



Overview: Compost Safety for Agriculture



EUROPE & SCOTLAND
European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future

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1 What is this document for?

This document provides a brief overview of the findings from three separate risk assessments procured by WRAP and Zero Waste Scotland that examine the safety of composts when used on agricultural land. Background information on the regulatory controls governing compost production and use in Scotland is also provided. A more detailed summary of the risk assessments can be downloaded from the WRAP website¹.

¹<http://www.wrap.org.uk/content/summary-report-compost-quality-and-safety-agriculture>



2 What is compost?



Compost is made from the controlled biological decomposition of either solely green waste (such as lawn clippings, prunings and woody material) or from a mix of green waste with food waste, in the presence of oxygen. The resulting 'green compost' and 'green/food compost' are excellent soil conditioners and sources of major plant nutrients, including readily available potash. Compost is not the same as 'potting soil' or other media used for container-grown plants, but compost can be used as an ingredient in potting soil mixes.

3 Are there any regulations around compost manufacture?

Yes – the process of compost manufacture is considered a 'waste' activity, and needs an appropriate approval from SEPA. Wastes accepted for processing must be source-segregated biodegradable wastes only, and be restricted to those listed in the SEPA approval. Where food wastes are composted, then an additional approval is required from the Animal and Plant Health Agency (APHA). Composting processes normally include a high temperature ($\rightarrow 65^{\circ}\text{C}$) sanitisation phase that lasts several days, in-line with PAS 100 recommendations noted below. This sanitisation phase is a legal requirement where food wastes are composted, under the Animal By-Products Regulations (ABPR).



4 Delivering quality compost

Where wastes are processed, the resulting compost is usually also considered a 'waste'. This 'waste' status can give the impression of poor quality, causing compost to be under-valued as a resource. To help overcome this perception, the UK environmental regulators all recognise 'end of waste' approaches for compost, delivered under the Compost Certification Scheme (CCS)².

The CCS requires all compost to meet the requirements of PAS100³ which is a 'Publicly Available Specification' owned by the British Standards Institution. The PAS100 specification provides a baseline for compost quality on which customers can build, and compliance is checked through annual audits by third parties. Compliant sites must operate a Quality Management System based on HACCP (Hazard Analysis and Critical Control Points) principles to ensure that the required quality is consistently delivered. PAS100 provides baseline limits for key hazards known to be relevant in compost, including: potentially toxic elements (such as zinc and chromium); indicator pathogens (*E. coli* and *Salmonella*); physical contaminants (such as metal and plastic). Certified composts are no longer considered wastes, however ABPR controls on grazing and forage harvest intervals still apply to composts made from food wastes.



²<http://www.qualitycompost.org.uk/>

³ <http://www.qualitycompost.org.uk/standards/pas100>

5 Confidence in compost

Although the regulatory and CCS requirements are freely available, the lack of visibility around their supporting evidence has previously prompted questions from food-chain stakeholders. In response to this, a wide-ranging programme of evidence-gathering was funded by WRAP and then Zero Waste Scotland, which included three separate risk assessments for compost quality:

- Green composts used where livestock graze or forage crops are grown
- Green/food composts used where livestock graze or forage crops are grown
- Green and green/food composts used where crops are grown for human consumption

These risk assessments were undertaken by a range of expert institutions, including: the James Hutton Institute, Animal & Plant Health Agency and Cranfield University. At all stages, input was sought from food-chain stakeholders that included the UK Food Standards Agency (FSA), Food Standards Agency in Scotland (now Food Standards Scotland; FSS), farming unions, retailers and many others. The independent advisory committees⁴ coordinated by the FSA, also provided scientific scrutiny.



These risk assessments focussed principally on risks to human and animal health, although risks to the wider environment (for example, from excessive nutrient applications) were also considered. Risks to crop health from plant pests and diseases were not covered in detail by the risk assessments, as they had been examined previously – and underpin the sanitisation recommendations in PAS100.

⁴The Committee on Toxicity (CoT) and Advisory Committee on the Microbiological Safety of Food (ACMSF)

6 Risk assessment overview

Where possible, quantitative risk assessments (QRA) were undertaken using a classic source-pathway-receptor model. Where published data were insufficient to populate full quantitative risk assessments, then qualitative assessments were made – for example, by comparing the ‘concentration’ of hazard in compost with the ‘concentration’ of the same hazard in other materials that are commonly applied to land, such as livestock manures. Based on stakeholder feedback, and following preliminary evidence reviews, six broad categories of hazardous agents were considered, as listed in Table 5-1.

The overall conclusion was that current statutory composting process requirements and (where appropriate) statutory grazing and forage harvest bans were sufficiently robust to ensure that risks to humans and livestock were acceptably low. Taking account of the current evidence base and scientific opinion, Food Standards Scotland (FSS) concurs with existing advice that the risks from PAS-100 compliant composts and PAS-110 compliant anaerobic digestates used in agriculture are low and comparable with other materials used for this purpose. Businesses intending to use composts and anaerobic digestates in food production should ensure that they are used appropriately i.e. that measures are taken in the food production process to control potential contamination arising from the

soil, water and any fertilisers used⁵. Businesses should use such products in accordance with manufacturers’ instructions.

⁵as defined in Regulation (EC) 852/2004; Annex 1; Part A(II); 3(a)
⁶<http://www.wrap.org.uk/content/summary-report-compost-quality-and-safety-agriculture>

Table 5 1 Categories of hazards that were considered when examining compost quality and safety, with examples. A full list of hazards considered can be found at in the detailed risk assessment summary

Toxic compounds present in plants
Yew (<i>Taxus baccata</i>), Ragwort (<i>Senecio jacobaea</i>) and Bracken (<i>Pteridium aquilinum</i>)
Organic compound contaminants
PAHs (Polycyclic Aromatic Hydrocarbons), PCBs (Polychlorinated biphenyls), Pesticides (including Fungicides and Herbicides), Inks
Potentially Toxic Elements
Zn (Zinc); Cu (Copper); Ni (Nickel); Cd (Cadmium); Pb (Lead); Hg (Mercury); Cr (Chromium); As (Arsenic)
Pathogens and other organisms of relevance to animal health
African Swine Fever Virus (ASFV); Newcastle Disease Virus (NDV); Classical Swine Fever Virus (CSFV); <i>Toxoplasma gondii</i> ; Swine Vesicular Disease Virus (SVDV); Classical and Atypical Scrapie; Foot and Mouth Disease Virus (FMDV)
Pathogens and other organisms of relevance to human health
Enterobacteriaceae (<i>E. coli</i> O157); <i>Salmonella</i> spp.; <i>Campylobacter</i> spp.; <i>Listeria</i> spp.; <i>Staphylococcus aureus</i> ; <i>Cryptosporidium parvum</i>
Physical contaminants of relevance to human and animal health+
Glass; metal; plastic; non-stone fragments; stones; sharps.

*Digestate risk assessment only

+Compost risk assessment only

7 Quality controls for materials applied to land



Although the risk assessments showed that the underlying regulatory requirements were robust, the regulations do not provide guidance on best practice that could reduce risks even further. Such best practice guidance is already in place for other materials, such as:

- Managing Farm Manures for Food Safety (published by the Food Standards Agency)
- The Safe Sludge Matrix (published by ADAS and Water UK)

Consequently, the findings of the risk assessments and wider research programme were used as the basis for a 'Renewable Fertiliser Matrix', which covers compost and anaerobic digestate. The compost requirements are presented in Table 6 1. Versions of this matrix have now been embedded into the requirements of farm assurance schemes such as Quality Meat Scotland and Red Tractor Assurance. The statutory ABPR controls are a key risk management barrier, allowing for the attenuation of residual pathogens in compost before livestock could come into contact with the material. This same principle is applied to fresh produce, where crops are harvested several weeks after compost is applied, minimising potential exposure of humans to residual pathogens.

Table 6-1 The renewable fertiliser matrix (compost content only)

		PAS100 compost			
		Green		Green/Food	
Cropping category					
Fresh produce	Group 1	✓	Before drilling or planting ²	✓	Before drilling or planting ²
	Group 2	✓	Before drilling or planting ^{2,3}	✓	Before drilling or planting ^{2,3}
	Group 3	✓	Before drilling or planting ^{2,3}	✓	Before drilling or planting ²
	Combinable and animal feed crops	✓	May be applied before and after drilling or planting ⁵	✓	May be applied before and after drilling or planting ⁵
	Grassland and forage – grazed	✓	Three week no grazing period applies	✓	Statutory no-graze intervals apply ⁵
	Grassland and forage – harvested	✓	Three week no grazing period applies	✓	Statutory no-graze intervals apply ⁵

Notes

1. Target of zero and absolute limit of $\leq 0.1\%$ (m/m dry weight) glass must be achieved.
2. May be applied as a mulch
3. In accordance with the European Animal By-Products Regulations (Regulation (EC) No. 1069/2009 and Commission Regulation (EU) No. 142/2011, as implemented by the nations of the UK and Northern Ireland). These currently stipulate intervals of two months for pigs and three weeks for other livestock
4. No specific additional risk-management approaches are required for this cropping category, as regulatory and good practice requirements apply to this (and all other) categories

The cropping categories used in Table 6-1 combine those previously adopted by Red Tractor Assurance for fresh produce, with those used in the Safe Sludge Matrix (Table 6-2).

Table 6-2 Categories used in the Renewable Fertiliser Matrix (updated to be in line with Red Tractor amendments)

Fresh produce	Group 1	Crops that the customer can eat raw and which do not have a protective skin that is removed before eating; they may also have a significant risk or history of pathogen contamination:	Whole head Lettuce, Leafy Salads (including any vegetable leaf you can eat raw), Celery, Salad Onions, Radish, Fresh and Frozen Herbs, Strawberries, Chicory etc.
	Group 2	Crops that the customer can eat raw and which either have a protective skin or grow clear of the ground, or that have no history of pathogen contamination:	Apple, Beetroot, Blackcurrant, Blueberry, Broad Bean, Broccoli, Cabbage, Carrot, Capsicum, Cauliflower, Celeriac, Cherry, Courgette, Cucumber, Garlic, Green Beans (including runner beans), Melon, Mushroom, Onion (red and white), Pea, Pear, Peach, Plum, Raspberry, , Sugar Snap Peas, Sweet Corn, Tomato and Tree Nuts, etc.
	Group 3	Crops that the customer always cooks:	Artichoke, Aubergine, Brussels Sprouts, Hops, Horseradish, Kohl Rabi, Leek, Marrow, Parsley root, Parsnip, Potato, Pumpkin, Squash, Swede, Turnip, etc.
	Combinable and animal feed crops	Wheat, Barley, Oats, Rye, Triticale, Field peas, Field beans, Linseed/flax, Oilseed rape, Sugar beet, Sunflower, Borage.	
	Grassland and forage – grazed	Grass, Forage swedes and turnips, Fodder mangolds, Fodder beet, Fodder kale, Forage rye and triticale, Turf.	
	Grassland and forage – harvested	Grass, Forage swedes and turnips, Fodder mangolds, Fodder beet, Fodder kale, Forage rye and triticale, Turf.	

8 Additional Resources

Farmer's guide to sourcing and using digestate and compost

https://www.zerowastescotland.org.uk/sites/default/files/Farmers_guidance_document.PDF

Digestate and compost good practice guidance

<http://www.wrap.org.uk/content/digestate-and-compost-good-practice-guidance>

Compost quality and safety for agriculture risk assessment summary

<http://www.wrap.org.uk/content/digestate-and-compost-good-practice-guidance>

PAS 100

<http://www.qualitycompost.org.uk/standards/pas100>

SEPA position statement on regulation of outputs from composting processes

<https://www.sepa.org.uk/media/219843/wst-g-050-regulation-of-outputs-from-composting-processes.pdf>



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