# Morley SIP platform and farming systems research


Plant Science into Practice

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MORLEY FARMS LIMITED

THE MORLEY AGRICULTURAL FOUNDATION

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SIP

# Sustainable Intensification Research Platform (SIP) - Morley

- SIP is a multi-partner programme comprising farmers, industry experts, academia, environmental organisations, policymakers and others.
- What is SI? *Managing farmland to increase farm output and competitiveness, whilst protecting the countryside and enhancing environment and social benefits*
- The platform is developing a community of practice, utilising research study farms and creating creating a data platform
  - see www.siplatform.org.uk for more information.

## Work at Morley

- Cover crops, Cultivations and Amendments
- Comparison of arable crop production systems:
  - IFM system A: Deep (20cm) non-inversion cultivation with over-winter cover crops plus other modified management.
  - IFM system B: Low intensity (<10 cm) soil disturbance with over-winter cover crops plus other modified management.
  - Conventional (C): 'Farm standard' cultivation (typically plough-based) and practices, with no cover crops
  - Collaboration with the Wensum DTC project and cross linkages to the Loddington SIP site(mixed farming).

# New Farming Systems (NFS)

*(supported by The Morley Agricultural Foundation and the JC Mann Trust)*

- NFS cover crop and cultivation experiment
  - 4 cultivation systems (plough, deep and shallow non-inversion and managed)
  - ± autumn cover crops ahead of spring sown crops in rotation with winter wheat
  - medium soil (Ashley series)

## Long term yield and margins (all crops)

| | Relative yield (to ploughed approach) | Cumulative gross margin minus machinery cost (£/ha) | Relative margin (to ploughed approach) |
|---|---|---|---|
| Plough | 100 | 2085 | 100 |
| Managed | 94 | 2105 | 101 |
| Deep | 90 | 2123 | 102 |
| Shallow | 83 | 1966 | 94 |
| *Average* | - | 2069 | |

(margins as gross output minus input costs and direct machinery costs)

# *Winter wheat yield (t/ha) and margin in NFS*

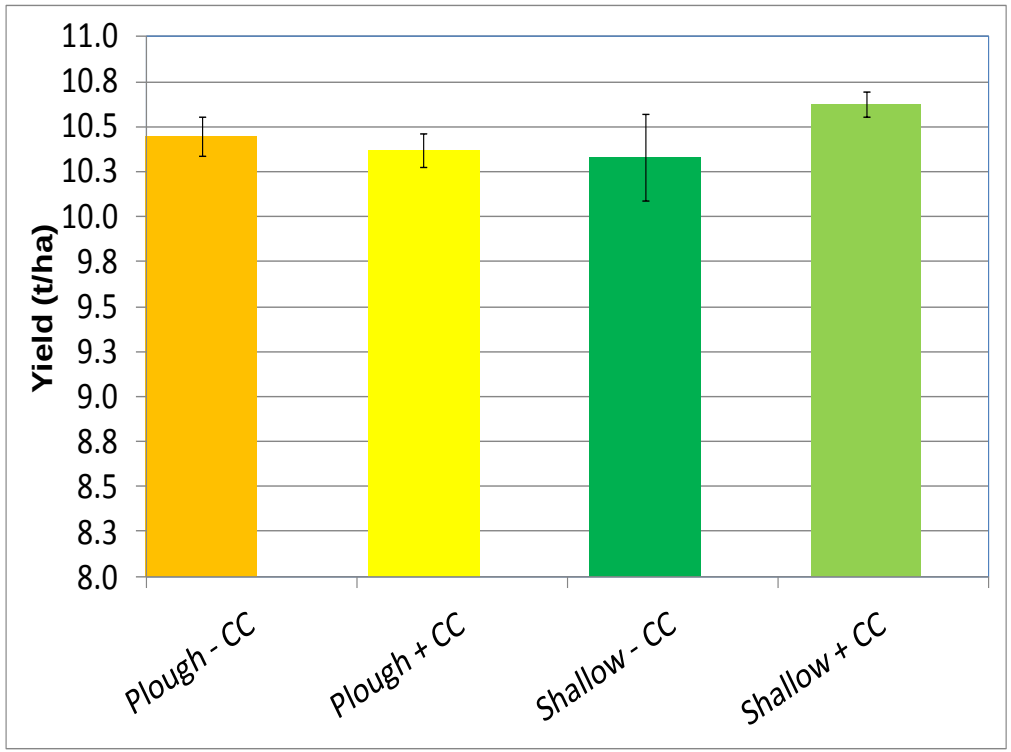
*Cross season analysis for tillage practice is as presented in the table; 'year' was significant at P<0.001 and 'treatment x year' interaction at P<0.01.*

| | **Seasonal yield data (t/ha)** | | | |
|---|---|---|---|---|
| **Tillage** | **Year 1 (2007/08)** | **Year 3 (2009/10)** | **Year 5 (2011/12)** | **Year 8 (2014/15)** |
| *Plough* | 12.75 | 8.26 | 10.41 | 10.70 |
| *Deep* | 12.55 | 8.17 | 10.54 | 11.27 |
| *Shallow* | 12.30 | 7.42 | 10.48 | 10.45 |
| *Mean* | 12.53 | 7.95 | 10.47 | 10.81 |
| *LSD* | 0.30 (NS) (*P*=0.16) | 0.77 (NS) (*P*=0.11) | 0.21 (NS) (*P*=0.56) | 0.68 (NS) (P= 0.10) |

| | **Mean yield and margin data** | | | |
|---|---|---|---|---|
| **Tillage** | **Mean yield (t/ha)** | **Yield (% of plough)** | **Margin (£/ha)** | **Margin (% of plough)** |
| *Plough* | 10.53 | 100 | 921 | 100 |
| *Deep* | 10.63 | 101 | 978 | 106 |
| *Shallow* | 10.17 | 96 | 930 | 101 |
| *LSD* | 0.16 (P<0.001) | - | - | - |

# New Farming Systems research
# Yield response data in winter wheat

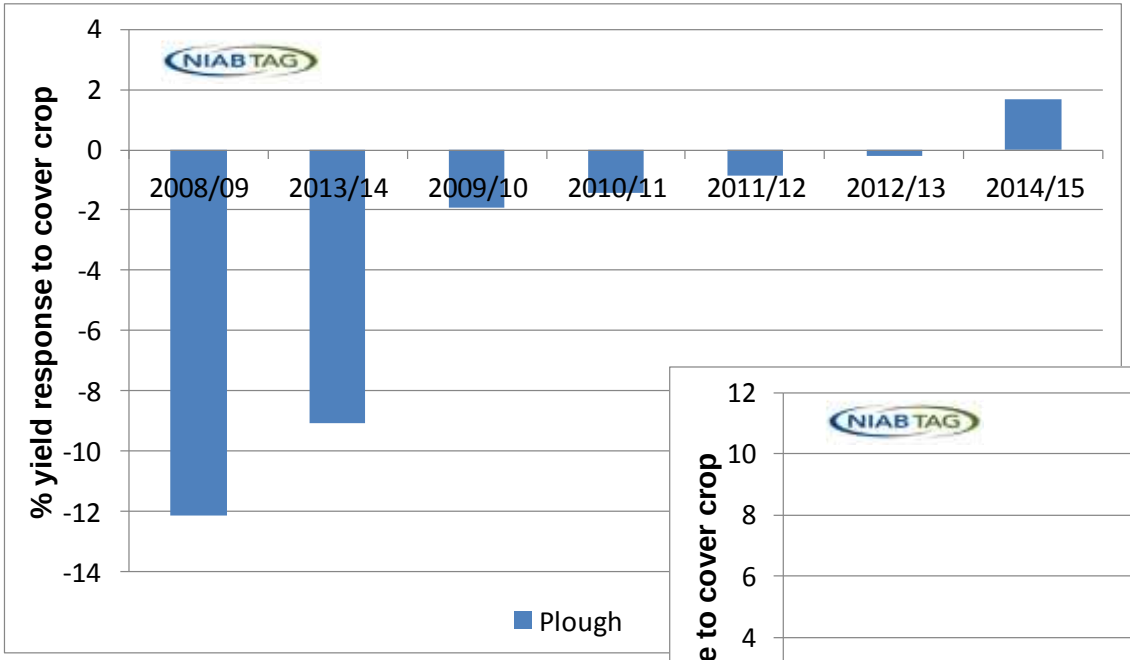
## Winter wheat yields, 2012

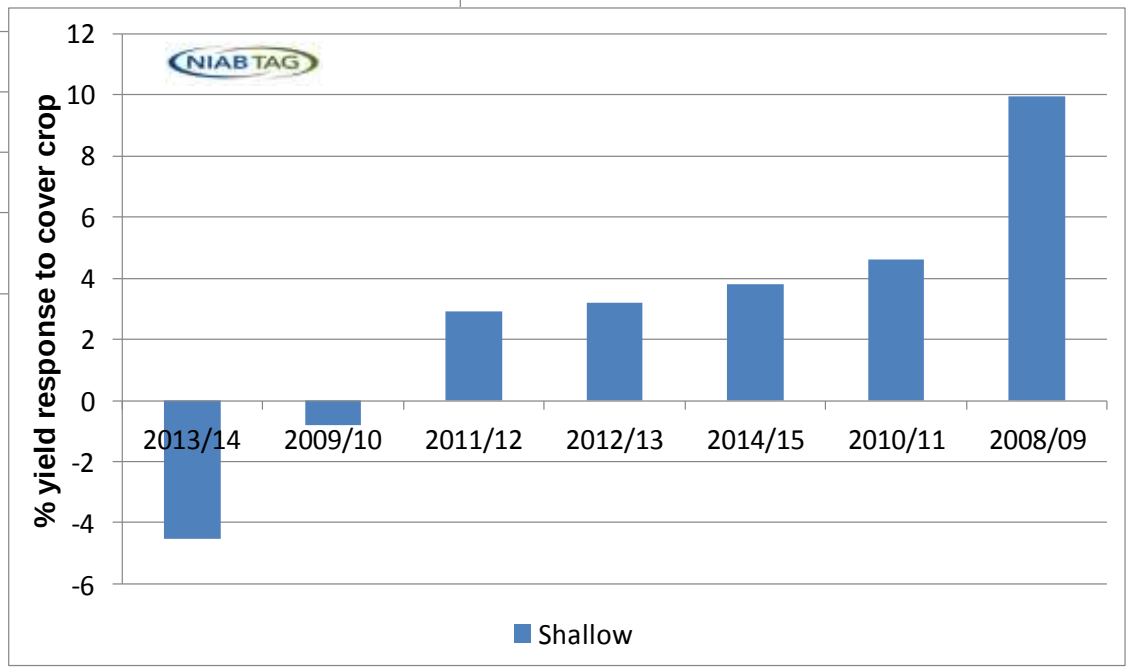



- Generally higher ear numbers where cover crops were used
- Increases in margin over input costs in cover crop comparisons
  - 2012: £52/ha - £98/ha (depending on comparison)
  - 2015: £38/ha - £47/ha (depending on comparison)

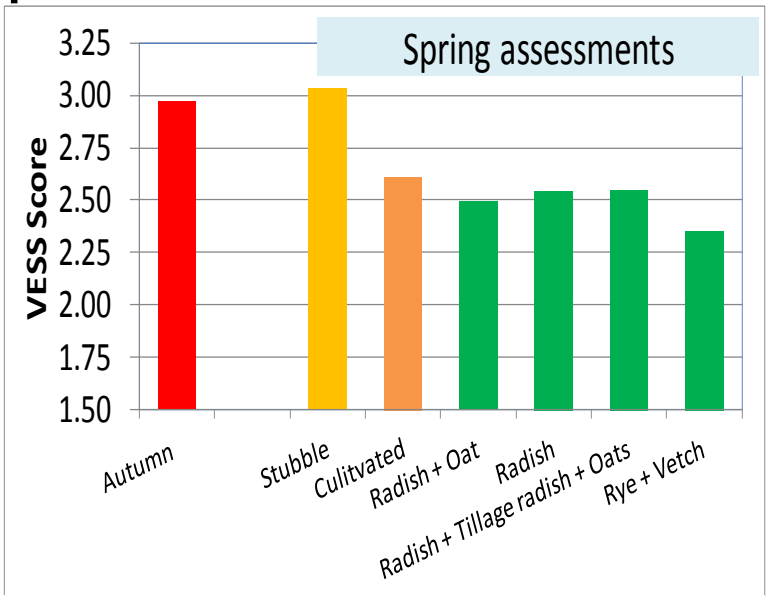
# Yield response (%) to the use of a brassica cover crop in the NFS long term study at Morley.

- Generally positive responses with cover crops and shallow tillage systems. Benefits less clear where plough based systems were used.



# Soil structure assessments at Loddington
# Comparison of cover cropping approaches

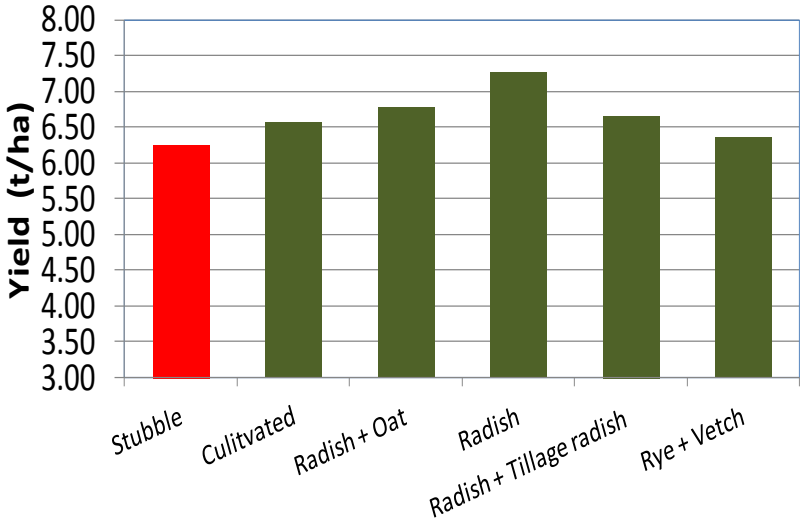



Cover crop costs from c. £20-60/ha.

Mean yield response from cover crop over 'stubble' 0.5 t/ha (c. £60/ha).

Peak yield response 1.0 t/ha.

Costs should also account for wide rotational yield responses.




http://www.sruc.ac.uk/info/120062/crop_and_soils_systems/412/visual_evaluation_of_soil_structure

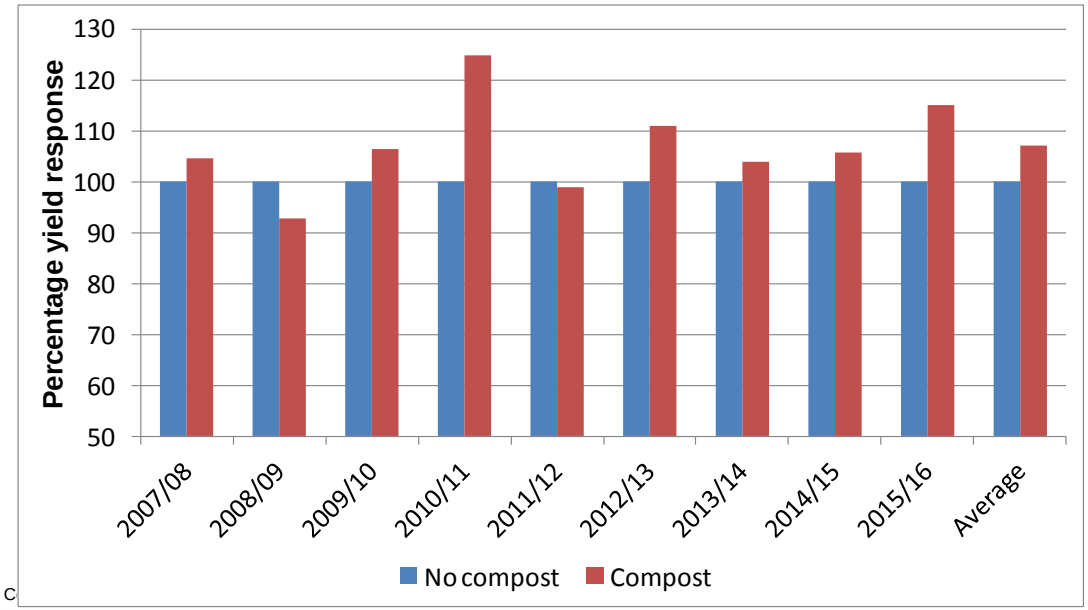
# *Determining the value of soil amendments.*

- Two rotational approaches
  - 'spring' cropping and continuous wheat
- Two amendment management regimes
  - standard practice
  - addition of 35 t/ha of green waste compost

Determining the value of soil amendments to soils and rotation systems.

*Yield response in continuous wheat (%)*

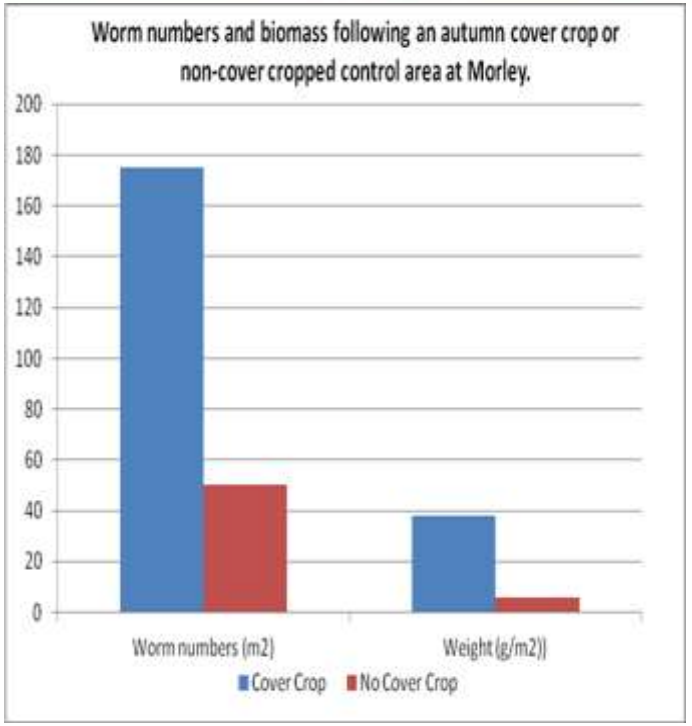
- Compost applied in years 1 to 4 only. No compost applied years 5-9.
- Positive yield responses in 7 years out of 9; mean response c. 7%.
- *Note: data for 2015/16 season is draft data subject to validation.*




- Compost applied annually over a 4 year period (ended 2011).
- Improved soil quality / water infiltration rates and yields.
- Infiltration rate increase a c. 20% increase in water infiltration over a 15 minute period.

# Farm scale cover crops at Morley 2016/17

- Range of cover crop types
  - legumes, brassicas grasses.
  - Overwinter assessments and tracking the rotational legacy.
- Recent field strip highlights:
  - Field strip work has demonstrated increases in earthworm biomass
  - Beet work: shown 11% population increase and GAI from 1.2 to 1.9
  - Beet site still to be taken to harvest.




**Questions:**

- How many of you are using cover crops or amendments?
- Why are you using them/not using them?
- Problems and benefits?
- What other soil improvement strategies are you using?

# Acknowledgements

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