



# Potential for cover crops in Northern Ireland

**Shay Phelan**  
**Teagasc Crops Specialist**  
*Oak Park*  
*Carlow*

# What Name

## ◆ Various names used

- ▶ Cover crops – cover the ground
- ▶ Catch crops – ‘catch’ nutrients preventing them from being lost
- ▶ Green manures – improve soil characteristics or benefit succeeding crop

## ◆ Any species or mixture of species can be used

- ▶ selection may be restricted within some schemes

## ◆ Most work at Oak Park (and abroad) on single species

- ▶ Limited information on benefit of mixtures over single species
- ▶ Legume/non-legume mixtures have been investigated

# Various different uses

- Nutrient capturing
- Soil enhancing
- Pest control
- Weed suppression
- Green manures
- Animal grazing



**Know what you want**

# Options

## Grass/cereals

- ▶ Risk of pest/disease carryover
- ▶ Some can have negative effect on succeeding crop (e.g. rye)
- ▶ Risk of weed problems in succeeding crop
- ▶ Some possibly less suitable for reduced tillage
- ▶ Potential source of forage

## Brassicas

- ▶ Fast growing and relatively cheap
- ▶ Limited disease/pest risk for cereals (if no volunteers)
- ▶ Can reduce pests, diseases and weeds
- ▶ Can host sclerotinia
- ▶ Can be tall – difficult to plough without chopping

# Options

## Phacelia

- ▶ Relatively expensive seed
- ▶ Small seed - difficult to broadcast
- ▶ Establishment requires cultivation
- ▶ Different family to crops – good disease break
- ▶ Generally good weed suppression
- ▶ Can be easier to incorporate than brassicas

## Legumes

- ▶ Potential to fix nitrogen and reduce fertiliser requirement
- ▶ Seed can be expensive
- ▶ Good from disease/pest risk
- ▶ Can be poor for N leaching

# Establishment

- Earlier the better
- Keep costs down  
– no ploughing
- Roll to ensure  
better germination
- No fert. needed



# GLAS

## List of Prescribed Catch Crops

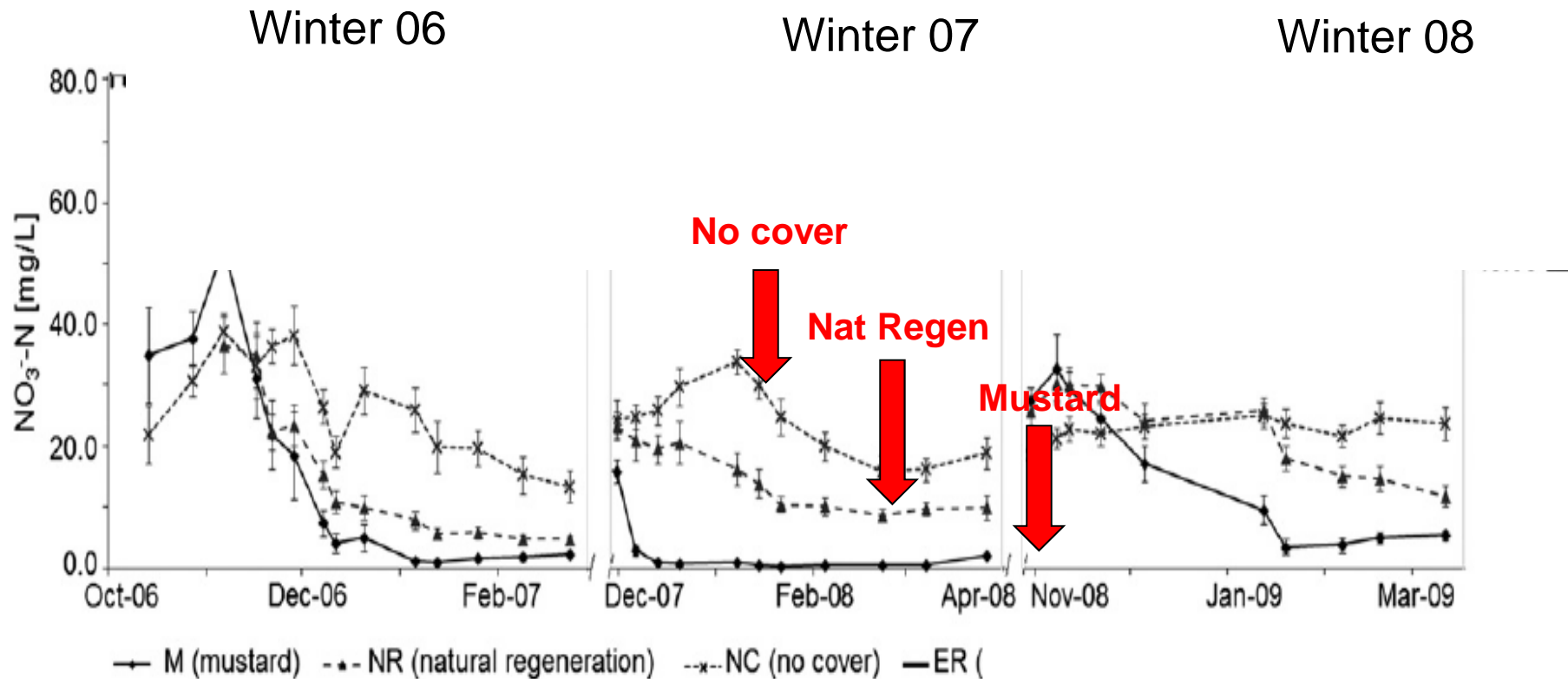
SPECIES	SEED RATE KG/HA	SPECIES	SEED RATE KG/HA
Buckwheat	35 – 50	Rye	70 – 90
<b>Crimson Clover</b>	10 – 15	Tillage Radish	5
<b>Berseem Clover</b>	10 – 15	<b>Vetch</b>	12
Forage/Fodder Rape	3 – 5	Leafy Turnip	5
Mustard	15 – 20	<b>Peas</b>	30
Oats (& Black Oats)	75 – 100	<b>Beans</b>	100 – 120
Phacelia	5 – 10		

# Potential benefits

- ◆ Reduction of nutrient loss (mainly nitrate)
- ◆ Reduction of pests, diseases, weeds
- ◆ Prevention of erosion
- ◆ Improvement of organic matter
- ◆ Improvement of soil structure
- ◆ Increased nutrient supply to next crop
- ◆ Potential to reduce fertiliser inputs
- ◆ Source of forage
- ◆ Yield benefits



# Cover crops or natural regeneration can substantially reduce nitrate leaching on leaching prone soils



Premrov *et al.* 2014

# Effects on pests, disease and weeds

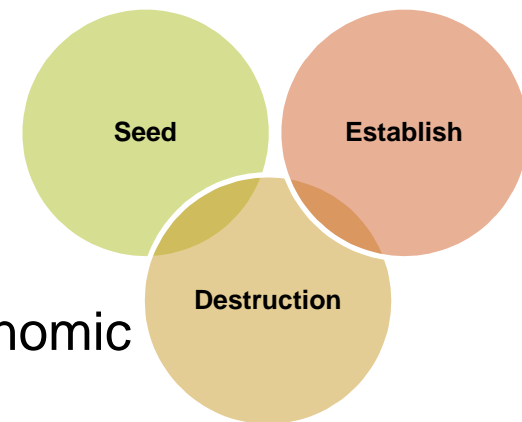
- ◆ Can have variable effects
  
- ◆ If cover crop is a host of the disease it can carry disease
  - ▶ Rhyncho
  - ▶ Mildew
  - ▶ Aphids (BYDV)
  - ▶ Take-all
  
- ◆ Weed effects generally related to fast growth and height
  
- ◆ Pest/disease reducing effects can be variable
  - ▶ Can be variety dependent eg nematode reducing varieties of radish

# Improvement of organic matter/soil structure

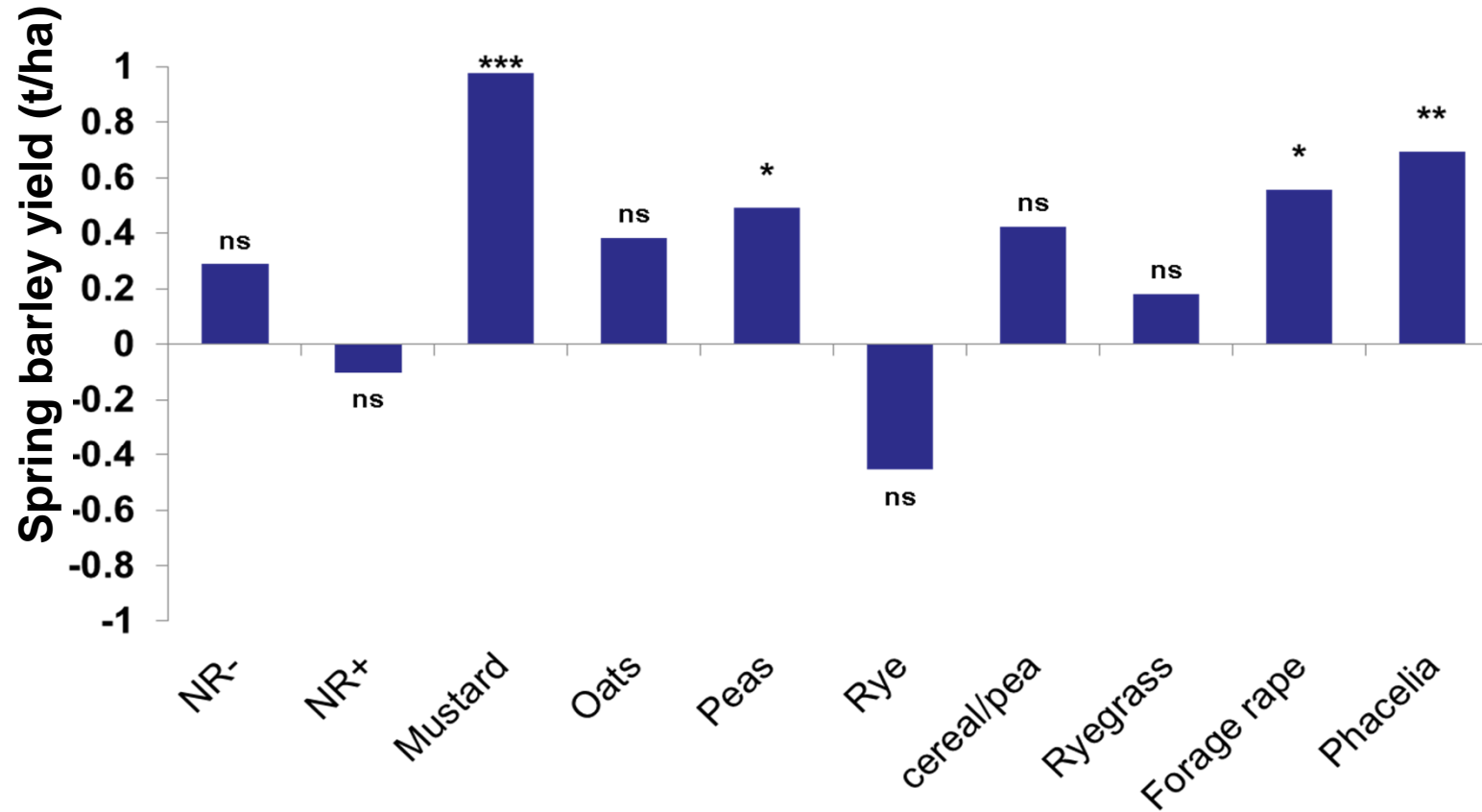
- ◆ Effects on total organic matter will be small
  - ▶ 3 t/ha DM input ~ 0.01-0.02 % increase in organic matter
- ◆ Effects on fractions of organic matter may be greater
  - ▶ Can have positive biological effects
- ◆ Effects will be governed by inputs
- ◆ Reduce effect of rainfall on soil surface
- ◆ Improve aggregate stability
- ◆ Can affect soil water and temperature

# Potential disadvantages

- ◆ Negative effects on succeeding crop
  - ▶ Allelopathic effect
  - ▶ Carryover of pests/disease/volunteers
- ◆ Cost
  - ▶ Incurs additional cost in the system
  - ▶ Yield benefits are variable and often small
  - ▶ Can be a net cost on the system when economic costs outweigh benefits
  - ▶ Management can help



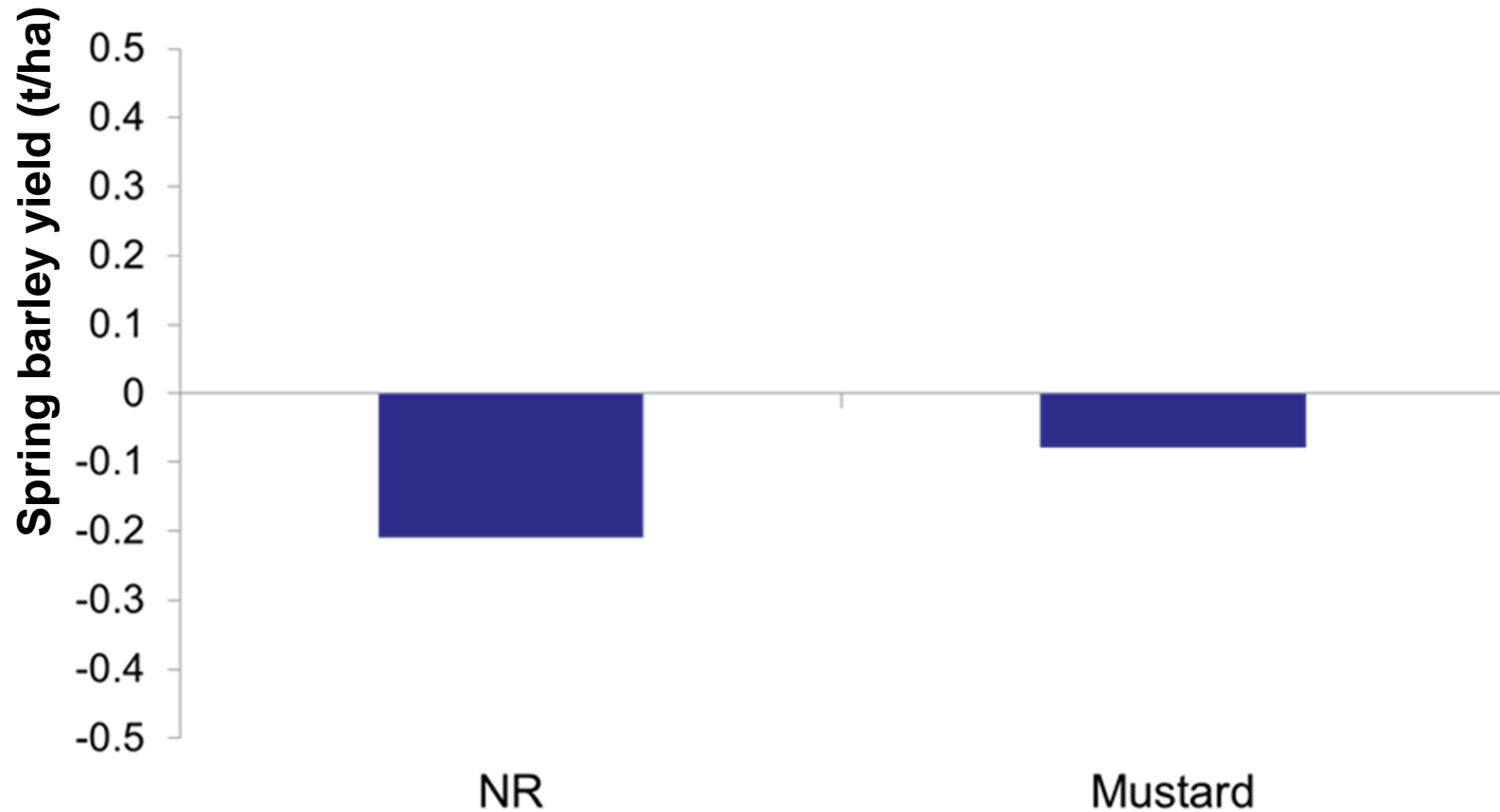
# Effect on yield Expt. A 2004-2006 Light soil (relative to bare stubble)



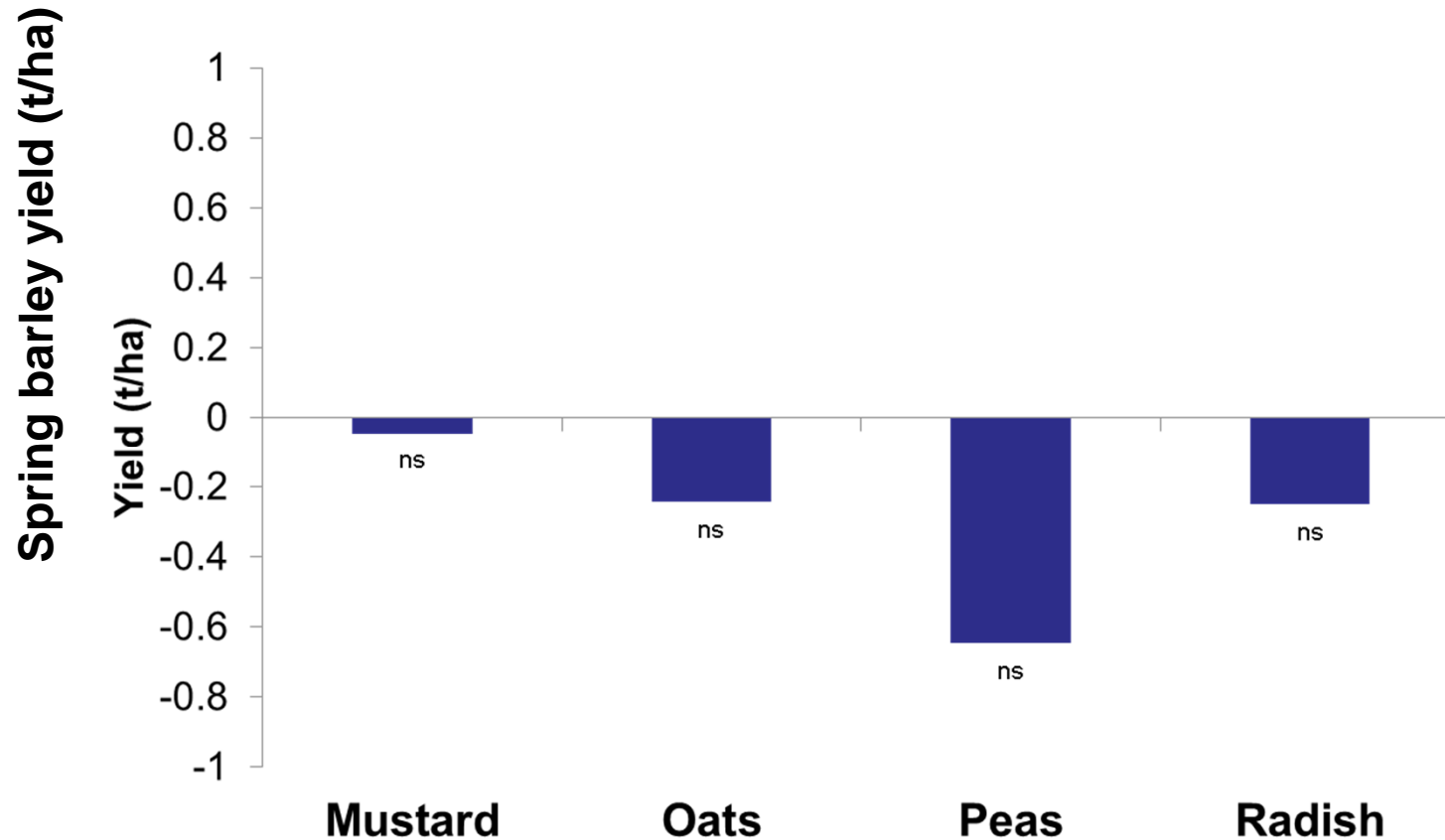
NR - > natural regeneration without stubble cultivation

NR + > natural regeneration with stubble cultivation

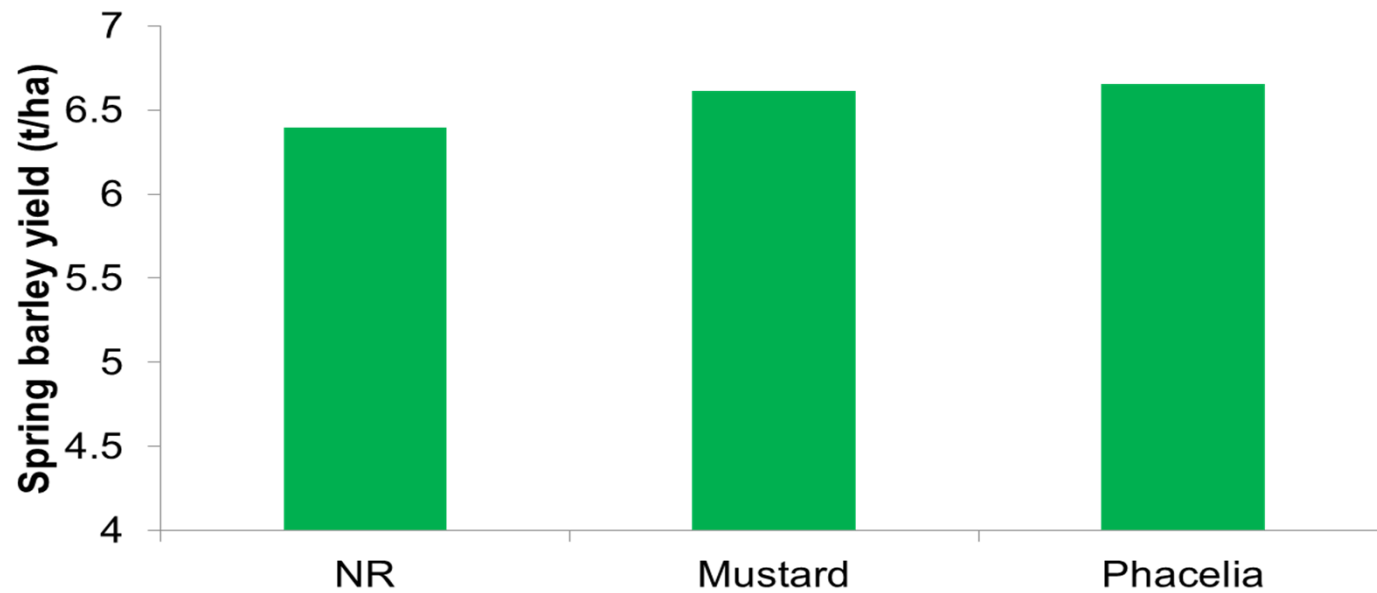
# Effect on yield Expt B 2004-2006 Light soil (relative to bare stubble)



# Effect on yield 2004-2006 Medium soil (relative to bare stubble)

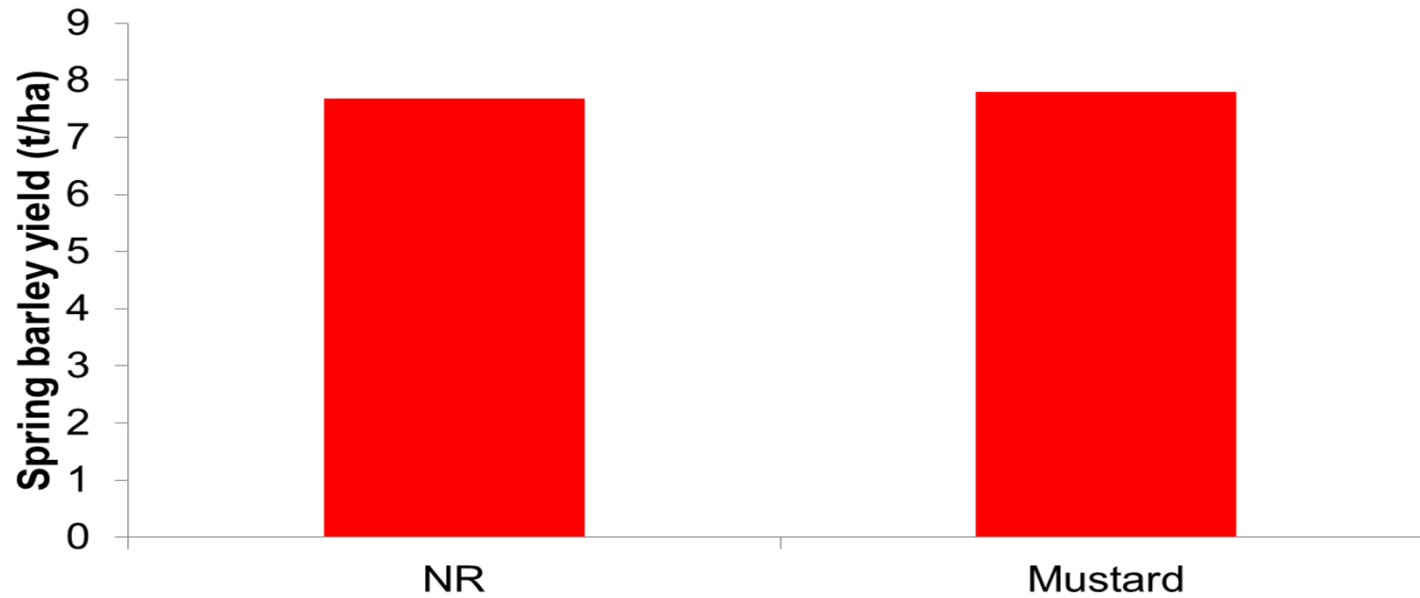


# Small effects of sown species compared to NR (2007)

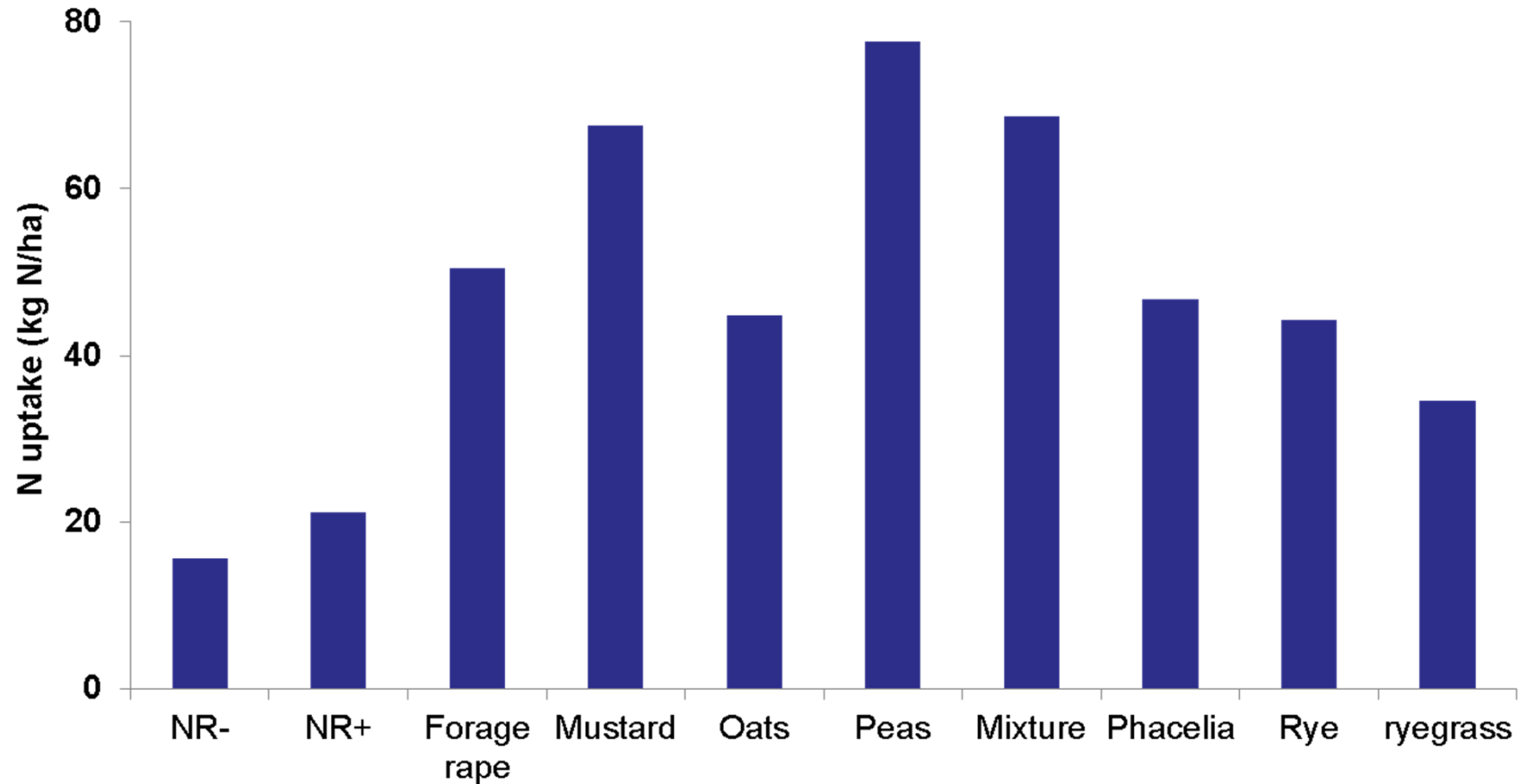




# Small effects of sown species compared to NR (2014)

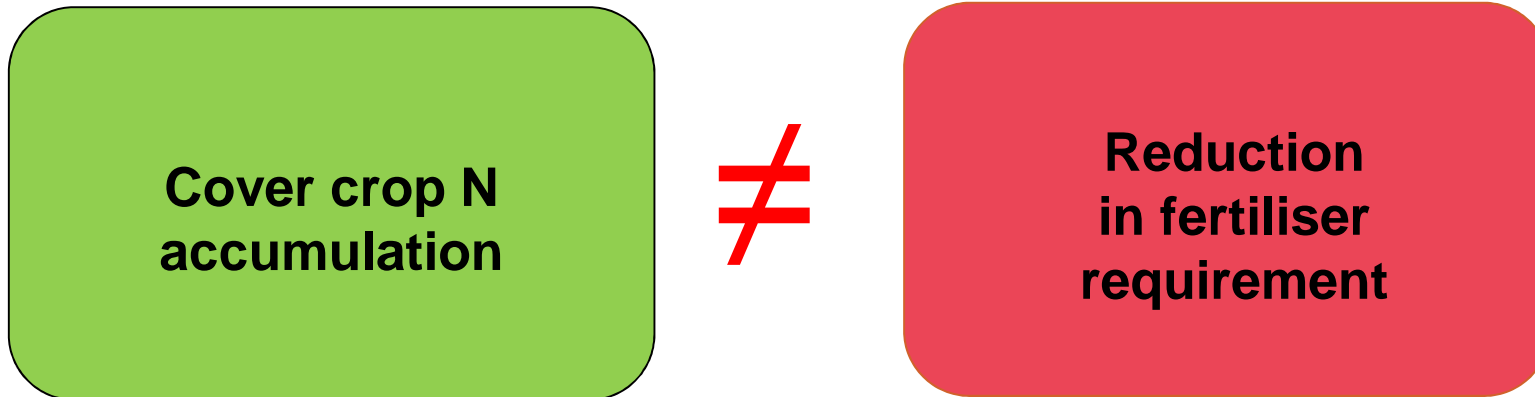


# Cover crops can accumulate large amounts of N but accumulation is very variable



Light soil

# Effect of cover crops on fertiliser N requirement



- ◆ Many factors involved
- ◆ Somewhat comparable to organic manures
- ◆ Variable and difficult to predict

# What to sow ?

## Factors that need to be considered

- ◆ Seed cost
  - ▶ Cost of expensive seed may not be recouped
  
- ◆ Rotation
  - ▶ Avoid crops that will cause problem for succeeding crop
    - ▶ Disease, volunteers, pests
  
- ◆ Method of sowing
  - ▶ Mixtures of big and small seed difficult to broadcast
  
- ◆ Benefits required
  - ▶ Some crops better for soil structure improvement
  - ▶ Some better for positive effect on succeeding crop (e.g. legumes)

# When to sow?

- With spring crop
  - ▶ Undersown grass/clover – not for grassland establishment
  
- Before harvest
  - ▶ Spread into growing crop
  - ▶ Allows early establishment
  - ▶ Can cause harvesting problems
  
- At harvest
  - ▶ Autocast type system
  
- Post harvest
  - ▶ In combination with normal tillage operation (min-till or stubble cultivation)
  - ▶ Additional operation if not using autumn cultivation already
  - ▶ Normally some cultivation + consolidation required

Growth declines with temp  
Early sowing essential  
Late Aug – early Sept

■(n.b. scheme conditions may dictate sowing date)

# Time of sowing effect and compaction



Photos: December 23



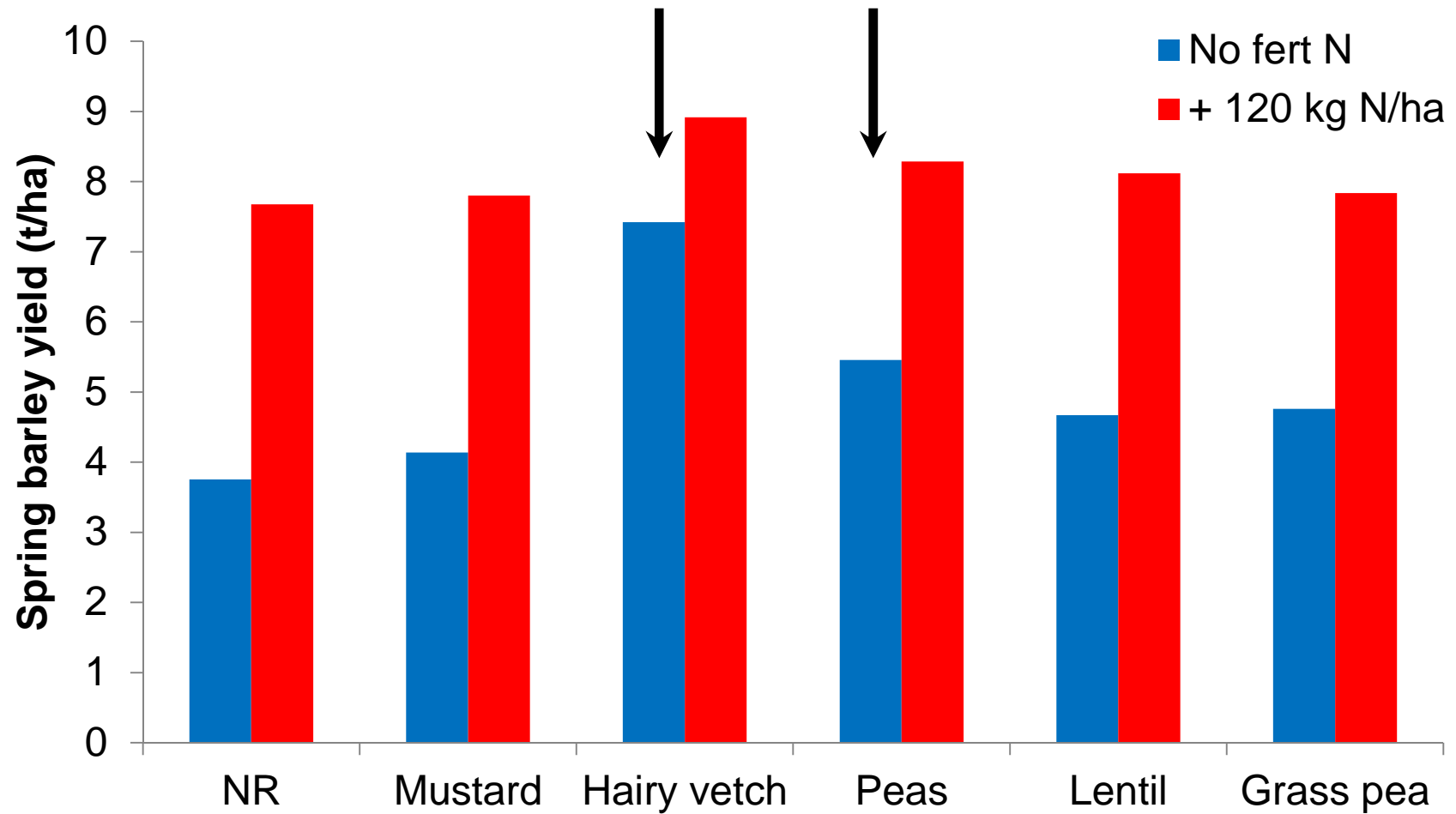
November 2

# Cover growth is dependent on available N



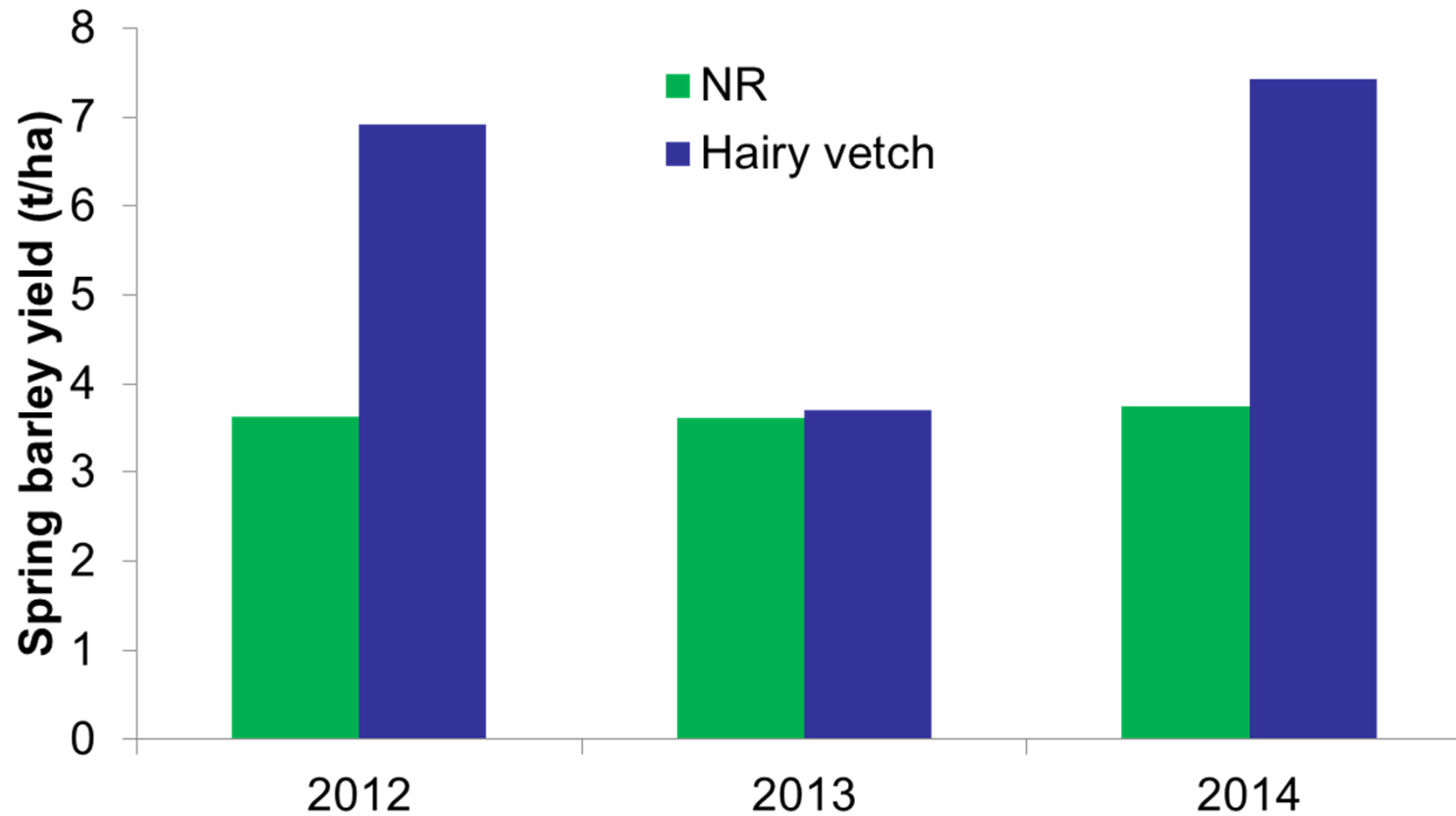
Excessive growth can indicate excessive fertiliser N application to previous crop

# Leguminous cover crops can reduce fertiliser N requirement





# Legume N benefit can vary between seasons



# Conclusions

## Cover crops in Northern Ireland?

- ◆ Have positive environmental effects
  - ▶ Reduced N leaching (where leaching is a problem)
- ◆ Can improve soil structure/soil 'quality'
- ◆ Can increase or decrease pests and diseases
- ◆ Effects on yield variable
- ◆ Effects on N requirement small (exception of legumes)
- ◆ Covers invoke additional costs (seed, sowing, destruction)
- ◆ Economic benefits can be small in the absence of financial incentive
  - ▶ Dependent on management, crop choice and year

# Thank You

## Acknowledgements;

Dr. Richie Hackett, Dr. Karl Richards, Dr. Owen Fenton