NCLE Composting Protocols

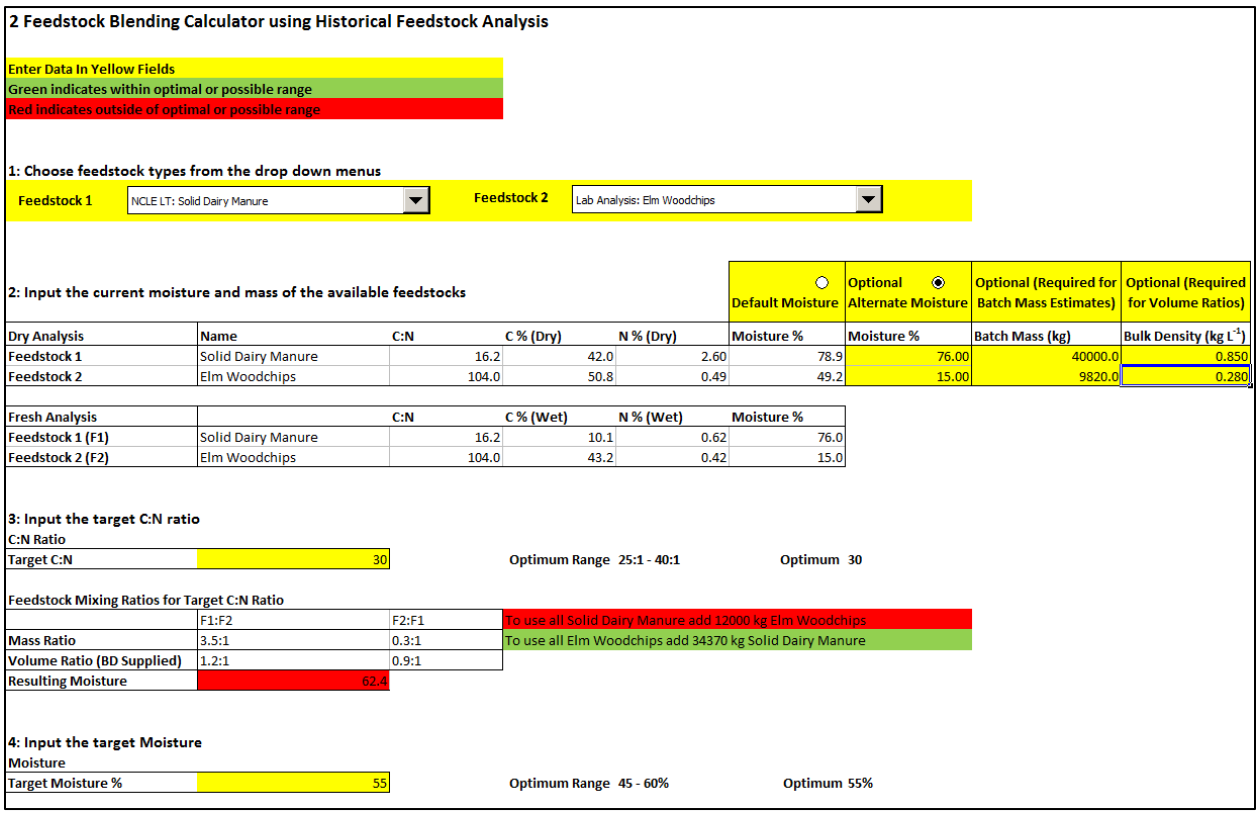
October 19, 2016

Table of Contents

National Centre for Livestock and the Environment (NCLE) Composting Protocols

Feedstock Preparation and Mixing

Feedstocks have a variety of qualities which will affect the composting process and the quality of the finished product. When a feedstock may be unsuitable or difficult to compost several feedstocks with complementary qualities can be blended. Blending cannot optimize all parameters, so a target value should be chosen within the workable range. The NCLE Feedstock Blending Calculator has been provided to help determine appropriate mixing ratios of various potential feedstocks.
(available at https://umanitoba.ca/national-centre-livestock-environment/resources).



2 Feedstock Blending Calculator using Historical Feedstock Analysis

Enter Data In Yellow Fields
Green indicates within optimal or possible range
Red indicates outside of optimal or possible range

1: Choose feedstock types from the drop down menus

Feedstock 1: NCLE LT: Solid Dairy Manure — Feedstock 2: Lab Analysis: Elm Woodchips

2: Input the current moisture and mass of the available feedstocks

○ Default Moisture ◉ Optional Alternate Moisture

Dry Analysis	Name	C:N	C % (Dry)	N % (Dry)	Moisture %	Moisture %	Optional (Required for Batch Mass Estimates) Batch Mass (kg)	Optional (Required for Volume Ratios) Bulk Density (kg L^{-1})
Feedstock 1	Solid Dairy Manure	16.2	42.0	2.60	78.9	76.00	40000.0	0.850
Feedstock 2	Elm Woodchips	104.0	50.8	0.49	49.2	15.00	9820.0	0.280

Fresh Analysis		C:N	C % (Wet)	N % (Wet)	Moisture %
Feedstock 1 (F1)	Solid Dairy Manure	16.2	10.1	0.62	76.0
Feedstock 2 (F2)	Elm Woodchips	104.0	43.2	0.42	15.0

3: Input the target C:N ratio

C:N Ratio: Target C:N 30 — Optimum Range 25:1 - 40:1 — Optimum 30

Feedstock Mixing Ratios for Target C:N Ratio

	F1:F2	F2:F1
Mass Ratio	3.5:1	0.3:1
Volume Ratio (BD Supplied)	1.2:1	0.9:1
Resulting Moisture	62.4	

To use all Solid Dairy Manure add 12000 kg Elm Woodchips
To use all Elm Woodchips add 34370 kg Solid Dairy Manure

4: Input the target Moisture

Moisture: Target Moisture % 55 — Optimum Range 45 - 60% — Optimum 55%

C:N Ratio

(Optimal = 30; Range 20-35)

The carbon to nitrogen ratio (C:N ratio) is the relative amount of carbon (C) to the amount of nitrogen (N) in a feedstock. Typically green or high protein products have more N and low C:N ratios while brown or woody products have less N and high C:N ratios. Microbes are most effective for composting within a particular range of C:N ratios. If C:N is too high decomposition will be slow or produce a product that has a high C content leading to low N levels when land applied (N immobilization). If C:N ratio is too low decomposition will be rapid while the piles are well aerated (aerobic) but rapid decomposition may deplete oxygen quickly making good aeration difficult to maintain. Poorly aerated compost (anaerobic) can become smelly and produce substances that

are toxic to plants. Low C:N ratio will also encourage nitrogen loss by ammonia gas and leachate. High concentrations of ammonia may become toxic to microbes slowing the composting process.

Feedstock C:N ratio can be adjusted by blending materials of different C and N contents. When current analysis is not available, a list of historical average analysis values can be used to estimate the mixing ratios. The above online calculator can be used to find a suitable mixing ratio to optimize C:N ratios.

When new feedstocks become available new entries can be made in the calculator data table and will be available to use in the calculator.

General Composition of Glenlea Feedstock Materials

Feedstock	Mean Moisture %	Moisture Range %***	Avg C/N	Dry C %**	Dry TN %	Dry P %
Liquid Hog Manure (Gold)	99.2	94.5 - 99.5	3.1	41.58	13.86	2.52
Solid Dairy Manure	78.9	76.6 - 79.9	16.2	41.98	2.60	0.85
Solid Hog Manure	65.1	49.7 - 67.7	21.4	41.99	1.98	1.03
Barley Silage (Fresh Cut)			28.7	44.50	1.55	0.29
Rapeseed (Green)*	77.0	63.8 - 85.3	22.7	44.50	1.96	0.41
Feed Wheat (Green)*	69.0	62.5 - 78.0	40.0	44.50	1.11	0.24
Non-Legume Hay*	66.7	22.0 - 80.4	37.8	44.50	1.23	0.24
Feed Wheat Straw*	40.1	23.3 - 64.1	81.0	47.00	0.58	0.19
Rapeseed Residue*	60.5	18.5 - 95.3	110.8	47.00	0.42	0.14

Values are averages from the NCLE Long Term Plots, database query Feb 1, 2011.

* Moistures of crop products are fresh immediately before harvest or cutting with no drying period. Therefore these are likely higher than bailed products.

** Carbon content has been estimated

*** Moisture ranges are minimum and maximum values.

Moisture

(Optimal = 55; Range 45-60%)

Moisture below 40% will stop decomposition and may take time to restart. Moisture above 60% will limit air-flow and encourage anaerobic conditions.

Feedstock moisture can be adjusted by blending feedstocks of different moisture contents or adding water. The above online calculator can be used to determine suitable mixing ratios and water to add.

When possible, waste water or effluent should be used to increase feedstock moisture content. Note that high N water may alter C:N ratios and water containing pathogens should only be added before the Hot Phase of composting.

Particle Size

(Range = 6 to 75 mm, 0.25 to 3”)

Aerobic conditions (oxygen present) encourage rapid decomposition while Anaerobic conditions (no oxygen present) will slow decomposition and can produce plant toxic chemicals, ammonia gas, foul smells and acidic compost. Incorporation of air into the windrows either passively by increasing pore sizes or actively by turning the compost will promote aerobic conditions.

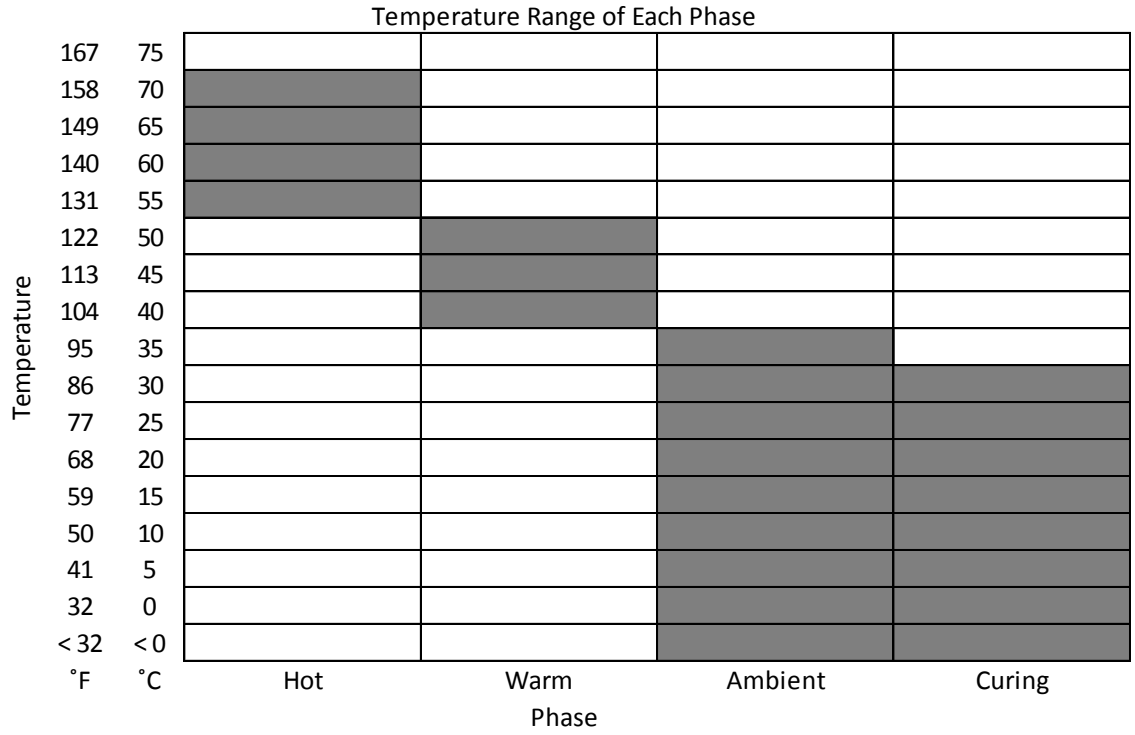
Larger particles will generally provide larger pores and smaller particles will provide smaller pores. Larger pores will allow for greater airflow but less surface area for decomposition and windrows will retain less heat. When particles are greater than 7.5 cm (3 inches) they may require reduction by chopping or further mixing. Care should be taken to not reduce particle size to the point where anaerobic conditions are encouraged. Larger particles can also be managed in larger piles or windrows which will also serve to restrict airflow and retain heat.

Windrow Formation Methods

There are several methods which can be used for the initial windrow formation; selection of an appropriate method will depend on the feedstock type, feedstock properties and the desired qualities of the finished product. Windrow size can be adjusted smaller to speed drying and encourage air-flow in wet, less porous feedstocks or larger to hold heat and compost faster for moist and porous feedstocks. Windrows should be oriented parallel to the ground slope to aid drainage and prevent pooling between the windrows. Once windrows have been created a windrow information sheet should be completed for record-keeping purposes.

When feedstocks are of a sufficient particle size (6 to 75mm, 0.25 to 3”) they can be piled in the proper proportions in appropriately sized windrows for your compost turner or loader. The materials can then be mixed and aerated with the compost turner. Pre-processing may be required to adjust particle size.

Composting Phases and Control Limits



Composting phases are defined by the temperature and moisture profile of the windrows. Each phase has a different set of “Control Limits” which are thresholds used

to determine when a management activity is required. For example during hot phase when windrow temperature drops below 55˚C (131 ˚F), and moisture is between 45% and 60% the windrow only needs be turned. To know when to perform management activities temperature and moisture must be monitored. The information collected can be used to compile “Control Charts”; these charts will be useful for scheduling activities, monitoring overall progress and will eventually reduce the monitoring frequency. Refer to the “Monitoring” section for measurement and record keeping protocols.

Hot Phase

(Estimated 2-3 weeks)

Hot Phase has a temperature lower control limit of 55˚C (131 ˚F) and is required for pathogen reduction, weed reduction and rapid decomposition. If moisture and carbon to nitrogen ratios are within operating limits, turning windrows during hot phase will be followed by a substantial increase in temperature. To ensure that pathogens and weed seeds are destroyed temperature must remain above 55˚C (131˚F) for a minimum of 15 days with a minimum of 5 turning events during this time (CCME guidelines).

Temperature and moisture can change quickly during this phase so frequent monitoring is recommended. Until the compost begins to heat a minimum turn interval of 1 week should be used to avoid turning too frequently.

Control Limits for Hot Phase

Control Limit Name	Value	Action
Moisture Upper	>60%	Monitor temperature and odor to prevent anaerobic conditions.
Moisture Lower	≤45%	Add pathogen free water and turn to incorporate. Suggest 55% as the target moisture.
Temperature Upper	>60˚C >140˚F	Monitor temperature and moisture closely. Add water if below 50% (<45% moisture material could combust).
Temperature Lower	≤55˚C ≤131˚F	Turn to aerate.

If moisture is in the acceptable range and temperature will no longer reach 55˚C (131 ˚F) following turning, hot phase is complete.

Note that if the requirements for pathogen reduction were not reached (15 days of >55˚C (131 ˚F), including 5 turning events), the compost can be analyzed or will need to be reserved for special use because it may contain more pathogens than are acceptable in a commercial product.

Warm Phase

Much of the volume reduction should already have occurred by this point; windrows can be combined to increase their size and may heat once more.

Warm Phase has a temperature lower control limit of 40˚C (104 ˚F) and is required for continued decomposition and stabilization. This phase is important for reducing plant toxic compounds which may have been produced during hot and early warm phases. During this phase the temperature response to turning is much weaker, the optimal temperature for warm phase is 45˚C (113 ˚F) or a range of 40-50˚C (104-122 ˚F). The

end of this phase will produce little to no temperature response to turning activities so moisture and timing will become the triggers for turning activities. Ideal moisture content is between 50-55%.

As a minimum, turn the windrows with water additions. Monitoring should occur at least once per week. Minimum turning interval should be 2-3 weeks.

Control Limits for Warm Phase

Limit Name	Value	Action
Moisture Upper	>60%	Monitor odor. Turn periodically to dry and aerate.
Moisture Lower	≤45%	Add pathogen free water and turn to incorporate. Suggest 55% as the target moisture.
Temperature Upper	55˚C 131˚F	None. Note; smaller windrows will retain less heat.
Temperature Lower	≤40˚C ≤104˚F	Turn to aerate.

If moisture is in the acceptable range and temperature will no longer reach 40˚C (104˚F) following two turnings, warm phase is complete.

Ambient Phase

The ambient phase allows time for microbial activity to slow as the last of the easily available food is consumed. During ambient phase there should be no substantial heating from turning events. Temperature should be tracked even though temperature control limits have become less useful. Moist aerobic conditions are still required but oxygen demand is reduced so turning frequency can also be reduced.

As a minimum, turn during moisture additions or monthly. Monitoring frequency can be reduced.

Control Limits for Ambient Phase

Limit Name	Value	Action
Moisture Upper	>60%	Monitor odor and turn periodically to aerate and dry.
Moisture Lower	≤45%	Add pathogen free water and turn to incorporate. Suggest 50% as the target moisture.
Temperature Upper	40˚C 104˚F	None. Note, smaller windrows will retain less heat.
Temperature Lower	Air Temperature	None.

The end of ambient phase and the beginning of curing phases are not easily defined and the management routine is very similar for these phases. A value between 10˚C and 20˚C (50-68 ˚F) on the “Self Heating Test for Compost Stability” indicates that the compost is ready to be pushed into a pile for curing. Control charts may be used to indicate the end point of the ambient phase once several windrows have completed composting and the operator has gained enough experience to judge when to cure.

Curing Phase

The curing phase is important for rebuilding microbial populations, building stable carbon forms and releasing previously immobilized nitrogen. Compost can be pushed into piles (Ideal: 3-5 m high and 5-10 m wide, 10-16' high and 16-32' wide) for storage and curing. Piles should be placed in dry, well-drained locations and covered when possible to prevent over-wetting, over-drying and nutrient leaching. Temperature and moisture should continue to be monitored.

Turn with water additions or monthly. Monitor temperature and moisture bi-weekly.

Control Limits for Curing Phase

Limit Name	Value	Action
Moisture Upper	>50%	Monitor odor turn periodically to aerate and dry.
Moisture Lower	≤40%	Add pathogen free water and turn to incorporate. Suggest 45% as the target moisture.
Temperature Upper	Air Temperature	None.
Temperature Lower	Air Temperature	None.

A value of less than 10˚C (50 ˚F) on the "Self Heating Test for Compost Stability" indicates that the compost has finished curing and is ready to use. This can also be determined using seed germination assays, purchased compost maturity tests or as part of a CQA analysis package.

Monitoring

Control charts track parameters such as temperature and moisture and will help determine when various compost management activities are required. Using the control charts, the rate at which moisture is decreasing can be extrapolated and used to schedule when to add water. Until control charts are produced temperature and moisture should be monitored frequently. When control charts have been produced monitoring frequency can be reduced and management activities can be scheduled in advance rather than closely monitored.

Measurements should be made at five locations in each windrow roughly evenly spaced along the length. These replicates will eventually be averaged into a value which is representative for the windrow as a whole. If sampling a pile, select five locations around the pile. All samples collected should be labeled with the windrow ID, date collected, sample location, type of sample and any other information required to identify the sample and the reason for taking it. Samples which are not immediately analyzed (> one week) should be stored in a freezer otherwise samples can be stored in a refrigerator or cooler (4˚C, 39.2 ˚F). Samples which will be sent for chemical or biological analysis may require special sample handling instructions refer to the "Chemical and Biological Analysis" Protocol.

Monitoring Temperature

Temperature can be used as an indicator of microbial activity; generally hotter compost has greater microbial activity and is decomposing faster. Decreasing temperature indicates that conditions, such as moisture or oxygen levels, are not optimal for microbial activity. If moisture is in the proper range the factor limiting microbial activity will generally be the lack of oxygen. Therefore, while moisture is in the proper range, temperature can be used to indicate when to turn for aeration. Tracking temperature can also indicate when some phases are complete.

Materials

- 5 Temperature probes
- Windrow information sheet

Procedure

- Insert five temperature probes into the windrow at the sampling locations. The tip of the probe should be near the center of the windrow at least 60 cm (2') from the base.
- Allow time for the temperature reading to stabilize (5-15 min) then record all five values on the correct windrow information sheet. Moisture measurements can be made while waiting for the readings to stabilize.

Monitoring Moisture

Moisture is a requirement for microbial activity and decomposition, although too much moisture will limit air-flow leading to anaerobic conditions (no oxygen), reduced microbial activity and the production of plant toxic compounds. The optimal moisture range is generally 40 to 60% by mass. It is important to add moisture before the windrow dries below 45% because, once stopped, it will take time for decomposition to resume. Low moisture during hot phase can cause the windrow to combust, track moisture closely while temperature is >60 ˚C (>140 ˚F). Only add clean water to the windrows following the initial windrow setup (Hot Phase) as pathogens may be re-introduced.

When water must be added to a windrow the online calculator above can be used to determine the correct amount of water to apply. Note that bulk density and windrow measurements are required for this calculation.

Moisture Sampling

Materials (per windrow)

- 1 Clean bucket; 4 L (1 gal) minimum capacity
- Clean shovel or fork
- 5 Labeled Ziploc freezer bags
- Rubber gloves

Procedure

- If temperature measurements are required, begin the temperature procedure before beginning the moisture procedure. If water addition is likely bulk density samples can be collected at the same time as moisture samples.
- At each of the five sampling locations:
    - Using a clean shovel or fork; dig a hole a minimum of 60 cm (2’) deep angled toward the center of the windrow.
    - Collect a handful of material from near the bottom, middle and top of the hole. Place all material in the bucket and mix well.
    - Immediately collect a sub-sample from the bucket and place it in one of the Ziploc bags labeled with sampling date, windrow or pile ID, sample type, person’s name and the purpose for collecting the samples (moisture).
    - Return unused material to the windrow and fill in the hole.
- Store the five replicate samples for up to one week at 4˚C (39.2 ˚F) until analyzed.

Moisture Analysis (Quick Microwave Method)

Materials

- 1 Microwave oven
- 1 Analytical balance
- 1 Microwavable tray (glass or plastic) per sample
- 1 Microwavable cup

Procedure

- Number and record the mass of all trays.
- Spread 15-25 g for wet samples, 25-40 g for moist samples or as much dry sample as will fit easily on each tray. Record the combine mass of each fresh sample and its tray.
- Ensure that no metal fragments are present in the samples.
- Place 5 samples in the microwave with in a microwavable cup filled with 250 ml (1 cup) of water.

  Do not dry samples without the cup of water or for excessively long intervals, this may char the samples, cause the samples to ignite or damage the microwave.
- If the samples are wet microwave on high for 5 minutes or if the samples are close to air dry microwave for 1-3 minutes. Adjust the number of minutes between checking based on the moisture of the sample.

  If samples begin sparking or smoking turn off the microwave, check for metal fragments and replace with new samples. Watch and when the water begins to boil replace it with cool water.
- Weigh several trays, record the mass and return them to the microwave.
- Microwave for an additional 1-5 minutes.
- Re-weigh the same trays and record the mass.
- If the mass decreased by more than 0.1g continue microwaving until a stable mass is achieved. For most samples this should take around 15 minutes.
- Calculate the (estimated) oven dried moisture of each sample and record the moisture on the windrow information sheet. The online calculator can be used to help convert the estimated microwave moisture to oven dried moisture and calculate the amount of water to add to a windrow.

  $$\text{Microwave Method Moisture\%} = \frac{[\text{Water(g)}] \times 100}{\text{WetCompost(g)}}$$

  $$= \frac{[\text{WetCompostTray(g)} - \text{DryCompostTray(g)}] \times 100}{\text{WetCompostTray(g)} - \text{Tray(g)}}$$

  $$\text{Oven Dried Moisture\%} = (0.9515 \times \text{Microwave Method Moisture\%}) + 5.5497$$

Bulk Density

Bulk density is a measure of how compact the compost is. It can be used in conjunction with moisture to estimate porosity or how much dry material is remaining at any point during composting. Bulk density should be determined before water additions to help estimate the remaining mass of compost and the amount of water to add. Refer to the online calculator.

Materials (per windrow)

- 1 Clean large Rubbermaid tub
- 1 Clean 20 L (5 gal) Bucket

  A pail with a previously known mass, volume and 1/3 divisions marked around the inside circumference is preferred.
- 1 Clean shovel or fork
- 1 Balance with a minimum capacity of 20 kg (44 lb) and a minimum resolution of ±200 g (1% error).

Procedure

- If temperature measurements are required, begin the temperature procedure before beginning the bulk density procedure. Moisture samples can be collected at the same time as bulk density samples.
- Place two marks around the circumference of the pail indicating the divisions between thirds. Weigh and record the bucket mass. Then fill the bucket to the brim with clean water, weigh and record the full mass.

  $$\text{BucketVolume(L)} = \frac{[\text{FullMass(kg)}-\text{EmptyMass(kg)}] \times 1(\text{L } H_2O)}{1(\text{kg } H_2O)}$$

  Record the volume.
- At each of the five sampling locations:
  - Using a clean shovel or fork; dig a hole a minimum of 60 cm (2') deep angled toward the center of the windrow.
  - Collect approximately 1/6 of the Rubbermaid tub full of compost. With approximately equal volumes from the bottom, middle and top of the hole.
  - Mix the material in the Rubbermaid well.
  - Fill in the hole and proceed to the next sampling location.
- Mix the material in the Rubbermaid well.
- Fill the bucket 1/3 full of mixed material. Drop the pail onto a firm surface 10 times from a 15 cm (6") height.
- Fill the bucket 2/3 full of mixed material. Drop the pail onto a firm surface 10 times from a 15 cm (6") height.
- Fill the bucket to the brim with mixed material. Drop the pail onto a firm surface 10 times from a 15 cm (6") height.

- Fill the bucket to the brim with mixed material and do not compact.
- Weigh and record the mass of the full bucket. The online calculator can help determine the “as is” and “dry” bulk density. Record the bulk density on the windrow information sheet.

$$\text{AsIsBulkDensity}(kg/m^3) = \frac{[\text{WetCompostBucket}(kg) - \text{BucketMass}(kg)] \times 1000(L)}{\text{BucketVolume}(L) \times 1(m^3)}$$

Or

$$\text{DryCompost}(kg) = \frac{[100 - \text{Moisture}\%] \times [\text{WetCompostBucket}(kg) - \text{BucketMass}(kg)]}{100}$$

$$\text{DryBulkDensity}(kg/m^3) = \frac{\text{DryCompost}(kg) \times 1000(L)}{\text{BucketVolume}(L) \times 1(m^3)}$$

Self Heating Test for Compost Stability

There are several indices to determine the stability of compost; including but not limited to seed germination assays and measuring compost heat generation. The Self Heating Test for Compost Stability, measures compost heat generation. This test can be used to determine approximately what phase the compost should be in.

Materials

- 1 Clean shovel or fork
- 1 Clean bucket; 20L (5 gal)
- 1 2L (0.5 gal) Dewar (or Thermos) with a 10 cm (4”) opening
- 2 Thermometers, one attached to a 30 cm (1’) probe.
- Rubber gloves and mask.

Procedure

- Collect a representative compost sample; at each of the five sampling locations:
    - Using a clean shovel or fork; dig a hole a minimum of 60 cm (2’) deep angled toward the center of the windrow.
    - Collect several handfuls of material from near the bottom, middle and top of the hole. Place all material in the bucket and mix well.
    - Fill in the hole.
- Ensure that a minimum of 2L (0.5 gal) of material has been collected.
- Adjust the moisture content to ideal (45-55%). See “Monitoring Moisture – Moisture Analysis”. Spread the sample on a clean surface to evaporate if too wet.
- Allow the compost sample to come to room temperature.
- Fill the Dewar incrementally 1/3, 2/3 and full. Following each addition shake and tap the Dewar on a firm surface to gently pack the compost.
- Place one thermometer into the compost filled dewer 5 cm (2”) from the bottom and the other nearby outside the Dewar.
- Record the temperatures of the two thermometers once daily for 5-10 days; or until two days after the maximum temperature is reached.

Calculations: SelfHeating(˚C) = MaxTemperature(˚C) – AmbientTemperature(˚C)

Rise Above Ambient		Stability Class	Description of Class	Class Name
<10˚C	<50˚F	V	Finished compost; stable to very stable	Finished
10 - 20˚C	50 - 68˚F	IV	Maturing; moderately unstable, curing	Curing
20 - 30˚C	68 - 86˚F	III	Active compost; material decomposing and unstable	Active
30 - 40˚C	86 - 104˚F	II	Immature compost; young or very active	Active
>40˚C	>104˚F	I	Raw Feedstock; fresh mixed ingredients	Raw or Fresh

Chemical and Biological Analysis

Samples can be collected and analyzed for a variety of qualities; however it is imperative that the sampling and sample handling procedures do not bias the results of analysis. It is important to know what the samples will be tested for because changing the purpose of the samples may require changing the sampling tools or procedure to match. For example when analyzing for most metals avoid sampling using metal sampling tools, store the samples in plastic or glass containers and because metals are stable the samples can be safely stored at 4˚C for up to 6 months before analysis. In contrast when interested in pathogens use sterilized sampling equipment and storage containers and samples should be analyzed immediately.

The generalized sampling procedures below are adequate for analysis of:

- Organic Carbon,
- Volatile Fatty Acids (Glass Containers),
- Volatile Solids,
- pH,
- Electrical Conductivity,
- Total Nitrogen, Nitrate, Ammonia,
- Sulfate, Sulfide,
- Most Metals (Use Plastic or Glass Equipment),
- Chloride,
- Mercury,
- Coliforms and Bacteria (Sterilized Containers),
- Helminth Ova (Sterilized Containers) and
- Most Synthetic Organic Chemicals Including Pesticides (Glass or Teflon Lined Containers).

The materials and procedure may be modified to suit the required analysis. When unsure of proper sampling and handling procedures for a particular analysis please refer to “02.01 Field sampling of Compost Materials” in “Test Methods for the Examination of Composting and Compost” by the Composting Council Research and Education Foundation.

General Materials

- 1 Clean shovel or fork
- 1 Clean bucket; 20L (5 gal)
- 1 Disposable Cooler
- Several ice packs
- 5 Labeled Ziploc bags
- Rubber gloves and mask.

General Procedure

- At each of the five sampling locations:
    - Using a clean shovel or fork; dig a hole a minimum of 60 cm (2') deep angled toward the center of the windrow.
    - Collect several handfuls of material from near the bottom, middle and top of the hole. Place all material in the bucket and mix well.
    - Place a representative sub-sample from the bucket into a Ziploc bag labeled with sampling date, windrow or pile ID, sample type, persons name and the purpose for collecting the samples.
    - Return the unused material and fill in the hole.
- Place several icepacks in the cooler with the samples alternating the icepacks with the samples if possible.
- Ship the samples to the lab within 24 hours; ask the lab to store the samples at 4˚C until analysis for a maximum of 2 days. If analysis must be delayed, freezing may be acceptable; please refer to "02.01 Field sampling of Compost Materials" in "Test Methods for the Examination of Composting and Compost" by the Composting Council Research and Education Foundation.

Analysis

Analysis should be completed by an accredited laboratory. Currently the only accredited lab in Canada is A&L of London, Ontario. Ensure that samples can be properly identified with a clear sample ID and ensure that a record of the sample ID and all other information (farm name, project name, sampling date, windrow or pile ID, sample type, name of sampler, etc.) is retained.

Determine the analysis package required.
http://www.alcanada.com/Agricultural-Compost.htm

Fill out the analysis request form.
http://www.alcanada.com/index_htm_files/A&L-F-014%20CompostCQASub.pdf

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