placement of P and S for canola and cereals than some other provinces
- common fall broadcast placement of nutrients in soybean and corn production