Food Waste

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Food waste is a term covering all discarded cooked and uncooked biodegradable food. Food waste was at one time used directly as a feed for animals but the tighter regulations imposed in 1973 led establishments to dispose of food waste by mixing with other solid waste or by macerating and disposing through the water system. The European union has now reached agreement on a 'Directive on the Landfill of Waste' and the strict targets require a radical alteration in the treatment of biodegradable waste.

The 'Directive on Landfill of Waste'

This directive has arisen as a result of the European wide recognised need to tackle the unsustainable nature of landfill. The contamination of soils with leachate and heavy metals coupled with production of methane, a potent greenhouse gas, means that this method of organic waste disposal is environmentally unacceptable at its current level. This directive will have a dramatic effect on our treatment of biodegradable waste. Over the next 20 years there must be a reduction by 65 % of biodegradable materials (based on 1995 levels), sent to landfill. The first target is 25% in 2010. In addition, all waste must be treated in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery. This directive anticipates a massive increase in the number of composting, recycling and anaerobic digestion facilities prior to landfill. Incineration is another option but not recommended by the European community.

Affect on schools

Schools vary greatly in the way in which dinnertime is organised and consequently the type and amount of waste that is produced. School kitchens have large quantities of uncooked waste and are in a situation where they can effectively separate cooked from uncooked and from meat /meat products. Finding ways of reducing the quantity of waste is of primary importance. Since the introduction of choice in the school menu, there has been a reduction in the waste produced. Packed lunches and morning snacks have also altered the pattern of waste production since pupils are now expected to return home with their waste.

The impact on the biodegradable waste stream therefore varies significantly between schools and it is inevitable that some schools will not feel it necessary to take action on their premises. However, this European directive is of such significance that a major change in attitude and understanding of biodegradable waste by the general public is required. Schools can play a major role in education in simple daily routines of waste minimisation, separation and appropriate disposal.

Food waste

Food waste consists of a mixture of different materials that degrade at varying rates. It is attractive to vermin (mainly rats), which can spread disease. This means that it is a difficult biodegradable material to deal with. At the same time, it is a material that causes concern in landfill because of its high nutrient and calorific value. Food waste can be separated into three categories; uncooked waste, cooked waste and meat waste or waste that has been in contact with meat. Uncooked waste consists of fruit and vegetable peelings, egg shells and tea and coffee grains. Cooked waste consists of vegetarian plate waste, dairy, oils, bread, crisps and biscuits. Meat waste consists of non vegetarian plate waste, fish, poultry and mammalian meat scraps, bones and any food which has been in contact with meat. Uncooked waste is the easiest to deal with and requires little specialised knowledge.

Composting can take place in open containers. Cooked and meat waste often has a high salt content and attract vermin. The composting of cooked waste requires a sealed or vermin-proof container. The composting of meat waste is regulated by the 2002 risk assessment of the animal biproducts regulation and requires a sealed container raised to a temperature of 600 for 2 days or 700 for 1 hour. This cannot be guaranteed on a school site and correct hygienic treatment would become the responsibility of the Local Authority.

Regulations

Uncooked vegetable and fruit wastes pose no human health risk. No licence is presently required if less than 1000cubic metres of waste is being composted on site but there are implications for the sale of the end product. Schools can only sell their composted waste if the compost is produced on their property. If it is removed to a farm or allotment etc, the compost would have to be used at that site. If composting occurs off site a 'carriage of waste' licence is required costing approximately £70 for three years.

Onsite composting

Composting on the school site is, in environmental terms, the best option. The viability depends on the type of waste produced, the amount of waste produced, size of

the school grounds, suitability of site, having a market for the compost end product and compliance of staff to maintain the composting operation.
The collection of waste from kitchens is most easily facilitated with smaller containers of around 10 L3 with a lid which shuts tight, situated on a work surface or a wheeled container situated near the work area, emptied on a daily bases into an outdoor composter. Biodegradable cornstarch bags are another option. These allow moisture to evaporate and have the added benefit of creating conditions that prevent the development of moulds and spores. Devices to automate waste separation or disposal, such as chutes, do not work well in practice because of difficulties in cleaning. There are several styles of purpose made containers that are easy to clean and handle. Important considerations for design are that there is sufficient kitchen space for an organic waste bin within a series of bins (or chutes) for other recyclables. Greater separation success is achieved if the containers are not only different colours but are also different styles so as to minimise confusion. Children can be encouraged, as part of their dinner routine, to place their organic waste in a bin both in the playground and dinnerhall. The removal of organic material from playground rubbish bins will minimise wasp attraction.
If the outdoor composter is situated reasonably close to the school kitchens then the chore of carrying the compost does not become tedious. However it must be far enough away so that occasional bad smells are unnoticed. Composting is not an odorous process. However if air flow through the compost is insufficient or acidity rises or if liquid is not drained away, a composter can become anaerobic and odourous. It is as well to design for these events as, even though they are occasional, they leave a lasting memory and create a user resistance to composting. Composters have been designed either for home use with a capacity of up to 700 litres or commercial use with capacities in excess of 10,000 litres. An option for schools is to maintain several household sized containers. A traditional style composter made out of slatted wood or bricks is only useful for woody waste, plant clippings, fruit and vegetable peelings, fruit cores, tea and coffee. The advantage of this type is that it can be constructed to the optimum required size being cheaply adjustable to suit the load. For any other type of food waste, purpose built plastic moulded or metal, vermin proof composters are required. There are now several commercially available tried and tested composters. Options include:
Worm composter. Worms aerate a compost mass and eat the organic matter, excreting wormcasts which create a high quality compost and a liquid plant feed.
Tumbler composter. The composting mass is in a container that can be easily turned. They have vents to allow air to pass through and the turning and aeration ensures high bacterial activity so that the mass attains a high temperature and composts within 3 weeks.
Compost bin. These vary greatly in size and features. Some have extra insulations and use solar heat to maintain the heat of decomposition. Others are detachable so that the finished compost can be removed or have no base and are dug partially into the ground- a wire mesh preventing access from burrowing vermin. Positioning under a tree can ensure nutrient recovery.
All composting operations have some maintenance and require knowledge and interest. Worm composts should be drained and the neutral pH maintained by additions of lime. Tumbler composters require daily rotation. Attention needs to be given to the materials entering the composter so as to ensure a good mix of carbon and nitrogen. The bin style composter needs the least attention but is also the slowest at producing compost.

The process

If organic material is left for a period of time it will decompose without any help. However a little knowledge of the process can ensure that decomposition will be rapid and the end product will be a good textured soil and not odourous slurry. Oxygen, moisture and heat are necessary for rapid breakdown. Therefore the composter needs to be well insulated and should be designed to allow air to enter at the base, flow through the organic material, and out through the top. Organic material is approximately 90 % water and should not require extra water to maintain the necessary moisture levels. Indeed, too much water will prevent good contact with air and result in anaerobic rather than aerobic decomposition. Anaerobic (without air) decomposition is a slower decomposition process resulting in the production of methane in the place of carbon dioxide, hydrogen sulphide in place of sulphates and ammonia in place of nitrates. Getting the right balance of carbon and nitrogen, approximately30:1is important. Food waste, which is generally high in nitrogen would ideally require mixing with sawdust, straw, hedge clippings, shredded paper or cardboard that have high carbon contents.
The organic material provides food for fungi and bacteria. They multiply and their activity causes a rise in temperature. Complex carbohydrates such as cellulose are broken down at this stage. The increase in temperature eventually kills the bacteria and fungi (and also seeds and disease organisms). The temperature then drops and higher organisms such as worms, centipedes and millipedes get to work.
Throughout the process there is a reduction in carbon content that stabilises at approximately 20% of its original content. A few weeks maturation time is required in order to produce usable compost. Additions of soil products such as sand or peat can alter quality and produce saleable composts for the wider school community.