

Economic & environmental results from experiments with cover crops & cultivation techniques in the Wensum DTC

Design: 3 cultivation blocks: **Block J** plough (= control, two fields, 41 ha); **Block P** cultivator & drill (three fields, 51 ha); and **Block L** direct drill (four fields, 51 ha) (Total = 143 ha) (Figure 1). An **oilseed radish cover crop** was established in seven fields (102 ha) north and south of the water course in late August 2013. Five fields received starter fertiliser application of 30 kg N/ha. Two fields had no starter fertiliser. The cover crop was sprayed off with Glyphosate in January and spring beans were established in March using two reduced tillage methods (Cultivator & Rapid drill and Seed Hawk direct drill). Nitrate levels were monitored by porous pot and field drain sampling, and crop leaf and root matter testing.

Experimental Results:

Table 1: Leaf & root matter testing - no significant differences, but fertiliser might have been more influential if cover crop had been established later.

	Mean N content LEAF (kg N/ha)	Mean dry matter yield LEAF (t/ha)	Mean N content ROOT (kg N/ha)	Mean dry matter yield ROOT (t/ha)	Mean N content TOTAL (root & leaf) (kg N/ha)	Mean dry matter yield 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

Table 2: Porous pots - differences between blocks of fields became less apparent as spring beans became more established.

Figure 2: Field drains – nitrate values from the cover crop fields remain low, but tended to increase slightly once the beans were drilled. Striking declines in nitrate values for two drains from Merrisons (winter wheat) from late November. Values from the winter OSR on Kerdy Green (D09R) remained low.

Field	Mean NO ₃ -N (mg/L)	Mean TDN (mg/L)	Mean NO ₂ -N (µg/L)	Mean NH ₄ -N (µg/L)
Middle Hemskey	0.50	1.85	2.81	8.19
First Hemskey	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 Hemskey (no cover crop)	17.52	22.40	245.16	27.95
Potash (no cover crop)	10.95	18.37	293.92	10.43

Table 2. Porous pot results (90 cm depth)

Financial Returns:

Cover crop and direct drilling (Block L) did not appreciably affect margins compared with the control fields (Block J) and, following experience gained, some establishment and pesticide costs could have been saved (Table 3). Overall, the cover crop clearly reduced nitrate losses without impairing margins.

	Block J	Block L	Block P	No Frills
Gross output: Yield (t/ha)	5.80	6.24	6.55	6.24
Output at £230/t (£/ha)	1334	1435	1506	1435
Costs: Establishment (£/ha)	96	67	128	70
Applications (£/ha)	90	120	120	90
Variable costs (£/ha)	318	432	415	318
Harvesting (£/ha)	85	85	85	85
Total costs (£/ha)	589	704	748	563
Margin (£/ha)	745	731	758	872

Table 3. Financial returns (Data supplied by Salle Farms Co.)

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Note: Bullens Close & Church Craft - 'No frills' comparison: over-winter stubble, spring cultivator & drill for beans

Figure 1. Field experimental area, Salle, Norfolk

Table 1. Oilseed radish leaf & root matter analysis (22/01/14)

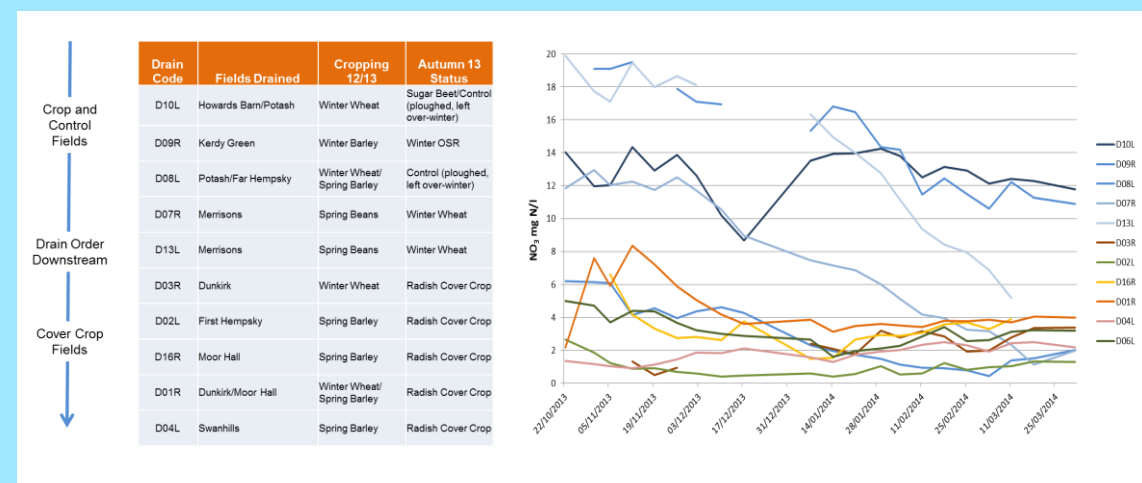


Figure 2. Weekly monitoring of field drains

Practical Observations:

- Some difficulty encountered in destroying cover crop before spring bean establishment.
- Less good uptake of Glyphosate where cover crop was topped for shooting purposes.
- More pea and bean weevil damage after the cover crop.
- Fields where cover crop was established did not dry as quickly when spring cultivations commenced.
- Bean crop established with direct drill gave a more even appearance at harvest.