

# IMPACT OF COVER CROPS AND FERTILIZATION METHODS ON HARVEST YIELDS AND QUALITY OF ORGANIC CARROT IN A MUCK SOIL

September 21, 2016

Caroline Côté, Christine Landry, Richard Hogue,  
Mylène Généreux, Denis La France, and Franck Bosquain



www.  
irda.  
qc.ca

irda  
DES  
RECHERCHES  
TERRE À TERRE



# ORGANIC PRODUCTION IN MUCK SOILS





# INTRODUCTION

- **Microbial communities**
  - Nutrients availability
  - Competition with plant and human pathogens
    - Soil temperature
  - Harvest yields, quality and safety
- **Genomic tools**
- **Evaluate the impact of organic carrot production systems on microorganisms populations and activity, nutrients availability, and crops yields, quality and safety**

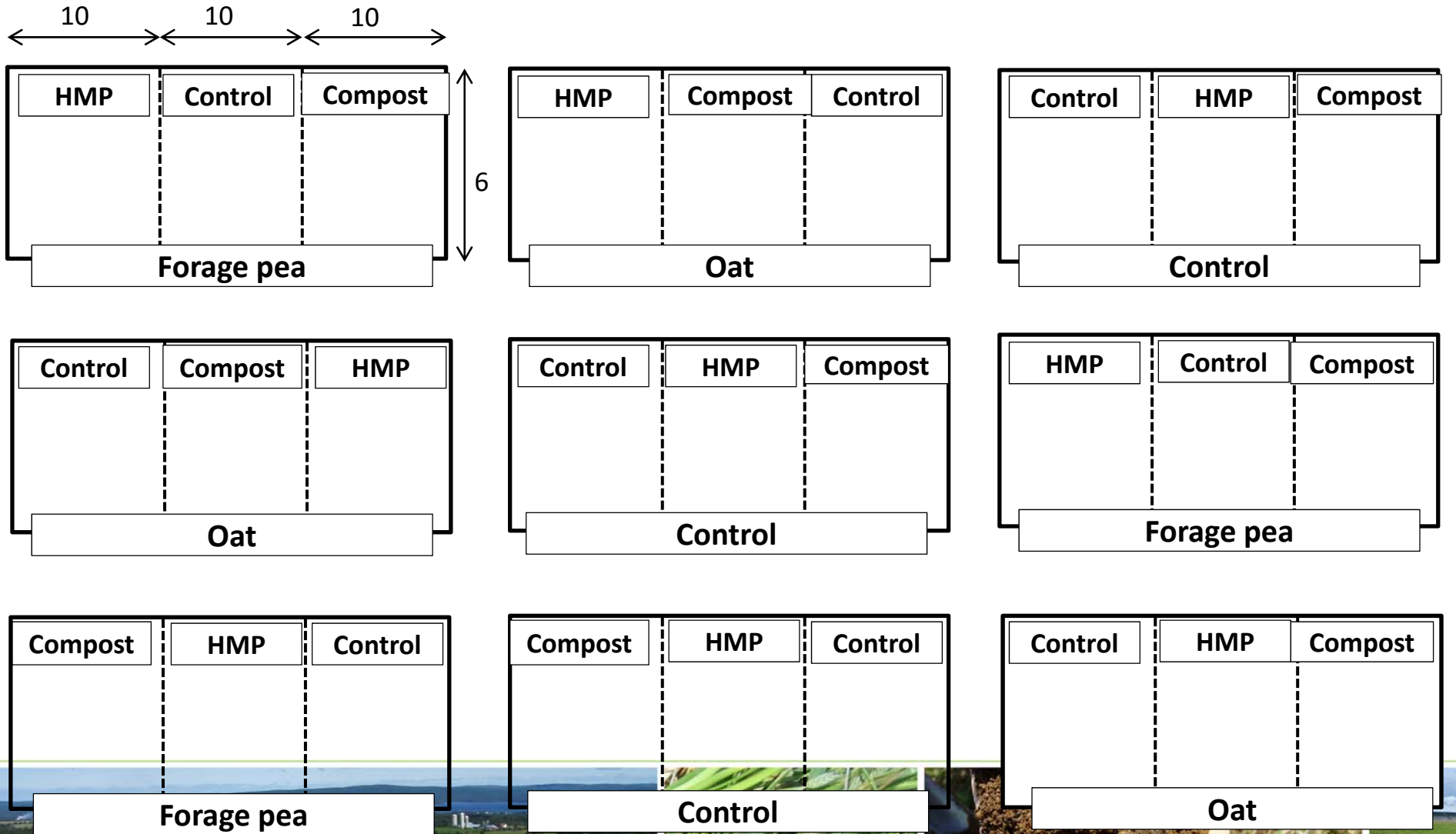


www.  
irda.  
qc.ca

**irda** DES  
RECHERCHES  
TERRE À TERRE



# EXPERIMENTAL DESIGN



HMP: Hen manure pellets



# FIELD WORKS

April

May

June

July

August

September

October

November



Field works



Fertilizers spreading



Irrigation



Carrot seedlings



Harvest



Green manure seedlings



Green manure mowing and incorporation



[www.irda.qc.ca](http://www.irda.qc.ca)

**irda** DES RECHERCHES TERRE À TERRE





# MEASURED VARIABLES



Cover crops  
fertilizers



Jeanne *et al.* presentation

Microbial communities and activity

*Biomass and labile carbon, mineralization power, urease, deshydrogenase, microbial communities*

Landry *et al.* poster



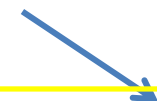
Plant nutrition

*Total and mineral nitrogen, major and minor nutrients*



Yields and quality

*Total and marketable yields, post-harvest losses*



Safety

*E. coli counts, nitrates*

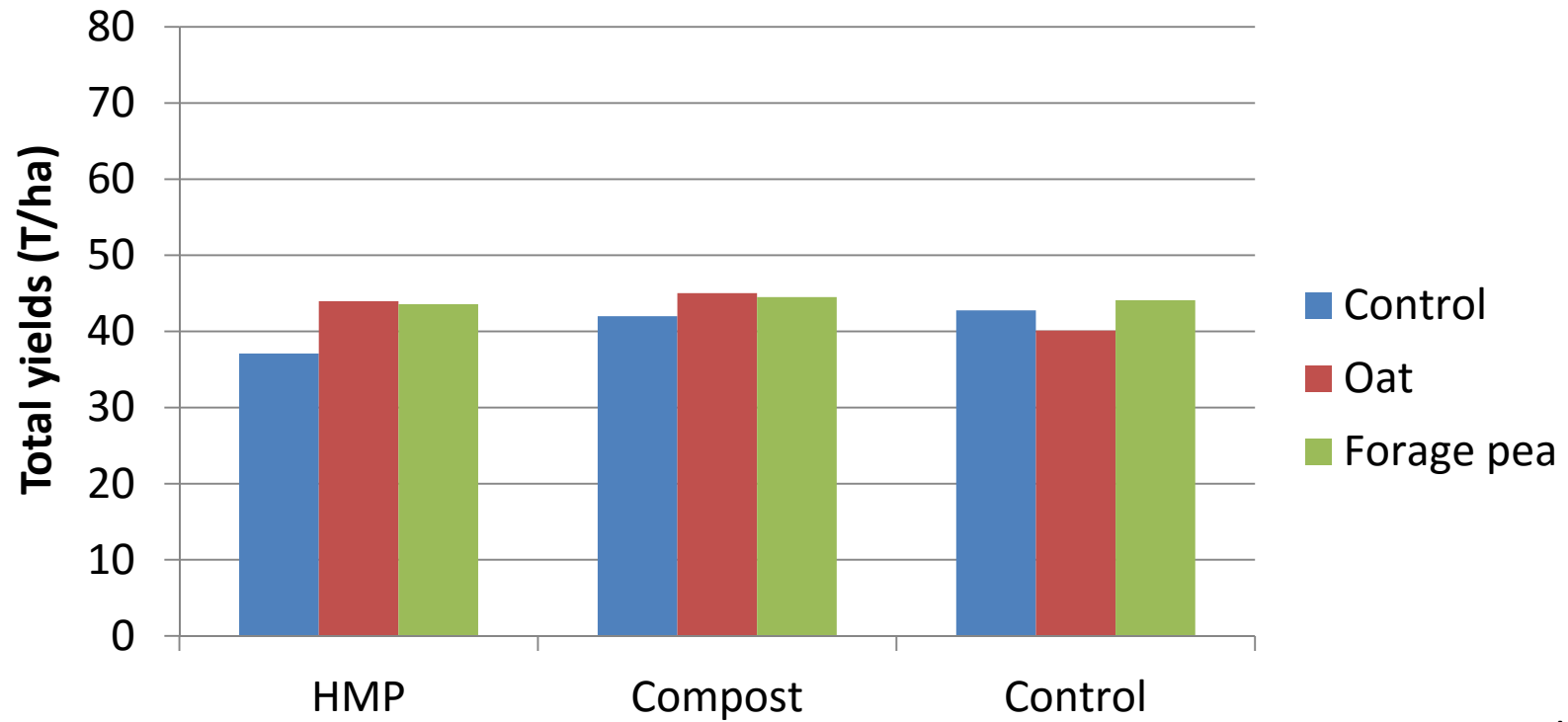


www.irda.qc.ca

irda  
DES RECHERCHES  
TERRE À TERRE



# TOTAL YIELDS – 2015



Stats: PROC mixed (SAS)  
No statistical difference



www.irda.qc.ca

**irda** DES RECHERCHES TERRE À TERRE





# SOIL COMPACTION



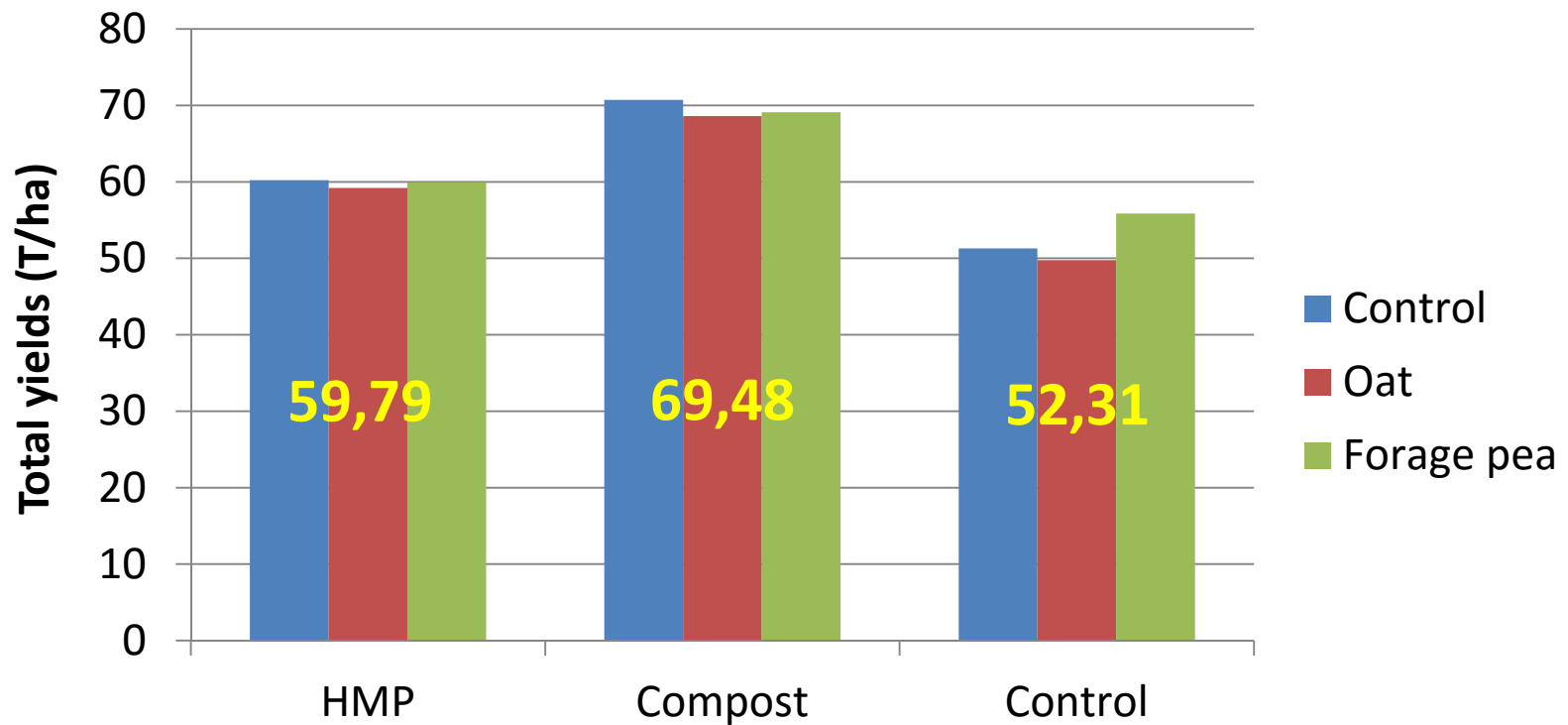
www.  
irda.  
qc.ca

**irda** DES  
RECHERCHES  
TERRE À TERRE





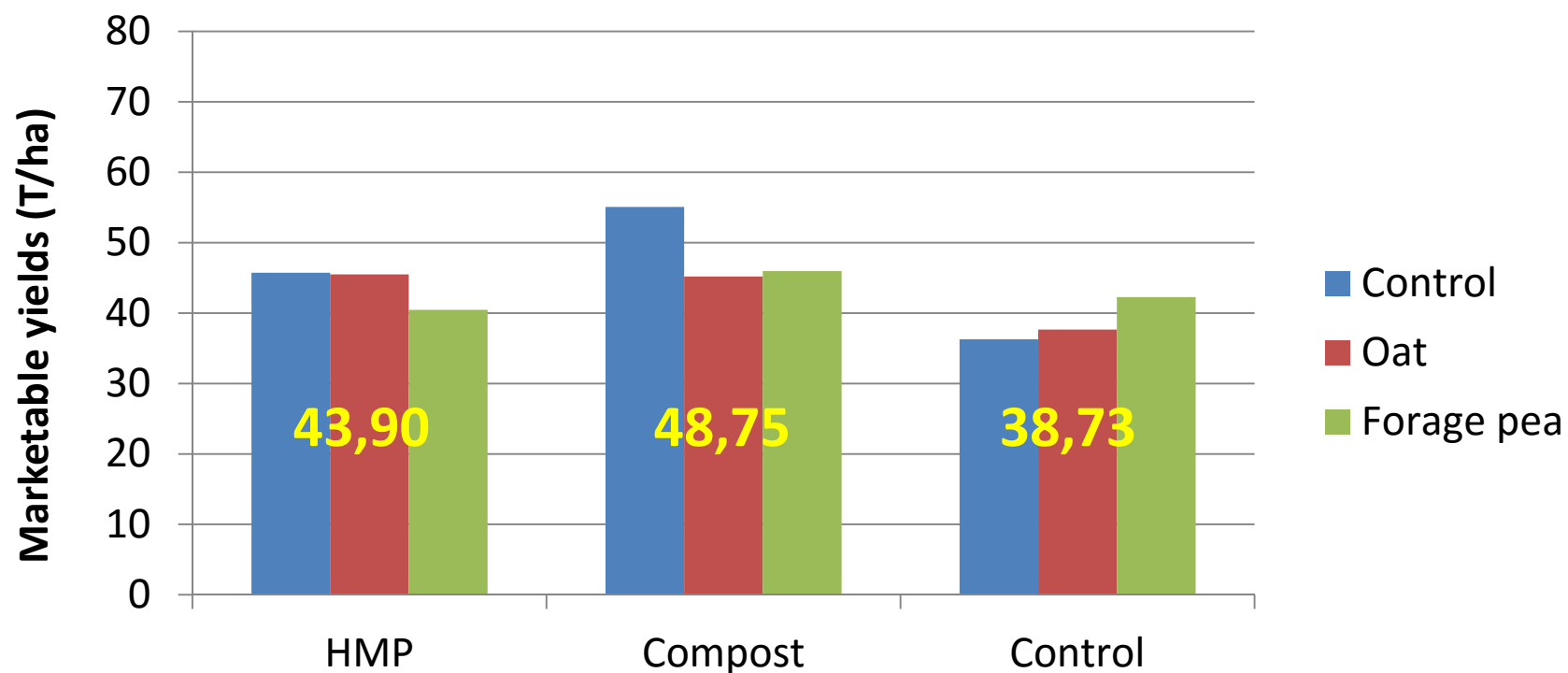
# TOTAL YIELDS – 2016



Stats: PROC mixed (SAS)  
Fertilizer: P < 0,001



# MARKETABLE YIELDS - 2016



Stats: PROC mixed (SAS)  
Fertilizer: P < 0,001



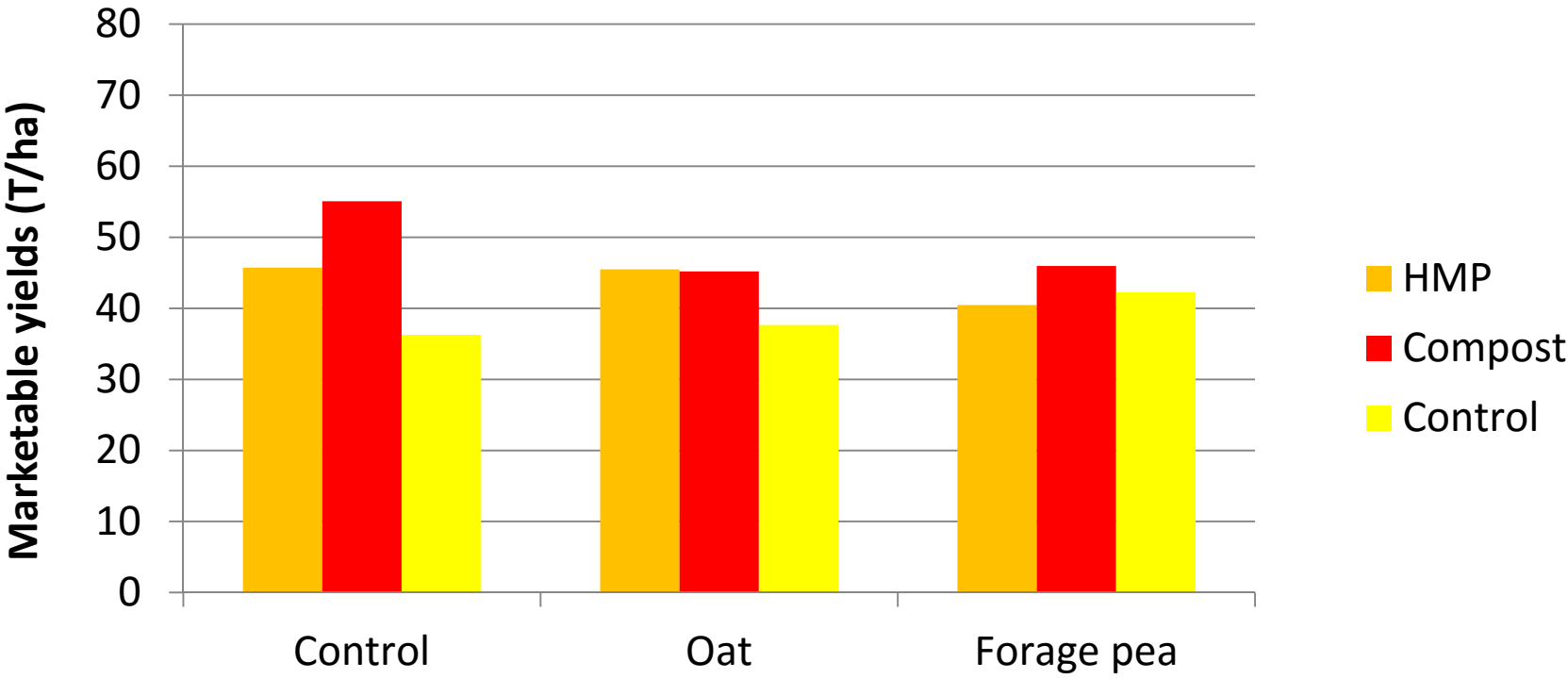
www.irda.qc.ca

**irda** DES RECHERCHES TERRE À TERRE





# MARKETABLE YIELDS - 2016



Stats: PROC mixed (SAS)

Fertilizer: P < 0,001

Cover crop x fertilizer : P = 0,006



# *E. COLI* COUNTS

- Irrigation water
  - 1900 CFU/100 mL
  - 4111 CFU/100 mL
- Soil
  - Low prevalence
    - 0 – 6 positive samples
  - No link with treatments
- Carrots
  - 2015: 4/27 (10 CFU/g)
  - 2016: 0/27
- Nitrate



www.  
irda.  
qc.ca

**irda** DES  
RECHERCHES  
TERRE À TERRE





# CONCLUSION

- Crop rotation
- Long term effects



# ACKNOWLEDGMENTS

The Organic Science Cluster II is supported by over 65 organic sector partners, and by the *AgrilInnovation* program of Agriculture and Agri-Food Canada's *Growing Forward* and *Growing Forward 2* policy frameworks



- IRDA

- Julie Mainguy, Mylène Marchand-Roy, Kathie Roseberry, Annie Fortin, Luc Belzile, Alicia Patry, Mylène Dandurand, Mélissa Paradis, Robert Boivin, Rosaire Boivin, Éric Ducharme, Rémi Ducharme, and Maurice Talisse

- Phytodata

- Mylène Fyfe, Stéphanie Sanchez, Mahmoud Ramadan et Amadou Sidibe

- Students

- Marc-Antoine Amos, Charles Béland, Jasmine Boissé, Alexandre Chamberland, Élodie Larouche, Éliane Latour, Maxime Richard, Xavier Villeneuve-Desjardins





Engrais de ferme	Apport (T ha <sup>-1</sup> )	N <sub>total</sub>	K <sub>total</sub>	N <sub>dispo</sub>	K <sub>dispo</sub>
		(kg ha <sup>-1</sup> )			
<i>Printemps 2015</i>					
Compost	36	177	190	44	190
Fientes granulées	0,95	44	15	31	15
<i>Printemps 2016</i>					
Compost	34	161	214	40	214
Fientes granulées	1,3	61	27	40	27



www.irda.qc.ca

**irda** DES RECHERCHES TERRE À TERRE

