

Digestate & Compost in Agriculture, Bulletin 6 – February 2014

Nutrient boost from organic materials delivers increased crop yields

The enhanced supply of major nutrients delivered by organic materials is increasing crop yields, as demonstrated by the latest results from the *DC-Agri* experimental sites. Compost and digestate have both performed well alongside livestock manures, with all organic materials out-performing the 'fertiliser only' treatments.

Organic materials pay dividends

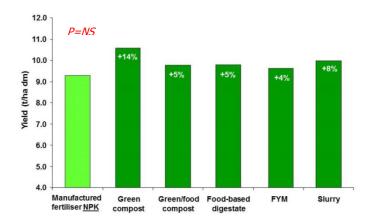
Increased yields of 0.20-1.56 tonnes per hectare and nitrogen fertiliser savings, together worth £60-380/ha, have been recorded on the *DC-Agri* experimental sites. These positive results were achieved following careful nutrient planning and the enhanced supply of major nutrients delivered by the compost, digestate and livestock manures, in comparison with the control which had received standard fertilisers only. Whilst the cost of purchasing and spreading organic materials has to be balanced against these savings, the results demonstrate the tangible value of digestate and compost to farmers.

A range of organic materials have been applied over the last three years to seven experimental sites across Britain. A nutrient management plan combining organic materials and manufactured fertiliser inputs was produced for each experimental site by a FACTS (Fertiliser Advisers Certification and Training Scheme) qualified adviser.

Application rates were based on the crop available nitrogen (N) supplied by each organic material. This was predicted using MANNER-NPK and then deducted from the total crop need, with the remaining requirement met by manufactured fertiliser N. Recommendations for phosphate, potash and sulphur were made using the Fertiliser Manual (RB209) guidance for sites in England and Wales, and relevant SRUC Technical Notes in Scotland. Table 1 summarises the nutrient content of 15 digestate samples analysed as part of the field experiments, as well as giving typical values for green and green/food compost.

Potash supply

At Lampeter in west Wales, on a medium textured soil, first cut grass yields were increased where a combination of organic materials and manufactured fertiliser was used (Figure 1). The increased grass yields and manufactured fertiliser N cost savings were worth £80-220/ha (yield increases, though not statistically significant, were within the range of 4-14%). The yield increases were a result of extra potash supplied by the organic materials; where the RB209 recommended guidance rate of potash was supplied by manufactured fertiliser, the grass was still potassium (K) deficient (Figure 2).



Recommended manufactured fertiliser policy-NPK (RB209)

Combined nutrient management policy (RB209; MANNER-*NPK*)

Figure 1. Grassland field experimental site in Wales (June 2013)

Table 1. 'Typical' nutrient values of digestate and compost

	Nitrogen (N)(kg/t)		Phosphate (P ₂ O ₅) (kg/t)		Potash (K ₂ O) (kg/t)	
	Total	Readily Available	Total	Crop Available	Total	Crop Available
Whole Digestate	5.0	4.0 (80%)	0.5	0.25	2.0	1.6
Green Compost ⁺	7.5	<0.2 (<2%)	3.0	1.5	5.5	4.4
Green/Food Compost+	11	0.6 (5%)	3.8	1.9	8.0	6.4

⁺ Source Defra "Fertiliser Manual (RB209)

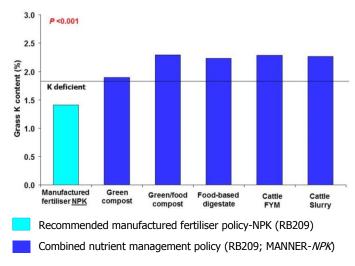
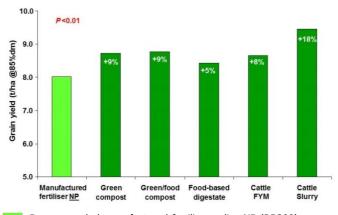


Figure 2. Significant increases in potassium content in first cut grass at Lampeter 2012

Phosphate response

At Devizes in south England, on a shallow soil over chalk, winter wheat yields were increased by a statistically significant 5-18% by using a combination of organic materials and manufactured fertiliser, in comparison with fertiliser only treatments (Figure 3). The increased yields and savings in manufactured N fertiliser cost were worth £120-380/ha. Yield increases were achieved as a result of the extra phosphate supplied by the organic materials, compared with the amount of phosphate fertiliser recommended in RB209 on a P Index 2 soil. This was reflected in enhanced phosphorus concentrations measured in the grain (Figure 4).



Recommended manufactured fertiliser policy-NP (RB209)

Combined nutrient management policy (RB209; MANNER-NPK)

Figure 3. Winter (feed) wheat grain yields at Devizes 2012



Field visit to the replicated experiments at Devizes (May 2013)

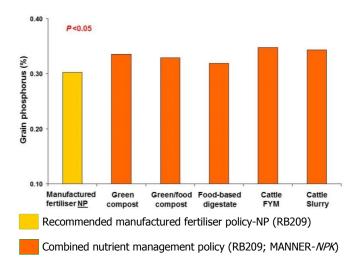


Figure 4. Winter (feed) wheat grain phosphorus content at Devizes 2012

Sulphur supply

At Aberdeen in northeast Scotland, on a light soil, a combination of organic materials and manufactured fertiliser achieved higher grain yields than those achieved by using only manufactured fertiliser. The winter barley yield increases and manufactured N fertiliser cost savings from using organic materials were worth £60-360/ha (yield increases, although not statistically significant, were in the range 4-32%). The yield increases were a result of the organic materials providing sulphur in varying amounts and improving the N:S ratios accordingly (Figure 5). No sulphur was applied in the manufactured fertiliser treatment.

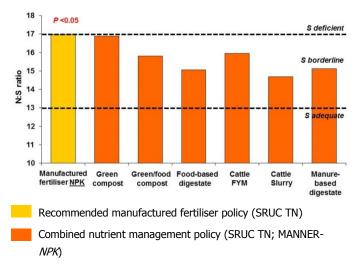
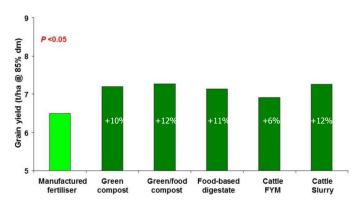


Figure 5. Winter (feed) barley grain N:S at Aberdeen 2012

Winter cereal yields (3 sites)

Cross site analysis of grain yields from the Devizes (winter wheat), Aberdeen (winter barley) and Terrington (winter wheat) sites showed that the yield increases on the green compost, green/food compost, food-based digestate and slurry treatments were greater (P<0.05) than fertiliser only treatments calculated using the "Fertiliser Manual RB209" or "SRUC Technical Note 633" (Figure 6). The increases resulted from the enhanced supply from organic materials of phosphate (Devizes) and sulphur (Aberdeen and Terrington).



Recommended manufactured fertiliser policy-NPK (RB209/SRUC)

Combined nutrient management policy(RB209/SAC; MANNER-NPK)

Figure 6. Overall winter cereal grain yields at Devizes, Aberdeen and Terrington 2012

New NVZ rules

New Nitrate Vulnerable Zone (NVZ) rules on the use of compost came into force in 2013:

- You can now apply BSI PAS 100 certified compost at a field application rate of 500 kg total N/ha in any two year period, either as a mulch or when worked into the soil.
- You can now use BSI PAS 100 certified compost at a field application rate of 1,000 kg total N/ha in any four year period, as a mulch on orchard land (i.e. land on which fruit of the genus Malus, Pyrus or Prunus is grown).

From 1 January 2014, you must include the crop available nitrogen supplied by all organic materials, including compost and digestate, when calculating the amount of nitrogen supplied to each crop type on your farm as part of the N max calculation.

To help you with the N Max calculation, you can use MANNER-*NPK*, entering either the actual analysis of the compost/digestate or the standard values provided. MANNER-*NPK* can be downloaded free from the PLANET website: www.planet4farmers.co.uk/manner



Dates for your diary

More results from the latest field experiments will be published in spring 2014. In the meantime here are some future opportunities to catch up with the project team:

- 20 February 2014 Farmer AD Workshop, Reaseheath
- 26 February 2014 Crop Protection in Northern Britain (CPNB) 2014 Conference, Dundee
- 04 March 2014 Soil, Muck & Money: Nutrient Management Event, Upper Largo, Fife
- 05 March 2014 Think Phosphate, FWAG Suffolk, Cambs
- 06 March 2014 FACTS/NAAC DC-Agri Update, Cockle Park Farm, Newcastle University, Ulgham, Morpeth, Northumberland
- 07 March 2014 FACTS/NAAC DC-Agri Update, University of Reading, Whiteknights, Reading, Berkshire and Veolia ES, Bushy Warren
- 13 March 2014 FACTS/NAAC DC-Agri Update, Local Generation Ltd, Anaerobic Digestion Plant, Wisbech Road, March, Cambridgeshire
- 26 March 2014 Prosoil Open Day at Bank farm, Churchstoke, Wales

If you would like details of these and future events contact: enquiries@earthcaretechnical.co.uk

Copies of this and previous bulletins can be downloaded from the project website at: www.wrap.org.uk/dc-agri











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