Material change for a better environment

Digestate & Compost in Agriculture Bulletin 1 – March 2011

Climate change drives high profile farmer-focused digestate and compost research project

A series of replicated scientific field experiments, recently commissioned by WRAP, Defra, and Zero Waste Scotland and funded by Defra and the governments of Scotland and Wales, will help farmers maximise the potential of anaerobic digestate (biofertiliser) and compost to grow quality crops whilst helping to meet our 2020 climate change and waste reduction commitments.

A partnership of leading agricultural research and advisory organisations including ADAS, Earthcare Technical, Rothamsted Research (North Wyke), SAC (Scottish Agricultural College), East Malling Research, Harper Adams University College and Lincoln University is working to deliver a series of replicated scientific field experiments, which will demonstrate the agronomic, safety and business cases for using both quality digestate and quality compost (produced to the BSI PAS 110 and BSI PAS 100 specifications, respectively) in a number of agricultural applications. Already underway, this four year series of experiments will complete in April 2014.

In an extension of earlier trials, the experiments are targeted at students, farmers and agricultural consultants. The results will be widely disseminated through knowledge exchange hubs centred on agricultural colleges and university departments across Britain, using materials developed as part of this project by leading educational institutions and supported by the delivery team. The Digestate & Compost in Agriculture Bulletin will give periodic updates on the experiments and feature project results as soon as they become available.

Driving Forces

The agricultural sector, including field horticulture, is the most important single market for the use of quality digestate and compost, accepting 60 per cent of all UK digestate and compost production. This represented 1.77 million tonnes in 2008/09 and is set to increase markedly, as anaerobic digestion and composting become more widespread.

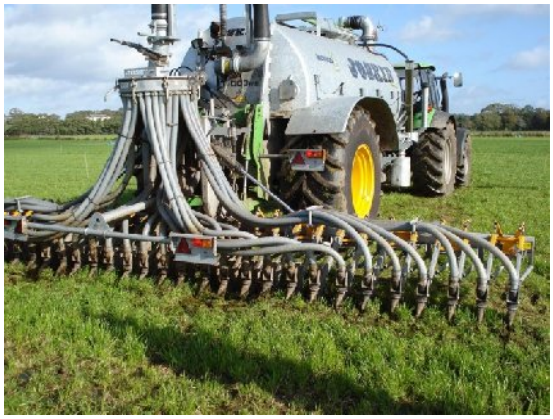
Using quality organic resources such as digestate or compost will deliver many benefits, from improving soil structure to enhancing nutrient supply. However, carefully monitoring the environmental impact of digestate and compost continues to be a key focus for WRAP, Defra, the Welsh Assembly Government and Zero Waste Scotland. Emissions of greenhouse gases and ammonia to air, and emissions to water of nitrate and phosphorus will be monitored during the field experiments and the results will feed into best practice guidelines, providing a framework for the responsible use of digestate and compost.

WRAP has delivered a number of field-based trials in recent years to answer questions posed by farmers, growers and their customers. These have included: the impact of compost use on soil biology; moisture holding capacity; structure and workability; the fertiliser replacement value of compost; and the practical application of the material in agriculture and field horticulture environments. WRAP's work in delivering robust scientific evidence to substantiate claims of the benefits to agriculture from using quality

compost has contributed to the tripling in size of the agricultural market for compost over the past five years.

Today's experiments

These latest field experiments, carried out under the auspices of a steering group comprising experts with farming and scientific backgrounds, will build on the work done to date, providing further substantiated evidence of the safety and efficacy of recycled organic resources in the form of quality digestate and compost.



Spreading BSI PAS 110 digestate

The first area of research will quantify the crop available nitrogen supply characteristics of digestate. Digestate is an excellent source of readily available nitrogen, and the information generated through this aspect of the project will enable farmers to understand how much nitrogen will be available and when, helping to reduce reliance on manufactured nitrogen fertilisers, whilst maintaining crop yields. The research will be carried out at 12 sites in total, reflecting different soil types, climatic conditions and cropping rotations. Six treatments will be compared against an untreated control and comprise two types of food-based and manure/crop residue-based digestates (applied in autumn and spring on separate plots), and livestock slurry (again applied in autumn and spring on separate plots). These treatments will then be compared against manufactured fertiliser nitrogen plots to assess the nitrogen efficiency and fertiliser nitrogen replacement value of the contrasting digestate/slurry applications.

The second area of research at seven sites across Britain with varying soil types, climatic conditions and cropping rotations, will quantify the effects of repeated digestate and compost applications on soil and crop quality. Against the control plots of farm standard fertiliser, six treatments will comprise quality green and green/food composts, quality food-based digestate, farmyard manure, livestock slurry and manure-based digestate.

Crops to be grown include grass, winter and spring wheat, winter and spring barley, oilseed rape, potatoes and linseed.

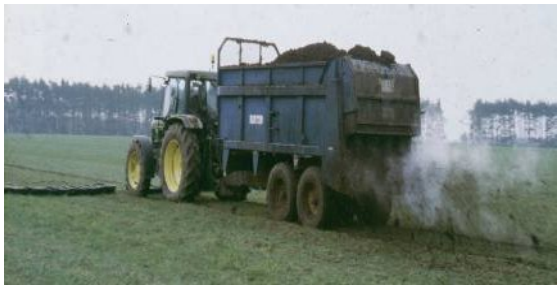
The third area of research will obtain robust data on greenhouse gas (GHG) emissions and emissions of other potential pollutants to air (*e.g.* ammonia) and to water (*e.g.* nitrate), resulting from the use of the various materials. This will contribute to the Defra funded "Agricultural Greenhouse Gas Research Platform". At three sites, nitrous oxide, methane and carbon dioxide emissions will be measured following the land application of quality digestate and compost. Static chambers will measure GHG emissions compared to untreated control plots. There are six treatments: surface broadcast and bandspread livestock slurry; farmyard manure; surface broadcast and bandspread digestate; and compost.

Ammonia emission measurements will also be made from each treatment using equipment that draws air into a wind tunnel at ground level and passes it through an acid trap, where ammonia-N is then captured prior to quantification.

Knowledge exchange

Embracing resource efficiency, i.e. using natural resources in the most effective way, whilst minimising the impact of their use on the environment - and improving soil management on farm are essential for the future sustainability of British farming and field horticulture. A major element of the Digestate & Compost in Agriculture project is the involvement of training providers across Britain for the duration of the project. They will be key to providing knowledge exchange opportunities, not only for today's farmers, growers and crop consultants, but also for the next generation.

Some of the experimental sites were selected because they are part of specialist agricultural colleges or university departments. Working closely with respected training providers, the knowledge exchange team is helping to develop a range of course materials on the use of quality compost and digestate in agriculture, suitable for each educational level – NVQ, HND and Degree. Core materials, including presentations, handouts and articles, will be made available to regional and on-line educational dissemination 'hubs'. Training providers can then download and use the information to produce materials to their own specific requirements.



Spreading BSI PAS 100 compost

Members of the research team will be visiting venues in England, Wales and Scotland over the next three years to give lectures and seminars on the current field experiments in the wider context of previous WRAP trials and an emerging AD industry. These events will be tailored to current farmers, growers and crop consultants to provide them with the knowledge and skills to maximise the potential of digestate and compost to deliver quality crops, increased yields and higher gross margins, whilst at the same time bringing major benefits to the environment. Events will also be held at the experimental sites to enable the benefits of using digestate and compost to be viewed first-hand.

The four year Digestate & Compost in Agriculture programme and dissemination activities will also contribute to Defra's "Demonstration Test Catchments" programme, established to find out if new farming practices, which are being implemented to reduce agricultural water pollution, are able to deliver sustainable food production and wider environmental benefits. If UK agriculture is to be sustainable in the long-term and the government is to meet its climate change, waste reduction and renewable energy obligations, tomorrow's farmers, growers and crop consultants must be armed with the knowledge and scientific evidence to make best use of quality digestate and compost to benefit their soils and crops.

For the very latest information on the Digestate & Compost in Agriculture project visit the WRAP website at www.wrap.org.uk/dc-agri.

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