

AfOR's Information sheet on composting paper and cardboard wastes comingled with biowaste

1. Introduction

Treating paper and cardboard presents significant challenges for composting operators, particularly those that are investing significantly in compost quality and market development.

Paper and cardboard is not suitable to process in all composting facilities, and comingled types are especially challenging.

In light of these challenges AfOR's advice to local authorities is that, wherever possible, paper and cardboard are collected separately from green waste and food waste and not sent to composting. There is an inherent risk posed of contamination entering the 'organics' waste stream when these materials are collected as a comingled waste stream. These issues are highlighted below.

2. Issues related to physical contaminants associated with cardboard packaging

Only small proportions of sufficiently clean paper and cardboard streams can be suitable for a composting process that aims to produce quality compost. Paper and cardboard that have been either comingled with other waste material green and kitchen waste, are very likely to include a range of undesirable contaminants.

Comingled or not pre-sorted paper and cardboard is likely to include plastic from over packaged cardboard, steel from staples included within the cardboard packaging, dyes and inks which are used in the printing of the cardboard and certain adhesives. All these can adversely affect the quality of the compost and although some may be removed through the screening process, this will inevitably increase the costs of production. Examples of key contaminants that often cause for concern include cigarette packets which often have a plastic covering and foil liner.

3. Issues related to non-biodegradable coatings

In addition, non-plain cardboard from household sources is unlikely to be composted within a typical composting process timescale¹. For example, food packaging boxes (e.g. muesli bar boxes), cereal packets, shoes boxes, and washing powder boxes, would not compost within a typical composting process timescale. They tend to have shiny or semi-shiny surface coatings that act as a moisture barrier and slow down the composting process. Exceptions are packaging items that have been independently certified compostable in accordance with the British and European standards for compostable packaging and plastics, respectively EN 13432 and EN 14995.

Foil-lined food or drink cartons (tetra pack/juice and milk cartons) will certainly not adequately biodegrade within a typical composting process timescale, mainly because of the presence of the non biodegradable surface and interior lining coatings. Again, they act as a barrier and slow down the composting process.

The type of domestic cardboard packaging that would be suitable for composting is reduced to few types such as toilet roll and kitchen roll tubes, egg boxes with non-compostable labels removed and brown/plain corrugated cardboard. However, this last type often contains non compostable materials such as bubble wrap, plastic film and polystyrene, the packaging's exterior is likely to carry adhesive tape or metal staples.

Recent research carried out by Woods End Laboratories and Eco-Cycle shows Relevant research shows that non-compostable plastic-coated paper products produce, when composted, both macro- and micro-fragments of non-biodegradable plastic which can contaminate the finished compost:

- ✓ micro-fragments are too small to be screened from the finished compost; thus, these can be dispersed into the environment, where they have not been shown to biodegrade and are suspected of causing detrimental effects to organisms in a variety of ecosystems.
- ✓ macro-fragments can be large enough to be screened from the finished compost as a contaminant, but this results in a significant increase in processing and disposal costs for operators.

More detail about this study can be found at:

<http://www.ecocycle.org/microplasticsincompost>.

Carbon to nitrogen ratio

If paper or cardboard is mixed with other biowastes prior to composting, it is important that a suitable balance of carbon and nitrogen is achieved at the start. This ensures that biodegradation is facilitated, in part, through the correct balance of nitrogenous and carbonaceous feedstocks. At certain times of the year, particularly

¹ Commercial composting timescales are typically 8 - 10 weeks for PAS 100, where they are processing biowastes that do not include compostable packaging.

the winter months, composting sites processing only green waste may face a significant reduction in the volume of nitrogenous material delivered (less grass cuttings). This means that there is insufficient nitrogenous material to allow the composting process to work effectively. On the other hand, a means by which composting processes dealing with food waste (nitrogenous feedstocks) can achieve a suitable carbon to nitrogen ratio is incorporation of a low proportion of plain paper and/or cardboard.

If paper and cardboard in composting cannot be avoided

WRAP published a Guidance Document for composting operators who are considering accepting cardboard and wood wastes². It is based on trials carried out by ADAS.

If it is not possible to avoid paper/cardboard within the feedstock materials, composting operators should know that composting of feedstocks containing some types of plain paper and cardboard is possible, only if incorporated in a suitably **low proportion**.

WRAP supported trials carried out by ADAS³ to assess the suitability of composting cardboard suggest that, with an initial proportion of cardboard of 16 % (wet weight) it is possible to operate a successful composting process and obtain a product suitable to be used as a soil amendment. **However, when the proportion of cardboard in the initial feedstocks is increased to 20 % (wet weight), the trials showed that large pieces of cardboard did not degrade well** for the following reasons:

- large pieces of cardboard have a small surface area available for degradation and
- large bits of card do not wet very well.

Thus, the key factors to take into consideration are shredding and wetting the cardboard material.

The WRAP guidance document concludes that if cardboard is mixed with green waste or kerbside collected green/kitchen waste at **10 %** (wet weight) or less, the resultant compost should not be significantly different from composts obtained without the addition of cardboard and should attract similar markets - agriculture, landscaping, or blended in topsoil or horticultural products.

Local Authorities that decide to go down the route of collecting paper and cardboard within the biowaste streams, should be aware that composting

² WRAP, 2007. Composting wood or cardboard waste with green garden or household kitchen waste. A practical guide to help compost producers who are intending to compost cardboard or wood waste. Downloadable from http://www.wrap.org.uk/downloads/Feasibility_of_Composting_Wood_and_Card_-_Guidance_Document.ceb8175b.3946.pdf

³ WRAP, 2006. Feasibility of composting wood and cardboard waste with green garden or household kitchen waste. Trials research report written by ADAS and downloadable from http://www.wrap.org.uk/recycling_industry/information_by_material/wood/feasibility_of.html

operators may find it very challenging to achieve quality products, in particular if the proportion of paper/cardboard is higher than that recommended above and if the paper/cardboard delivered to the composting site is not sufficiently clean.

In particular, Local Authorities should be aware that composting operators treating a significant proportion of paper/cardboard are very likely to struggle not to exceed the limit for physical contaminants set in BSI PAS 100:2011 Specification for Composted Materials and that for plastics. According to the current edition of PAS 100 (2005) this limits for compost products is set at 0.25 % m/m for total physical contaminants **(including visible fragments and clumps of paper and cardboard)** and at 0.12 % mm for plastics.

Where local authorities are compelled to collect paper and cardboard within the organics waste stream, the processing facility needs to clearly define the following:

- paper and cardboard types that shall be accepted at the composting facility and those that will be rejected;
- maximum portion of cardboard/paper (in weight) that shall be accepted at the composting facility above which the load will be rejected; and
- the cost of disposing of this rejected material through the most appropriate channels.

Please take into account that this is guidance. Compost producers should establish what would suit his/her process and ONLY accept the material on a trial basis until process management and compost quality has been thoroughly checked.

Implication for PAS 100 / Compost Quality Protocol producers

AfOR highlights that any producer on the PAS 100 and Compost Quality Protocol Scheme must return to a process and quality validation phase if they start accepting paper, cardboard, or similar potentially contaminated types of feedstocks.

Compost producers should also consider that adding paper and cardboard to the feedstocks may have implications for process management: compost piles may need additional watering, longer composting timescale and compost may have to be screened to a finer grade.