Supplementary material on Composting

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The explanations shown in this supplementary material were adapted from the following report:
"**The art and science of composting, Cooperband (2002)"**

Available at: http://www.cias.wisc.edu/wp-content/uploads/2008/07/artofcompost.pdf

1. How to measure bulk density of compost

Bulk density is defined as the weight per unit of volume of your material, in this case compost.

In order to calculate the bulk density of compost, or any other material, you need the following equipment:

- Bucket with a determined volume.
- Weight scale
- Compost

These are the steps:

1. Weigh the bucket empty and record.
2. Filling the bucket: Add the organic waste or compost into the bucket. Fill 1/3 of the bucket and tap the bucket five times on a flat hard surface. Add another 1/3 of material, tap five times again, then fill to top without tapping.
3. Weigh filled bucket and record.
4. Determine the bulk density using the calculations below.

In this example we will use a bucket of 20 liters to measure the density of compost.

			Example
-	$\boldsymbol{W_{bucket}}$	Weight of empty bucket	1 kg
-	$\boldsymbol{W_{c+b}}$	Weight of bucket with compost.	10 kg
-	$\boldsymbol{W_{compost}}$	Weight of compost $(W_{c+b} - W_{bucket})$	9 kg
-	$\boldsymbol{V_{compost}}$	Volume of compost	20 L
-	$\boldsymbol{\sigma_{compost}}$	Bulky compost $\left(\frac{W_{compost}}{V_{compost}} = \frac{9\ kg}{20\ L}\right)$	0.45 kg/L

2. How to measure porosity of compost

Porosity is defined as the volume of pores divided by the total volume of compost. In order to calculate the porosity of compost, or any other material, you need the following equipment:

- Bucket with a determined volume.
- Weight scale
- Compost

These are the steps:

1. Filling the bucket: Add the organic waste or compost into the bucket. Fill 1/3 of the bucket and tap the bucket five times on a flat hard surface. Add another 1/3 of material, tap five times again, then fill to top without tapping.
2. Weigh filled bucket and record.
3. Take the filled bucket and pour water in it until it is completely full
4. Weight the filled bucket with water and record. The volume of the water will correspond to the volume of pores. The volume of water can be assumed to be equal to its weight, assuming a density of $\sigma_{water} = 1kg/L$.
5. Determine the porosity using the calculations below.

   In this example we will use a bucket of 20 liters to measure the density of compost.

			Example
-	$\boldsymbol{W_{c+b}}$	Weight of bucket with compost.	10 kg
-	$\boldsymbol{W_{c+b+w}}$	Weight of bucket with compost and water	21 kg
-	$\boldsymbol{W_{water}}$	Weight of water $(W_{c+b+w} - W_{c+b})$	11 kg
-	$\boldsymbol{V_{water}}$ - $\boldsymbol{V_{pores}}$	Volume of water = volume of pores	11 L
-	$\boldsymbol{V_{compost}}$	Volume of compost	20 L
-	$\boldsymbol{P_{compost}}$	Porosity compost $\left(\frac{V_{water}}{V_{compost}} = \frac{11\,L}{20\,L}\right) \cdot 100$	55 %

3. How to calculate moisture content of compost

Moisture content is defined as the weight of water per unit weight of your material, given in percentage.

In order to calculate the moisture content of compost, or any other material, you need the following equipment:

- Small container, preferably ceramic or metallic.
- Oven
- Weight scale
- Compost

These are the steps:

1. Weigh the small container empty and record.
2. Add 10 g of compost into the container and record the weight. This will be the *wet weight*.
3. Introduce the container with the compost into an oven and dry it at 110°C during 24 hours.
4. Reweigh the sample and subtract the weight of the container. This is the *dry weight*.
5. Determine the moisture content using the following equation:

$$Moisture\ content = 100 \cdot \left(\frac{Wet\ weight - Dry\ weight}{Wet\ weight}\right)$$