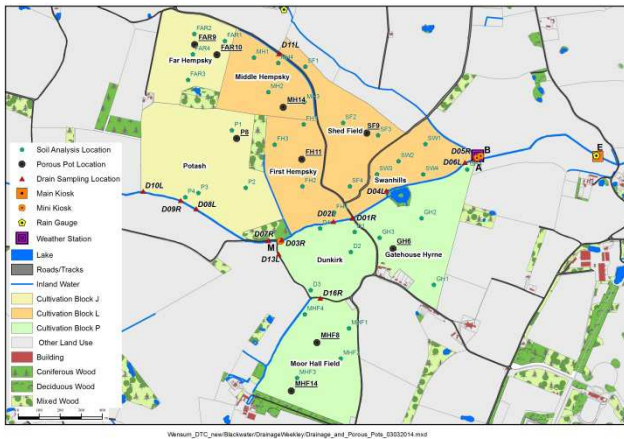


Aims: (i) To test the effectiveness of using a cover crop to reduce nutrient leaching losses post-harvest, provide a 'green manure' and improve soil quality; and (ii) assess the practicalities and farm economic costs of introducing a cover crop in an arable rotation.

Field experimental area, Salle, Norfolk




Experimental design:

3 cultivation blocks: plough (= control, two fields, 41 ha); cultivator and drill (three fields, 51 ha); and direct drill (four fields, 51 ha) (Total area = 143 ha).

Oilseed radish cover crop applied to seven fields (102 ha) north and south of stream A. Four fields received starter fertiliser application of 30 kg N/ha.

Radish leaf and root matter testing. Porous pots & field drain sampling. Farm business data analysis.

Oilseed radish leaf and root matter analysis (January 2014)

	Mean N content	Mean dry matter yield	Mean N content	Mean dry matter yield	Mean N content	Mean dry matter yield
	LEAF (kg N/ha)	LEAF (t/ha)	ROOT (kg N/ha)	ROOT (t/ha)	TOTAL (root & leaf) (kg N/ha)	TOTAL (root & leaf) (t/ha)
Without starter N	57.31	1.91	13.15	0.64	70.46	2.55
With starter N (= 30 kg N/ha)	63.57	2.17	11.97	0.61	75.54	2.78

Porous pot results (90 cm depth) (February 2014)

Field	Mean NO ₃ -N (mg/L)	Mean TDN (mg/L)	Mean NO ₂ -N (µg/L)	Mean NH ₄ -N (µg/L)
Middle Hempsey	0.50	1.85	2.81	8.19
First Hempsey	0.42	1.75	6.59	45.98
Sheds Field	0.45	0.80	9.04	32.34
Moor Hall Field	0.25	n.a.	5.41	7.24
Gatehouse Hyrne	1.37	4.57	14.44	32.69
Far Hempsey (no cover crop)	17.52	22.40	245.16	27.95
Potash (no cover crop)	10.95	18.37	293.92	10.43

Weekly field drain monitoring results

	Drain Code	Fields Drained	Cropping 12/13	Autumn 13 Status	Mean NO ₃ mg N/L 19/02 - 30/04 2013	Mean NO ₃ mg N/L 22/10 - 17/12 2013
Crop and control fields	D10L	Howards Barn/Potash	Winter Wheat	Sugar Beet/Control (ploughed, left over-winter)	12.19	12.30
	D09R	Kerdy Green	Winter Barley	Winter OSR	11.76	4.92
	D08L	Potash/Far Hempsey	Winter Wheat/ Spring Barley	Control (ploughed, left over-winter)	5.61	18.27
Drain order downstream	D07R	Merrisons	Spring Beans	Winter Wheat	6.48	11.61
	D13L	Merrisons	Spring Beans	Winter Wheat		18.42
Cover crop fields	D03R	Dunkirk	Winter Wheat	Radish Cover Crop	5.71	1.31
	D02L	First Hempsey	Spring Barley	Radish Cover Crop	2.52	1.08
	D16R	Moor Hall	Spring Barley	Radish Cover Crop		3.72
	D01R	Dunkirk/Moor Hall	Winter Wheat/ Spring Barley	Radish Cover Crop	8.61	5.56
	D04L	Swanhills	Spring Barley	Radish Cover Crop	3.34	1.43

Key results:

- Mean nitrate values in soil water at 90 cm depth in porous pots below the cover crop fields range in concentration from 0.25–1.37 mg N/L compared to mean values of 11.0 and 17.5 mg N/L below the two ploughed control fields.
- During autumn 2013, mean nitrate concentrations in the drain flow from below the cover crop fields was typically <6 mg N/L compared to mean values of between 8 and 20 mg N/L in drain flow associated with arable fields without the cover crop.
- Use of starter fertiliser N made no statistical difference in radish leaf and root nitrogen take-up.
- Diversity of soil invertebrates was highest under cover crops, with no significant difference observed between soil textures.

Next steps:

- Following the cover crop, compare nutrient leaching and sediment losses and crop yields for spring bean fields drilled using conventional and direct drilling methods.
- Analysis of gross margins comparing cover cropping, and conventional and direct drilling methods.



Further information from Prof. Kevin Hiscock (k.hiscock@uea.ac.uk) and Prof. Andrew Lovett (a.lovett@uea.ac.uk)