Best Practice Guidance for On-Site Composting in Green Spaces Managed for Biodiversity

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1.Introduction

Most local authorities have been promoting a policy of mulching or grasscycling in the management of grassy areas in parks and public open spaces. This cutting and leaving it approach is best practice in terms of waste prevention as it avoids the need to remove landscape waste for disposal and facilitates the recycling of nutrients at source. While grasscycling reduces the time and cost associated with managing grassy areas, it is out of sync with newer goals to promote biodiversity and establish more pollinator friendly areas within our communities. Under the National Pollinator Plan, more local authorities and communities are managing open space with longer cutting regimes to allow wild flowers to flourish.

Better management of grass that allows for wildflowers to establish, flower and reproduce makes this more challenging. As grassy meadows are cut less often (varying from every 4-6 weeks to just once a year), this does not allow for effective grasscycling or mulching due to the increased volume and stalky nature of the cuttings. The options for managing these pollinator friendly areas include mowing and lifting the grass cuttings for on-site composting or to transport the cuttings for treatment at a centralised composting facility. The most cost-effective approach, and best practice environmentally, is to compost these materials on site. This guidance document, therefore, provides advice on how to effectively compost these materials on site.

2. Landscape Cuttings from Biodiversity Areas

There are generally three types of landscape cuttings from biodiversity areas depending on the type of plant, time of year and frequency of cutting or mowing. Each will favour a particular range of wildflowers. Timing of cutting will also influence what plants can flower and seed successfully.

a. Long green grass cuttings

These are generated from the mowing of grassy areas that are allowed to grow for 4-8 weeks, depending on the time of year. The cuttings consist of both grass leaves and stems. The stalky nature of the cut stems prevents them from breaking down easily if they are left on the cut area. In wet conditions, the cuttings clump together and prevent sunlight from reaching the growing grass below creating a spotty unhealthy and unattractive area.

b. Summer wildflower areas
The pictures above show two wildflower pollinator friendly areas within a park setting. When mowed, the cuttings must be lifted or the cuttings will suffocate any plants underneath. Plus the area would look messy and unmaintained

c. Autumn/Winter wildflower areas
These are areas that are allowed to flower in summer and early autumn months and then when it gets colder in late autumn or early winter, the plants die. As shown in the picture to the right, what's left is stalky and dry. If mowed, the cuttings would become a thick mulch and most likely would prevent the wildflower area from reestablishing itself in the following spring and summer months.

In all three cases, the best way to manage the cuttings from these areas is to collect and compost them instead of being left in place. However, a concern with the on-site composting of these materials would be the survival of grass, flower or weed seeds after the composting process. Unless this compost is returned to the area from which the materials came from, it would be of limited use, as it could potentially spread grass, wildflowers or weeds into planting areas where they are not wanted.

3. Recommended Types of Composting Systems

There are many types of composting systems that can be used from a continuous, cool and slow holding system to a batch, hot and fast turning system. However, in order to control or kill off grass, wildflower and weed seeds, a composting system that produces heat in excess of 60° C is needed so a batch turning system is recommended. These systems require a large volume of materials to create a batch of at least one cubic meter in size. This allows sufficient heat to be generated by the composting organisms and because a larger pile provides insulation of the core, heat can be maintained within the pile which will kill off seeds. Turning the composting materials provides aeration and sustains the composting process. This allows all materials to be exposed to seed and pathogen killing temperatures by turning the core to the outside and outside areas into the middle of the pile.

Depending on the volume of materials that are being managed, there are two options:

1. For smaller volumes of materials, one option is to have two individual composting bins, such as a pallet bin shown to the right, where a batch can be created and then turned into another pallet bin two weeks later. After another two weeks, the materials can be turned back into the original bin. A two-bin block system can also be used and is shown here.

2. For larger volumes of materials generated on a more consistent basis throughout the year, the other option is to have a 3-6 unit bunker system where a batch of compost can be made in the first bunker and then turned one way into subsequent bins, ending up in the last bin for curing. Individual bins or bunker systems can be made from timber, blocks or pallets as shown in these photos:

4. Essentials of Composting

Composting is a biological process. We are, in essence, farming microbes to promote the decay of biodegradable materials or anything that was once living. The key thing here is that all of the composting organisms, bacteria, moulds, fungi, worms and insects, require a balanced diet of green and brown materials, oxygen and moisture to thrive. There are five essential elements for successful composting especially if the goal is to reach seed and pathogen killing temperatures. These are explained below.

a. Surface Area

Composting happens from the surface inward. So the smaller the particles, the faster they will decay. It is therefore essential that larger stalky materials are shredded or cut up using a mower. If large and long materials are allowed in the system, there will not be a good opportunity to mix a variety of materials together. The larger materials will also create too much porosity or air space within the pile leading to materials drying out and as described below, without adequate moisture, the composting process stalls.

b. Balance of Green & Brown Materials

One of the biggest challenges with hot composting is getting the mix of materials right. Too green and wet, the materials will compact and get gooey and smelly (see the picture at the top of this page to the left of a pile of grass cuttings on their own… not a pretty sight). This will be the challenge for the long green grass cuttings. They will not compost well on their own and need to be mixed with autumn leaves or bush trimmings. Half leaves and/or bush trimmings to half grass cuttings would be a perfect mix by volume. On the other hand, too dry and brown and the materials will take a long time to compost and will not reach seed killing temperatures. This is the case with the materials generated from autumn/ winter wildflower areas. These need to be mixed with fresh grass cuttings or a lot of shredded flowers, weeds and bush trimmings. The only material that does not need to be blended with other materials would be cuttings from summer wildflower areas. These just need to be cut or shredded and moistened to compost well.

c. Moisture

All life needs moisture to survive and thrive and the composting organisms are no different. The composting organisms live in the film of moisture that surrounds each composting particle. With no moisture, there is no where for the composting bacteria to live and do their work. However, too much of a good thing can be bad meaning that if a pile is too wet, water can fill up the needed small air spaces within a pile so it cannot breathe and maintain aerobic or oxygen rich conditions. The moisture level of the composting pile should be moist to the touch or as wet as a wrung out sponge.

d. Aeration

Supplying oxygen is an essential element in stimulating air loving bacteria that are the engine of the initial composting process. Without sufficient air, bacteria that can survive without air can take over creating methane and foul odours as a result. If materials are chopped up and well balanced, and there's sufficient moisture, the composting process takes off and heat is generated as the microbes breakdown the carbon chains within composting materials. The heat, therefore, is an indication that optimal conditions have been created within the composting mass. In this situation, composting activity accelerates until one or more of the essential elements of composting becomes limited. If the pile dries out, for example, composting will stall or slow down. The same thing happens when the composting mass cannot get sufficient oxygen or the pile cannot breathe. Initially as heat is generated and rises, air is drawn into the pile to keep it aerobic. As materials decay, the pile settles reducing the porosity or air space within it which inhibits passive air flow. Physically turning the pile restructures it or fluffs up materials to increase air pockets as well as introduces fresh air into the composting mass. This helps sustain the composting process and keeps the composting mass hot enough for a longer period of time to kill seeds and pathogens.

e. Critical Mass

A critical mass of materials is needed to kick start and sustain the composting process and to maintain heat within a pile. If a pile is too short, materials can either dry out in summer months or get soaking wet in winter months. Too dry and the composting process stalls. Too wet and anaerobic bacteria can take over and create odours. Shorter piles also do not retain heat as well as taller piles. There is just too much surface area on top relative to the volume of materials underneath. At least a cubic meter sized pile provides the volume of materials needed to self insulate itself and hold heat to kill both potential pathogens and plant seeds.

5. Steps for Managing Composting of Materials from Biodiversity Areas

Here are the steps for building a hot pile and managing the composting process:

a. Cut or Shred Large Materials
Following the composting essential of particle size, large materials such as the summer/autumn wildflowers or the stalky autumn/winter wildflowers need to be cut up or shredded prior to composting. This can be done with the use of a lawn mower regardless of its size. If materials are cut by hand, be sure to cut or shred long trimmings into pieces that are less than 15-20 cm in size. If a hedge trimming devise is used, cut the wild flower patch down 15-20 cm at a time until the desired length from the ground up is attained. This also applies to bush and hedge trimmings if they are to be used as a supplement for composting long fresh green grass cuttings.

b. Assemble Ingredients
Following the composting essential of balancing green and brown materials, this is the time to make sure that you are providing the composting bacteria with the right diet of materials. For the composting of long fresh grass cuttings, be sure to add a mixture of brown materials such as leaves and/or cut up bush trimmings in equal volumes. So if you have a cubic meter of grass cuttings, a cubic meter of leaves and/or bush trimmings are needed to balance things out. (This is why collecting leaves in the autumn is so important for mixing with long grass cuttings in the subsequent spring and summer.) Summer/autumn wildflowers are well balanced diet wise so all you have to do is be sure they are cut up or shredded. For shredded or cut up autumn/winter wildflowers that are stalky and dry, store them until you can mix them with green materials, such as fresh cut grass cuttings, a mixture of cut up or shredded weeds, flowers, plants and bush trimmings or fresh unbedded or lightly bedded animal manure, generated in spring or summer months. This can also be done on a one-to-one volume basis as well: one part chopped dry stalky brown wildflowers to one part shredded green materials.

Mix and water

Well mixed materials

c. Mix and Moisten Materials Outside of Bin

Assemble all of the materials on the ground in front of the bin, bay or bunker you plan to use for composting. Using a pitch fork, mix and moisten materials until there is a good mixture of materials and everything is well moistened. Don't worry about adding too much moisture. Any extra moisture at this point will simply run off of materials and drain into the ground.

d. Add Mixed & Moisten Materials to the System

Once materials are thoroughly mixed and moistened, use a pitch fork to add them to the composting bin, bay or bunker for composting. Fill the bin up all the way or create a square pile within a bay or bunker. Avoid making piles that are too short and wide or spread out.

5. Steps for Managing Composting of Materials from Biodiversity Areas - continued

e. Monitor Temperature

Using a thermometer (one can be purchased online for €15), monitor the temperature of the composting pile. Within days the temperature should start to increase. In 5-7 days, the pile should be getting hot to between 40-60°C. In 10-12 days, the temperature should be as hot as it is going to get and could reach as high as 70°C. Once the temperature starts to decrease, you know that the pile is beginning to suffocate and needs to be turned. If you do not have a temperature probe, then don't worry. Check temperatures by feel and turn piles every two weeks.

f. Turn the Pile

For smaller bins, use a pitch fork to turn the pile being sure to place materials from the outside of the initial pile into the middle of the new pile and vice-a-versa. If the pile seems to be a bit dry, you can sprinkle a little water on materials as you are turning them. The important thing when turning materials is to loosen them up and make sure that clumps of materials are broken up. If you are using a larger bunker or bay, a tractor or front end loader can be used to turn materials. Again, care should be given to mix materials within the initial bay or bunker by lifting up materials and "bouncing" the bucket as it is slowly being emptied. Once the materials are mixed up a bit, shovelfuls can be picked up and moved or turned into the new bay or bunker.

g. Monitor Temperatures and Turn Again

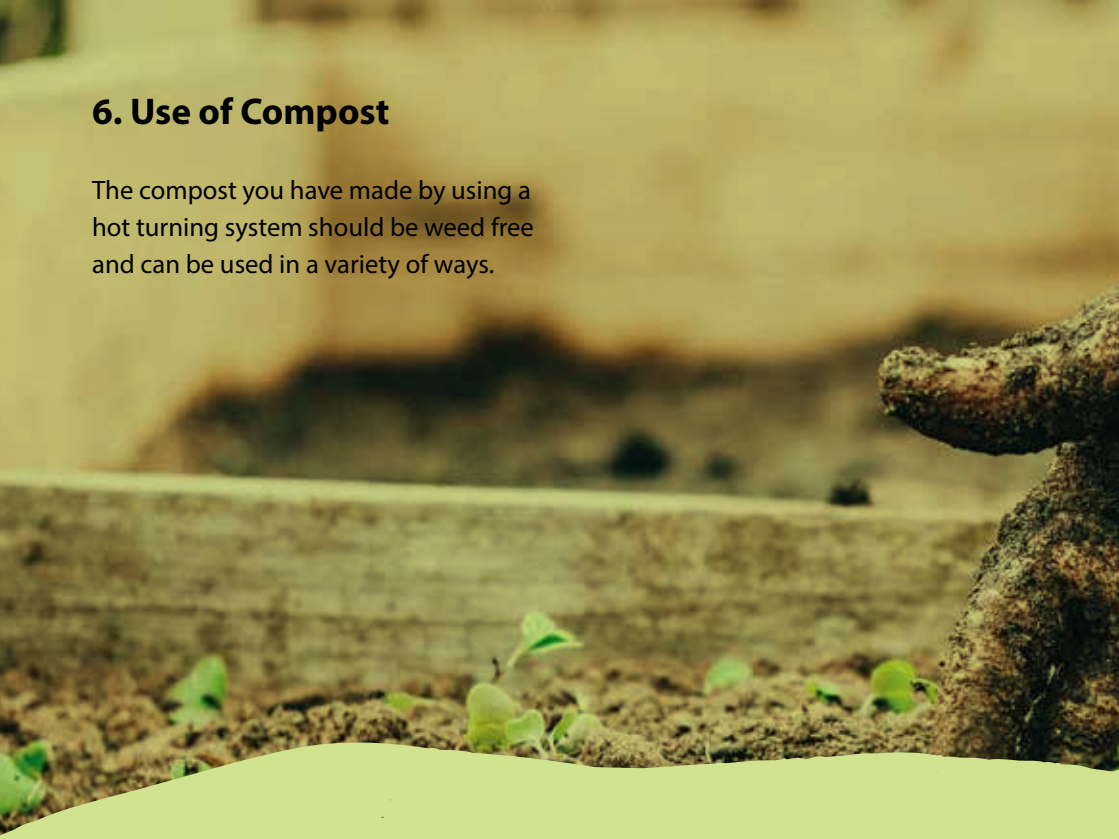
Monitor the temperature of the turned pile every few days. Although the temperature may not reach as high as in the first pile, temperatures nevertheless should exceed 60°C. Allow the materials to compost until the temperature starts to decrease in 10-14 days. At this point, turn the pile again being sure to break up clumps when turning and check for adequate moisture.

h. Allow the Pile to Sit and Cure

After the pile has been turned for the second time, temperatures will increase again, but not as high as in the previous piles as the composting bacteria have used up the food that is easily accessible to them and the composting process is well on its way. All the materials then need to sit and rest in the third bin or bunker. After a month or more and especially during wetter winter months, cover the pile with a tarpaulin to keep it from getting too wet. In 2-3 months, the compost should be ready to use. You can also let the pile sit over winter allowing it to fully mature for use in spring gardening beds.

6. Use of Compost

The compost you have made by using a hot turning system should be weed free and can be used in a variety of ways.



a. Top Dressing

The compost can be used as a top dressing for lawns, sport pitches or grassy public spaces to stimulate grass growth and provide essential micronutrients for healthy lawn maintenance. It can also be used to establish new grassy areas by broadcasting seeds on loose soil and covering with 1cm of compost. Then water. The compost will hold moisture on top of the seeds which helps facilitate seed germination, especially in warmer late spring and summer months.

b. Mulch

The compost you make can also be used as a mulch in both annual and perennial planting areas. Simply spread 3-10cm in planting areas being sure to keep the compost away from plant stems. As a general rule of thumb, shorter annual plants require less mulch than larger perennial plants. As the area receives water from irrigation or rain, nutrients will seep into the soil and feed plants within it. The mulch also conserves soil moisture in summer months and helps prevent weed growth.

c. Soil Amendment

Compost can also be used as a soil amendment for planting areas. Apply 6-10cm of compost onto a planting area and use a spading fork or mechanical tiller to mix the compost into the soil to a depth of 20-30cm. You can then plant flowers, ground cover or bushes into the soil.

d. Ingredient in Potting Soil and Seed Starting Mixes

The compost can also be mixed with soil to create a potting mix. Use 1/3 compost to 2/3 garden soil. A sieved compost (<1cm) can be used to create a seed starting mix using 1/2 sieved compost with 1/2 fine salt-free sand.

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