Potential for cover crops in Northern Ireland

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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

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Various different uses

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

Know what you want

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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

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GLAS

List of Prescribed Catch Crops

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

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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

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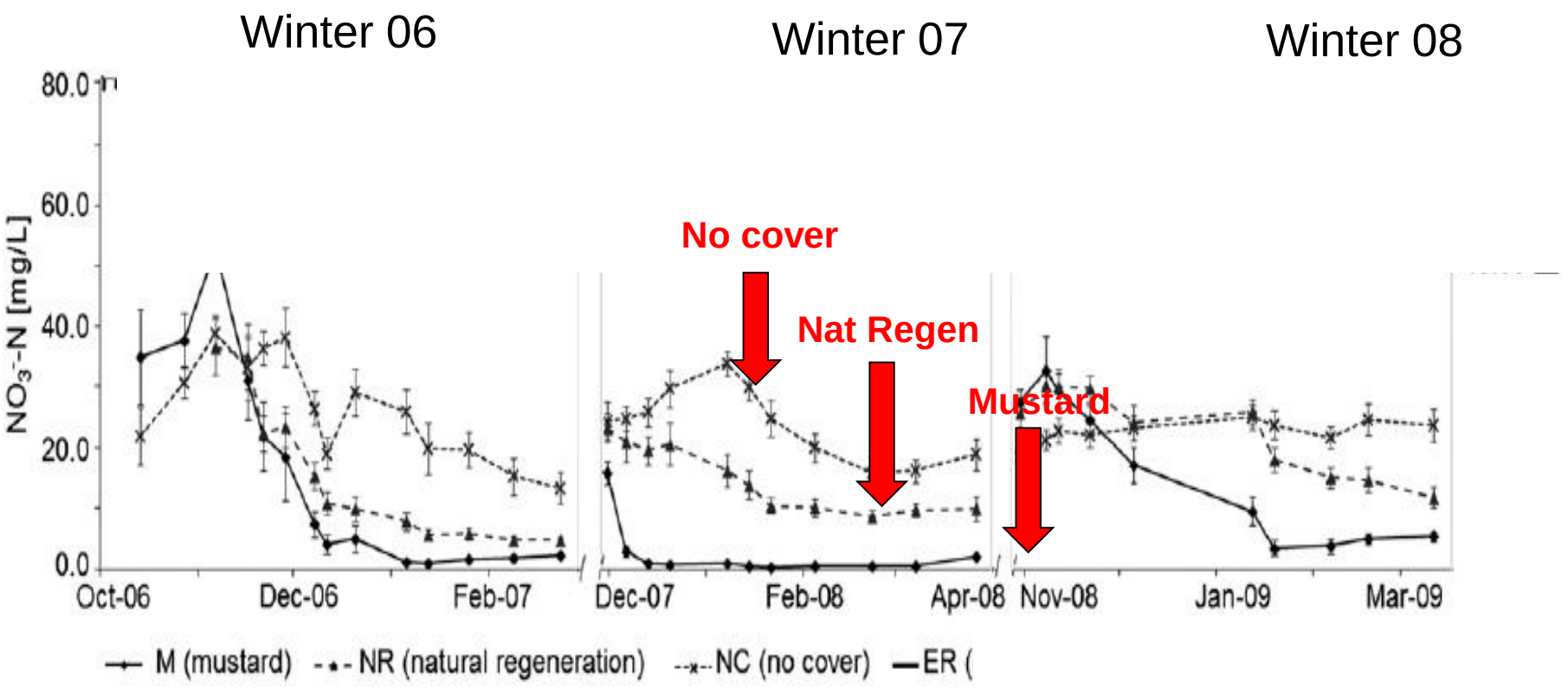
Cover crops or natural regeneration can substantially reduce nitrate leaching on leaching prone soils



Premrov *et al.* 2014

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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

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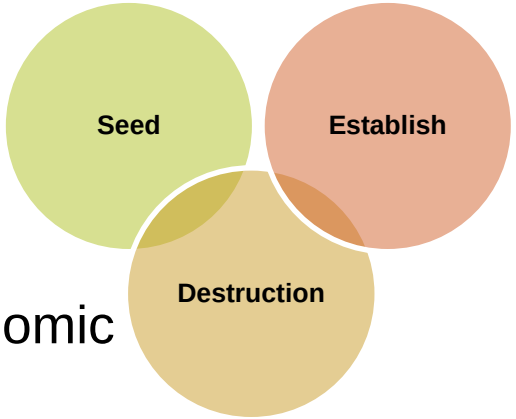
Potential disadvantages

- 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



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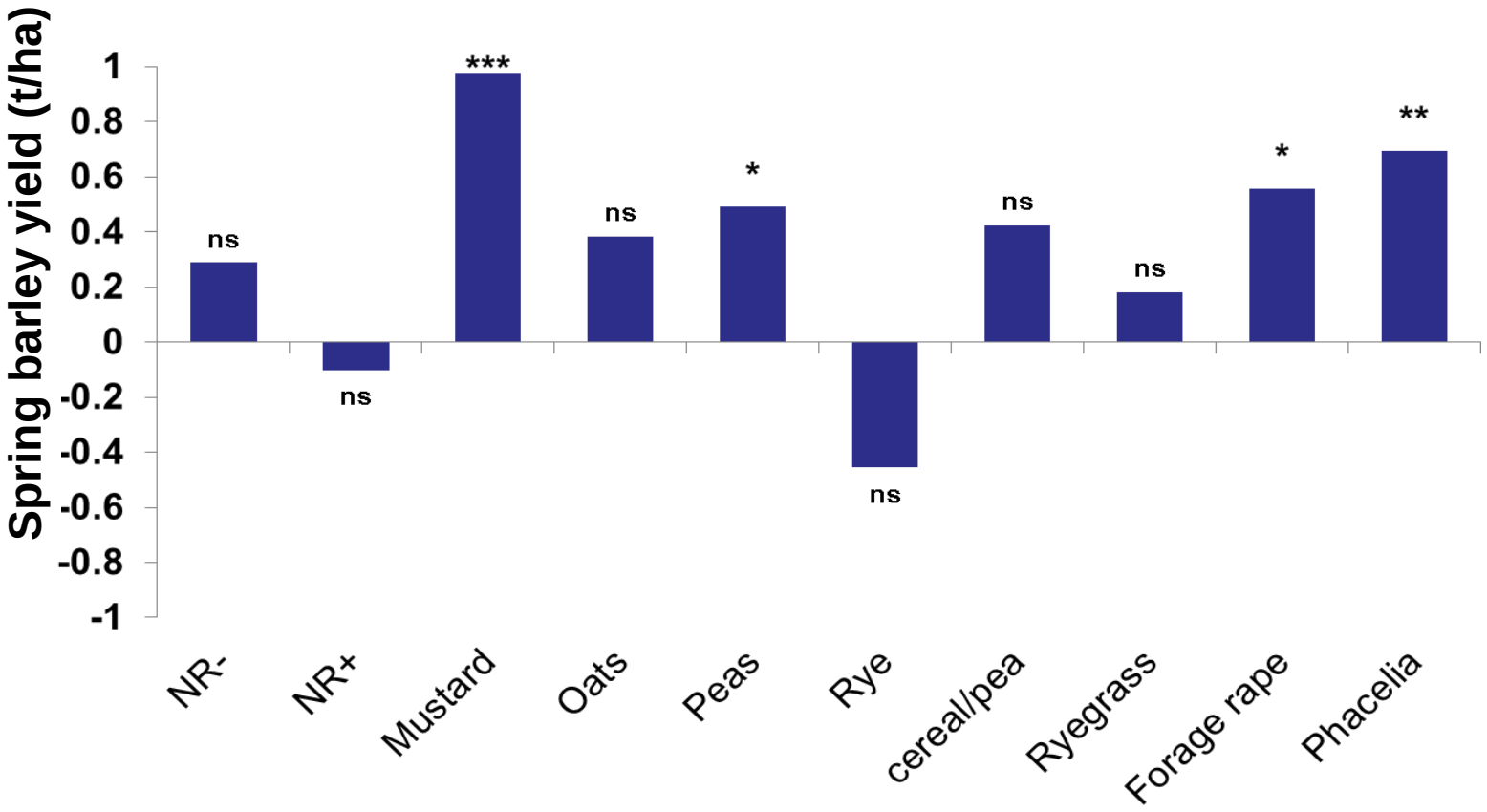
Effect on yield Expt. A 2004-2006 Light soil (relative to bare stubble)



NR - > natural regeneration without stubble cultivation
NR + > natural regeneration with stubble cultivation

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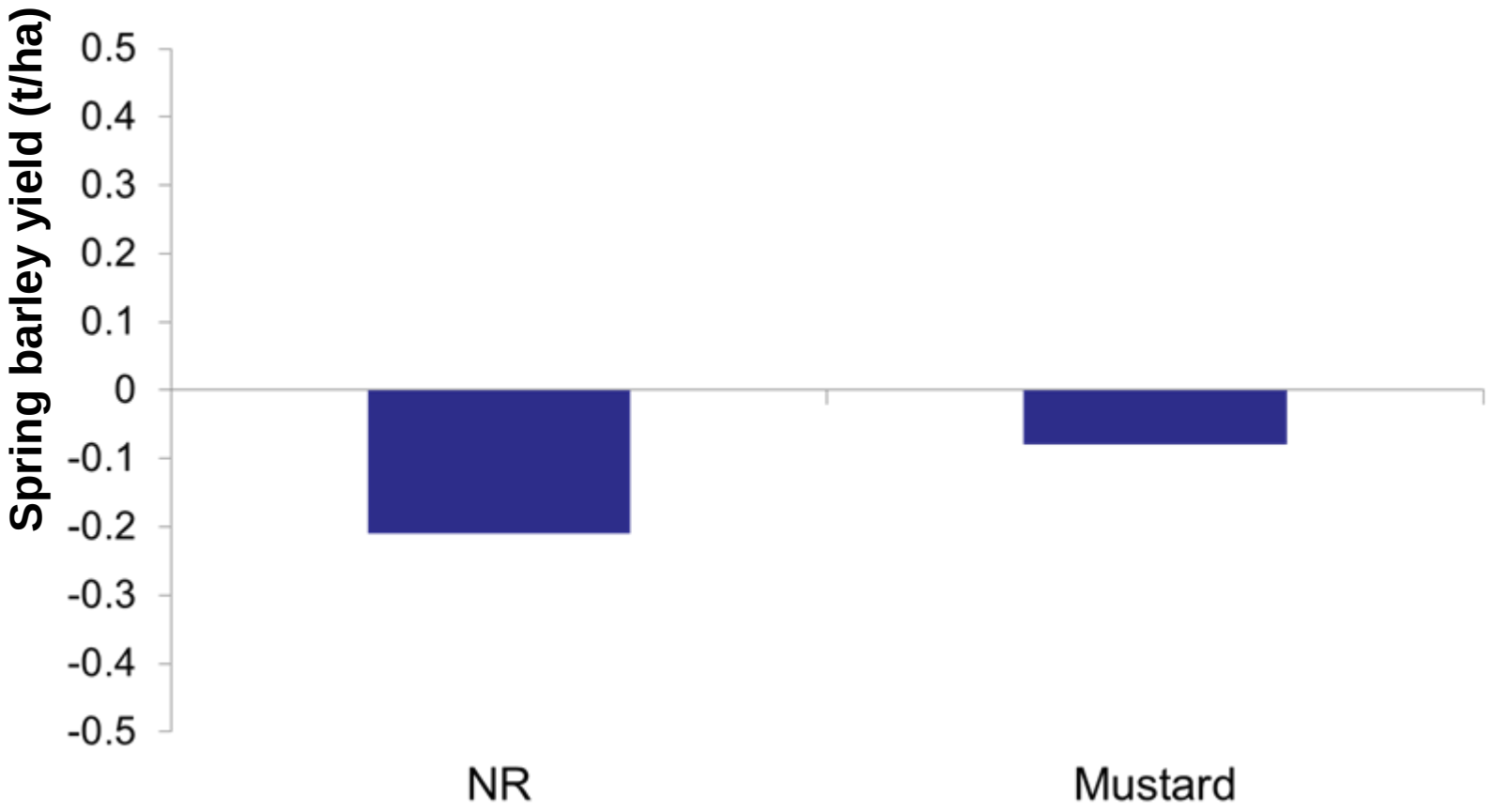
Effect on yield Expt B 2004-2006 Light soil
(relative to bare stubble)



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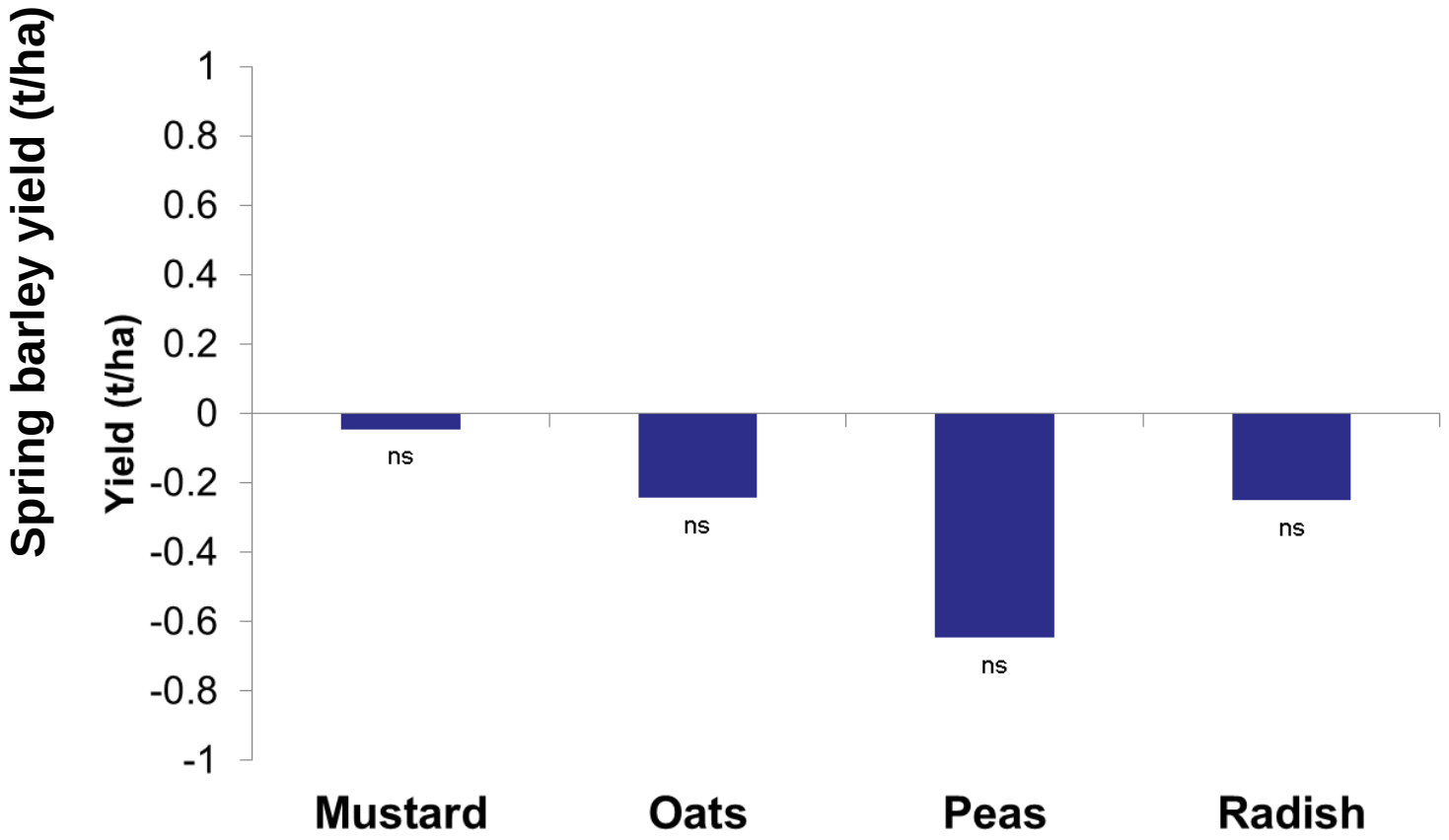
Effect on yield 2004-2006 Medium soil
(relative to bare stubble)



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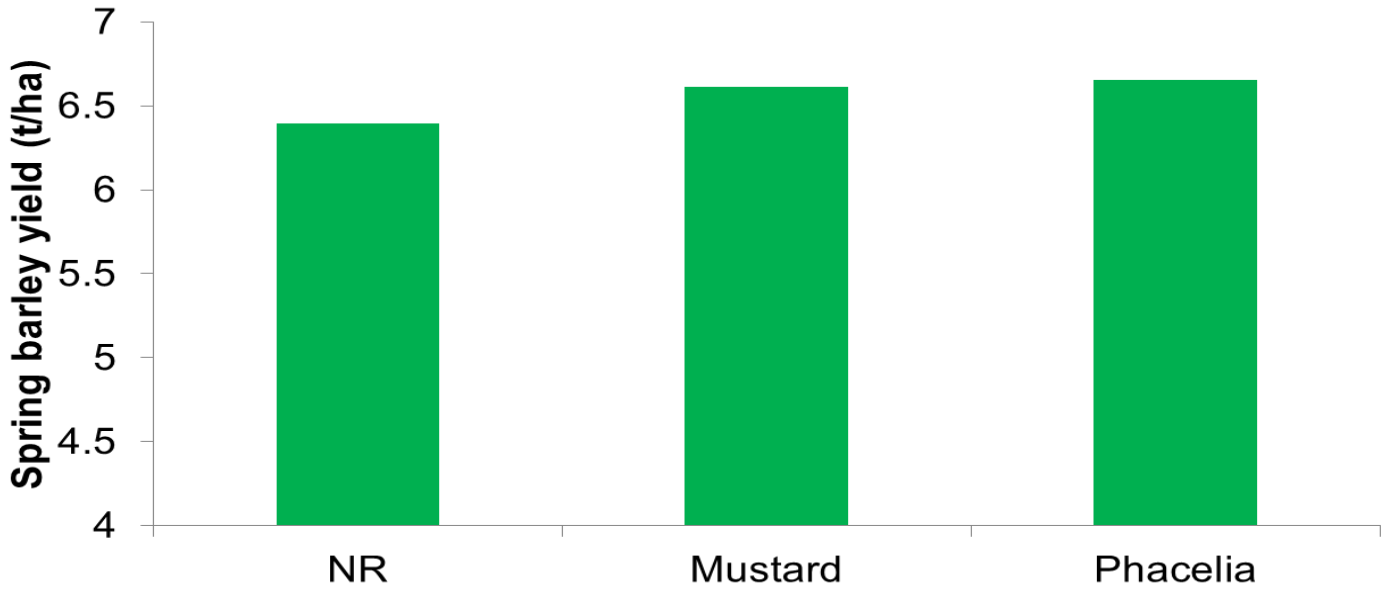
Small effects of sown species compared to NR (2007)



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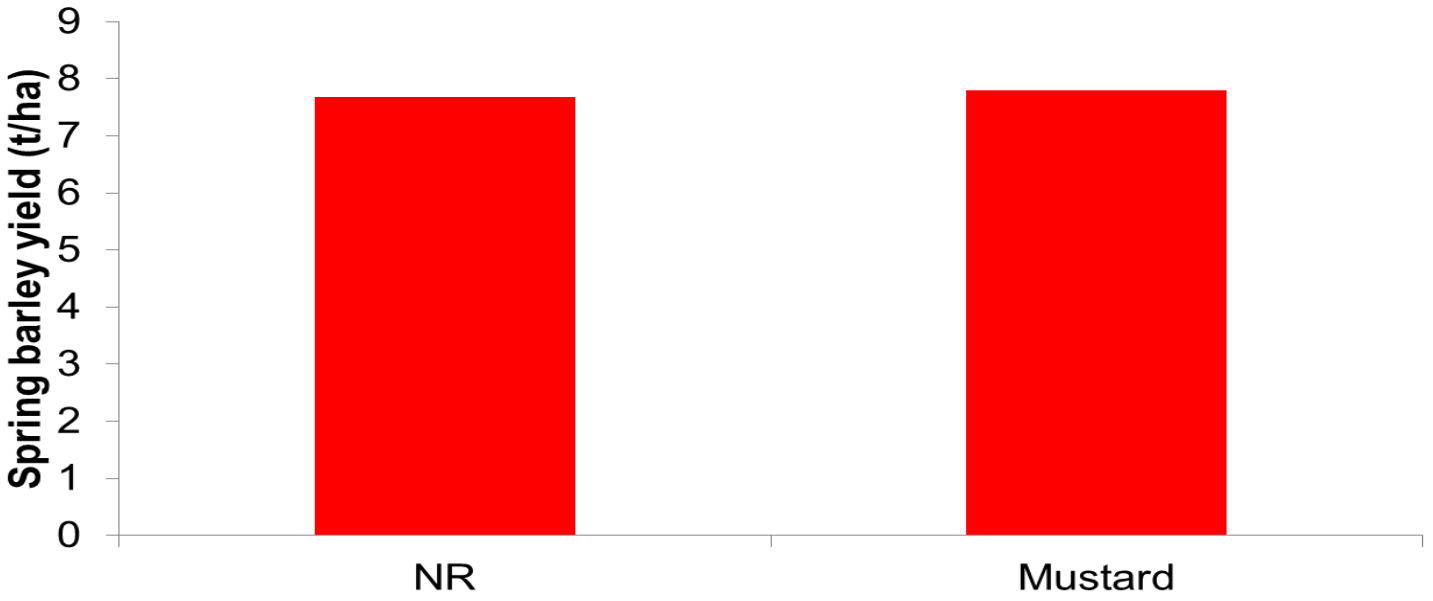
Small effects of sown species compared to NR (2014)



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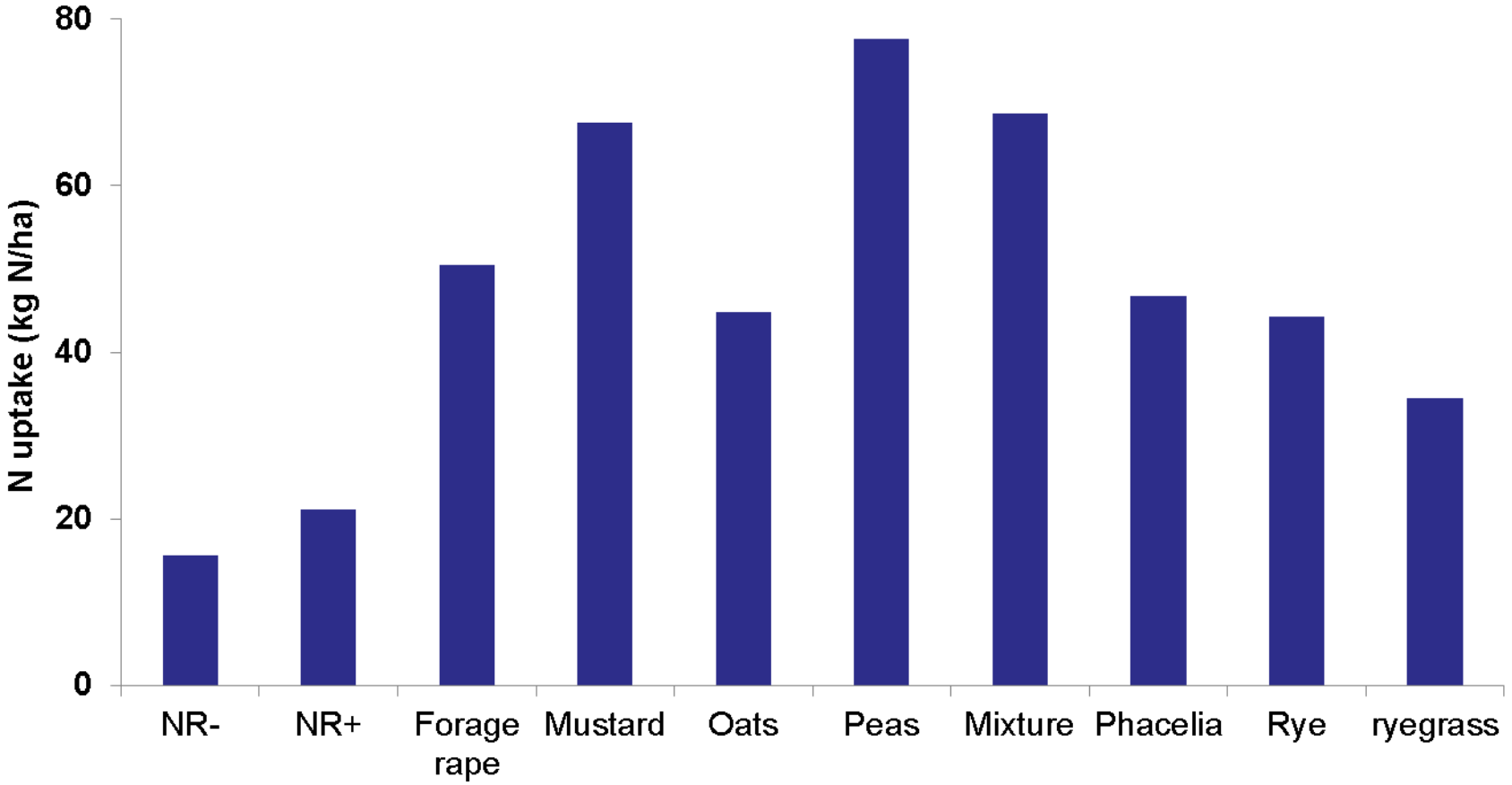
Cover crops can accumulate large amounts of N but accumulation is very variable



Light soil

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Effect of cover crops on fertiliser N requirement

Cover crop N accumulation ≠ **Reduction in fertiliser requirement**

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

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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)

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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

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Cover growth is dependent on available N

Excessive growth can indicate excessive fertiliser N application to previous crop

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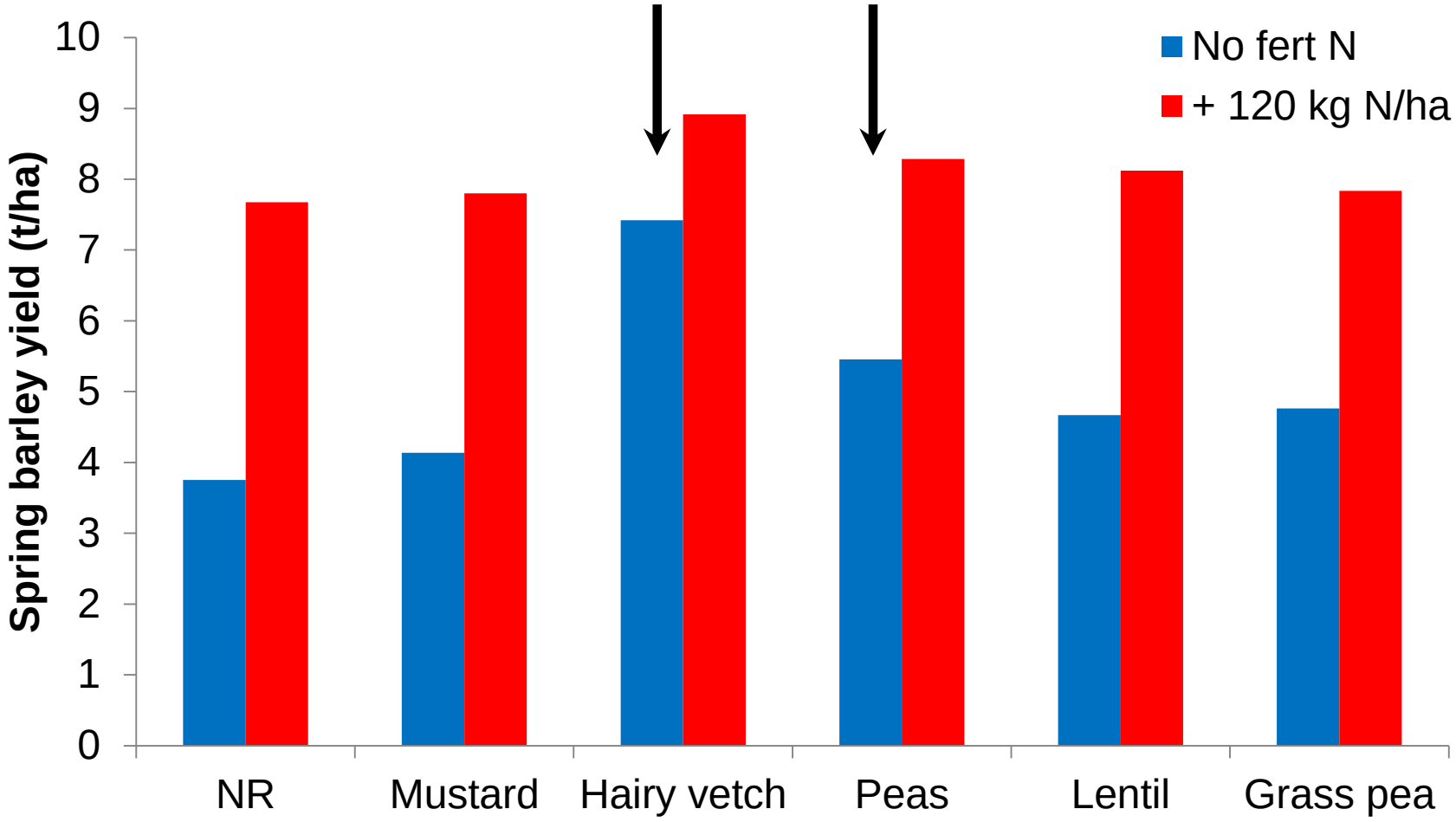
Leguminous cover crops can reduce fertiliser N requirement



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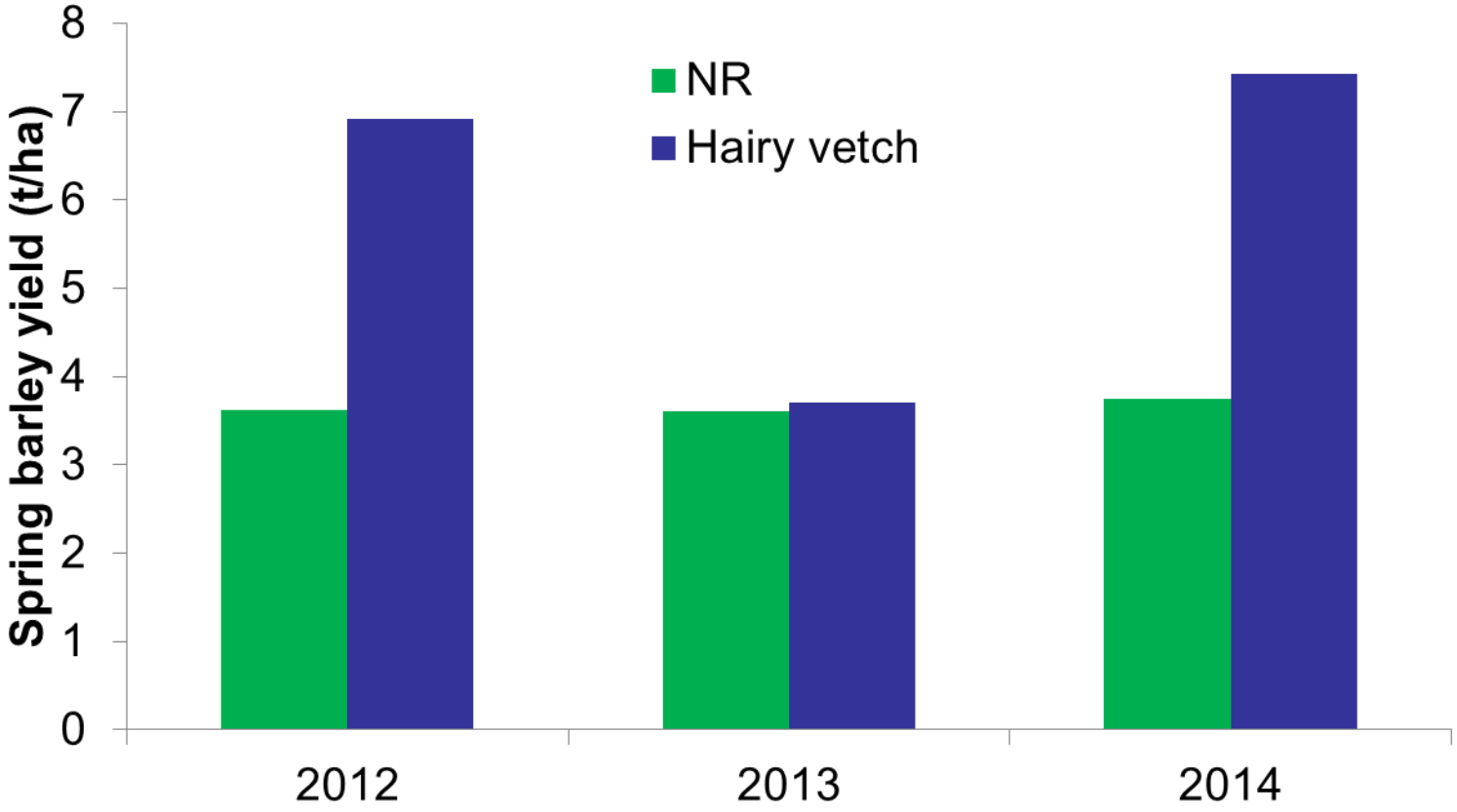
Legume N benefit can vary between seasons



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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