



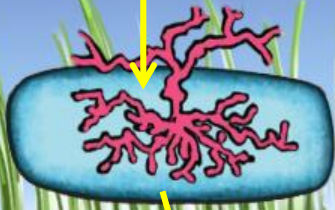
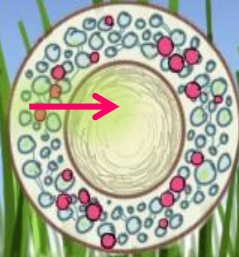
# Forecasting the Quality of AMF Communities

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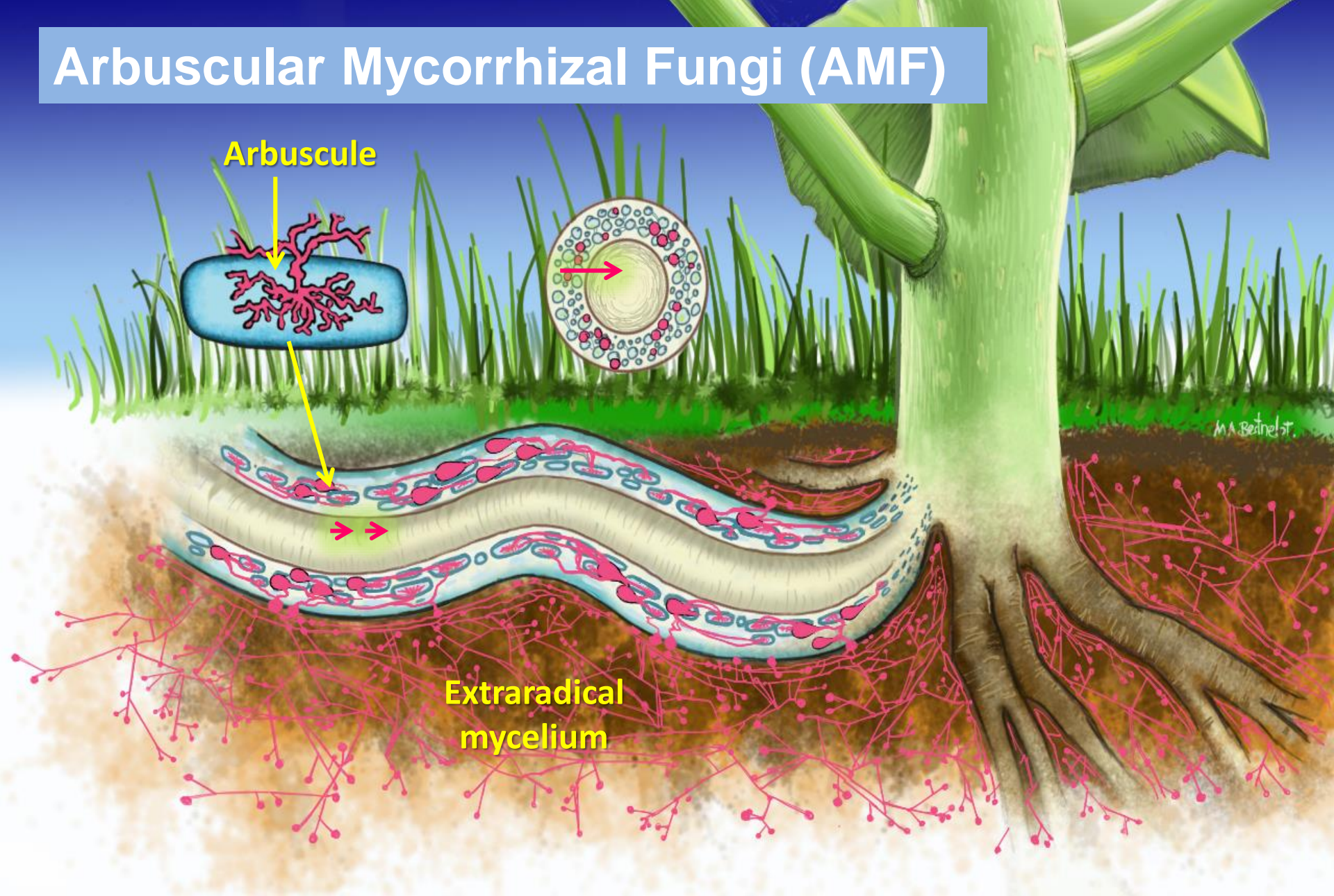
AAFC – Semiarid Prairie Agricultural Research Centre

# Arbuscular Mycorrhizal Fungi (AMF)

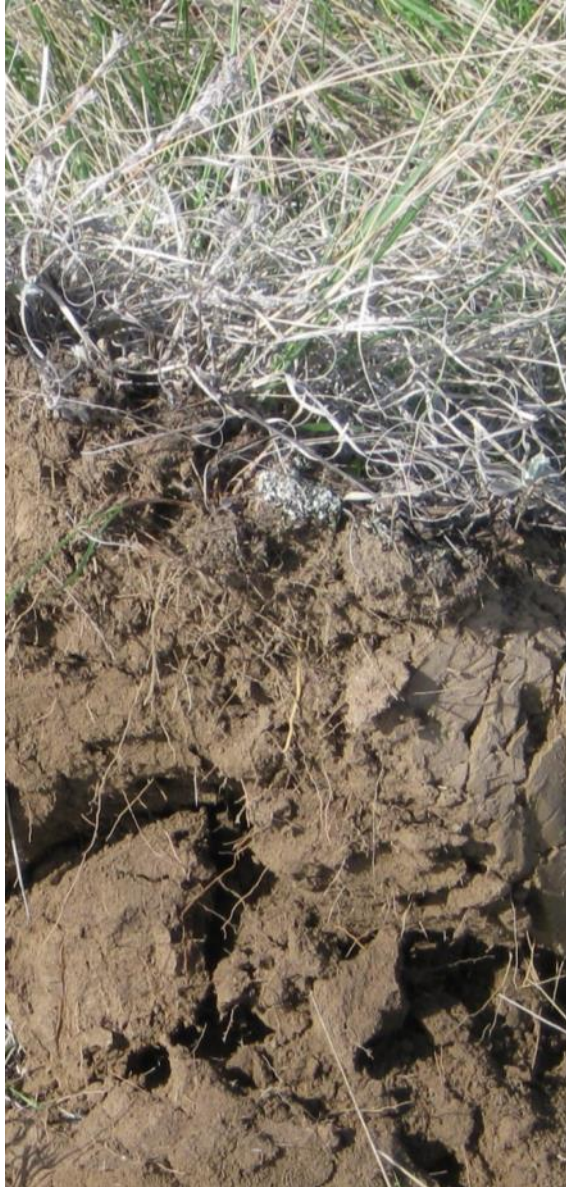
Arbuscule



Extraradical mycelium



# Introduction



- Living organisms can only exist in environmental conditions fulfilling their basic needs.
- The composition of the AMF community may be a reflection of site characteristics.

# Soil Sampling (May 2013)

**Native rangeland**



**Crested wheatgrass**



**Cereal fields**



**Roadsides**



# Soil Sampling Methods



**May 2013**

- Soil cores to depth of 120 cm

0-7.5 cm

7.5-15 cm

15-30 cm

30-60 cm

60-90 cm

90-120 cm



Physical & chemical  
characteristics

0-15 cm

15-30 cm

30-60 cm

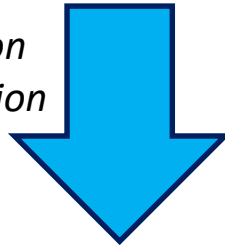


Taxonomic profile of  
AMF  
communities

# Taxonomic Diversity of AMF



*DNA extraction*  
*PCR amplification*

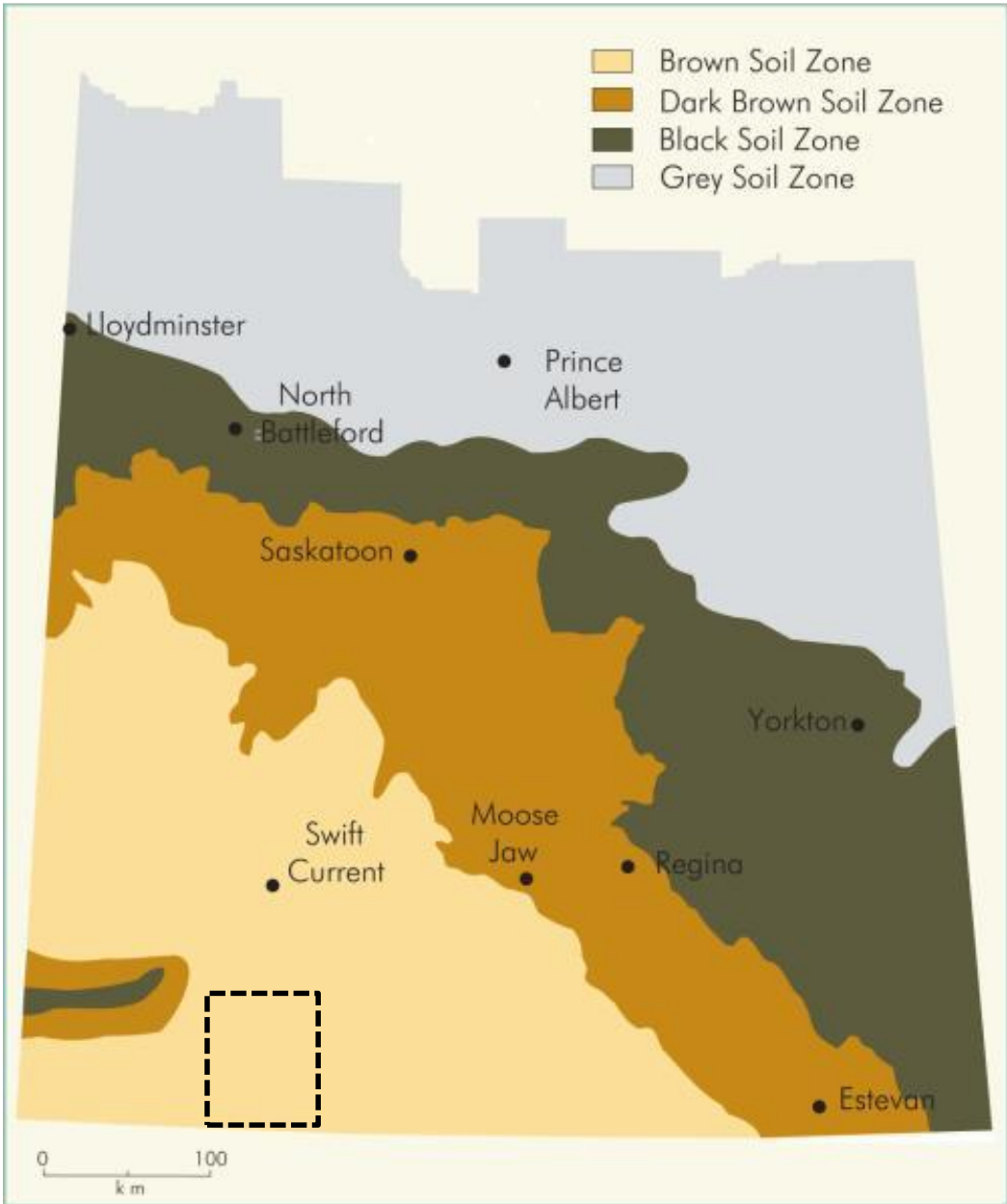


**454 sequencing**

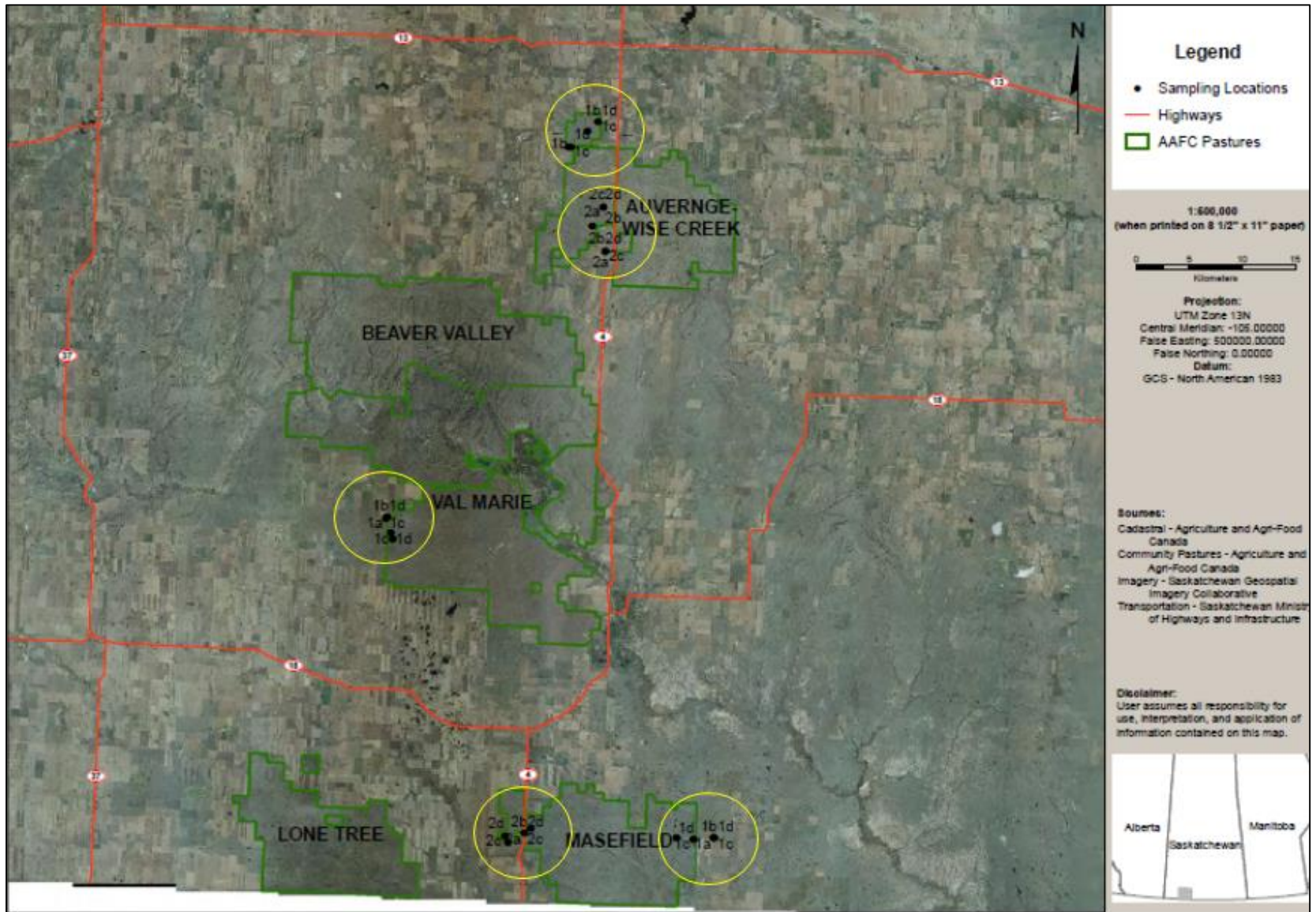


**AMF**  
18S rRNA gene

# Sampling Location:



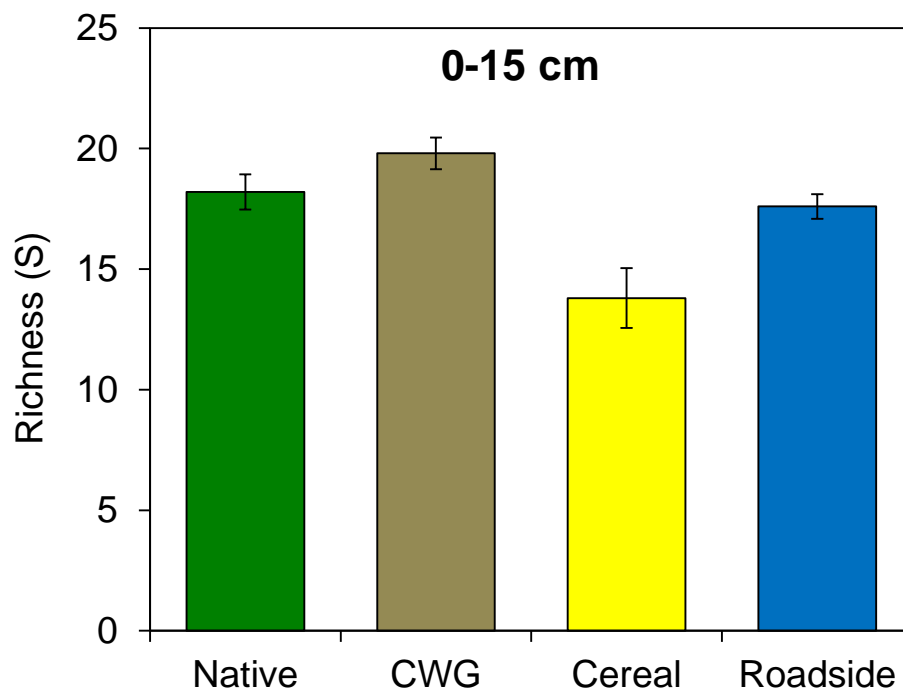
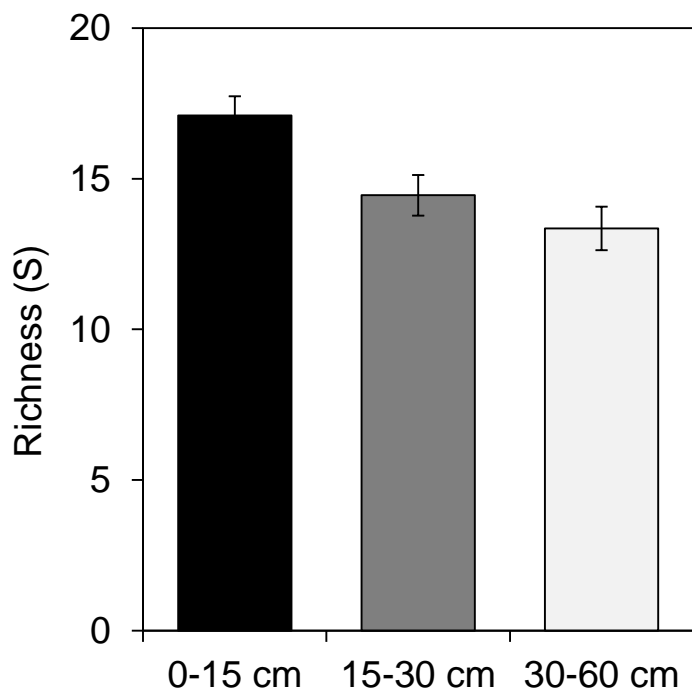
# Sampling Location:





# Taxonomic Diversity of Arbuscular Mycorrhizal Fungi (May)

Factor	<i>df</i>	Community composition	Richness ( <i>S</i> )	Shannon's ( <i>H'</i> )	Simpson's ( <i>D</i> )	Evenness ( <i>E</i> )
Depth	2	< <b>0.001</b>	< <b>0.001</b>	< <b>0.001</b>	< <b>0.001</b>	< <b>0.001</b>
Land use (0-15cm)	3	< <b>0.001</b>	< <b>0.001</b>	< <b>0.001</b>	<b>0.006</b>	<b>0.003</b>
Land use (15-30cm)	3	<b>0.008</b>	<b>0.023</b>	<b>0.013</b>	0.082	0.10
Land use (30-60cm)	3	0.11	<b>0.012</b>	<b>0.018</b>	0.13	0.08

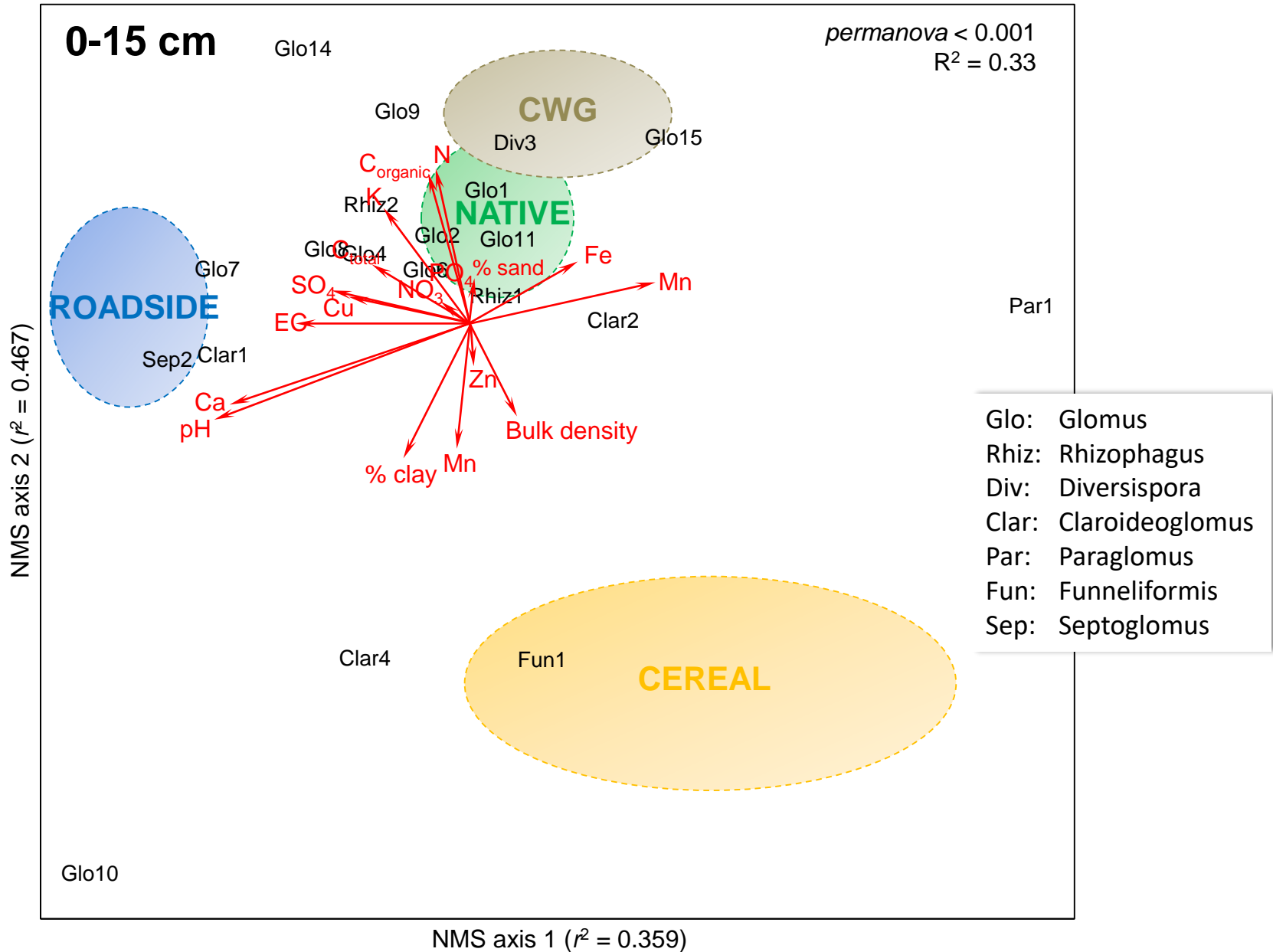


# Results



- Most effects were in the top layers of soil (0-7.5 cm and 7.5-15 cm)

# Taxonomic Diversity of AMF Community vs Soil Environment



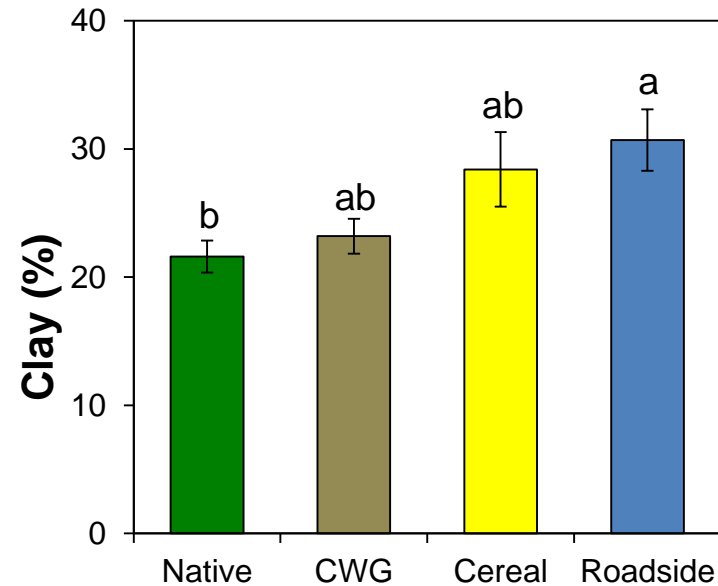
# Results: Soil Properties

## Soil physical properties

0-7.5 cm

Bulk density \*\*\* ↑ Cereal, CWG  
 Sand (%)  
 Silt (%)  
 Clay (%) \*\* ↑ Cereal, Roadside

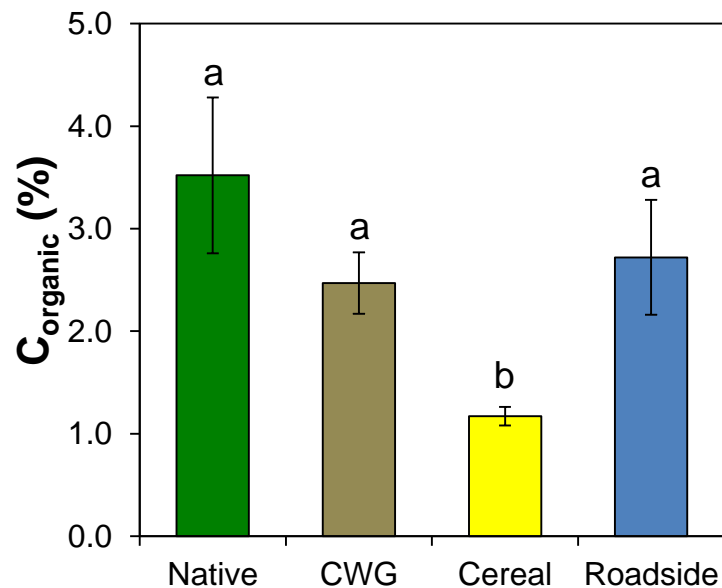
\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$



## Soil chemical properties

0-7.5 cm

pH \*\* ↑ Cereal  
 EC \*\* ↑ Cereal  
 $C_{total}$  \*\* ↓ Cereal  
 $C_{organic}$  \*\*\* ↓ Cereal  
 $C_{organic}/C_{total}$  \*\* ↓ Cereal  
 $N_{total}$  \*\* ↓ Cereal  
 C:N  
 $NO_3$

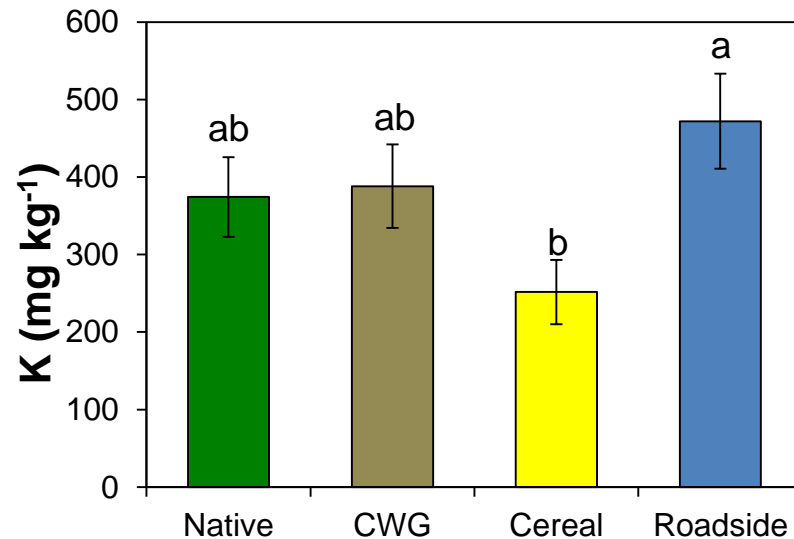


# Results: Soil Properties

## Soil nutrient pools

0-7.5 cm

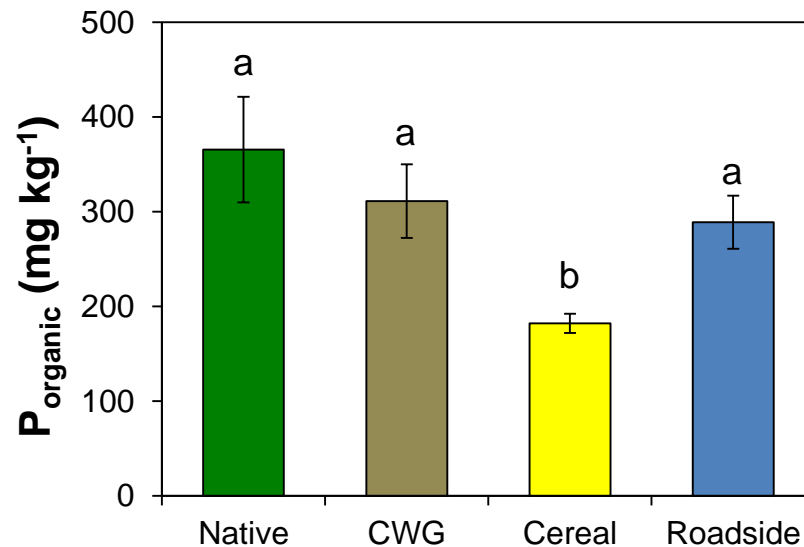
Ca			
Mg			
Fe	*	↓	Cereal
K	*	↓	Cereal
Al	**	↓	Cereal, Roadside
Mn	**	↓	Native
Zn			
Cu	*	↓	Native
SO <sub>4</sub> -S	*	↓	Cereal



## Soil phosphorus pools

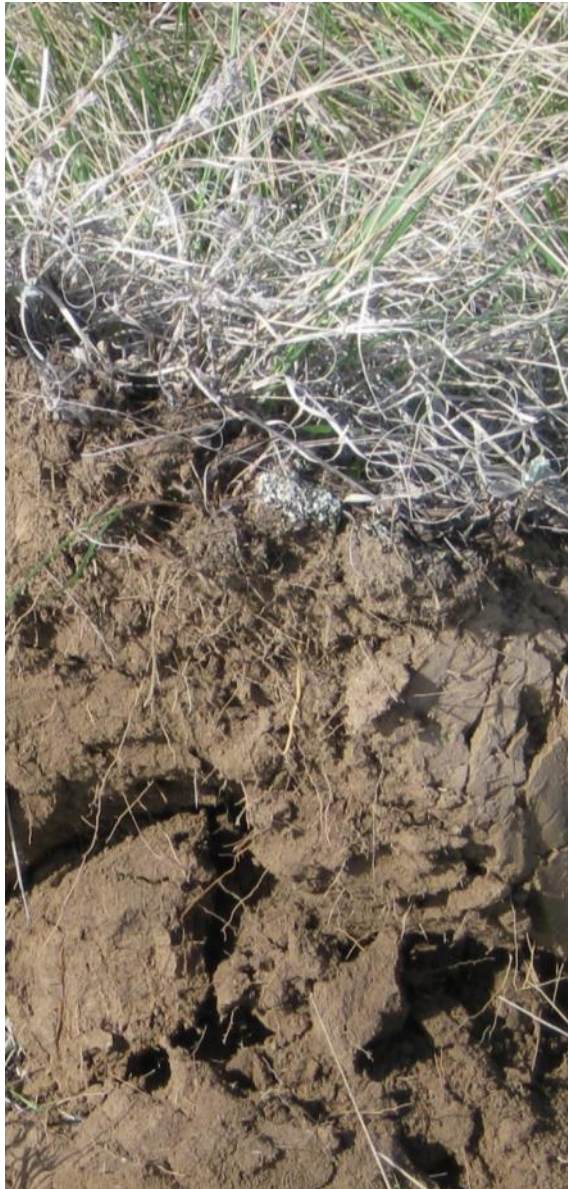
0-7.5 cm

P <sub>total</sub>			
P <sub>organic</sub>	***	↓	Cereal
P <sub>organic</sub> /P <sub>total</sub>	***	↓	Cereal
Olsen P	***	↑	Cereal, Roadside





# Conclusion



- The composition of the AMF community is a reflection of site characteristics and
- may be largely a reflection of soil characteristics.

## Collaborative project

- **Soil Microbiology Group (SPARC)**
- Nutrient Cycling Group (SPARC)
- Plant Ecology Group (SPARC)
- Rangeland Biologists
- Local Producers in SW Saskatchewan
- Community pasture managers



# Thank you

