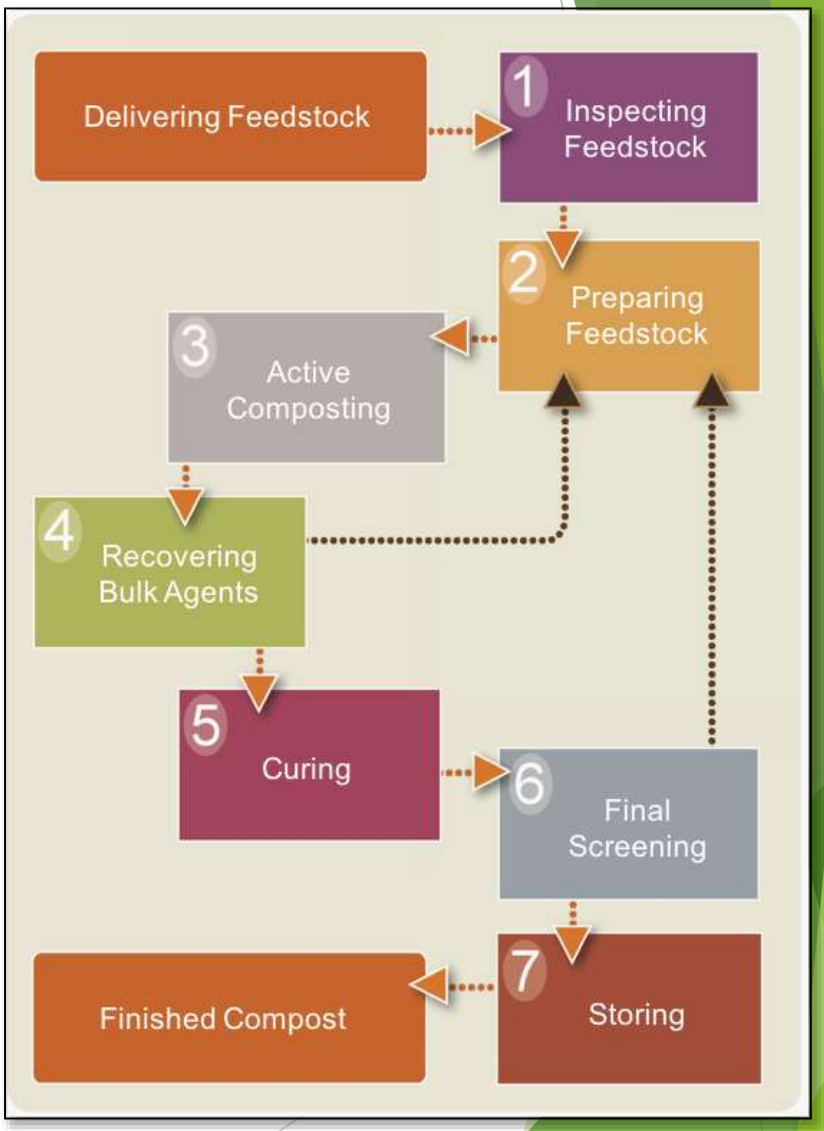
Compost Workshop - Saskatoon

Breaking Down Organic Waste: Options for Smaller Communities

Prepared by Scott Gamble-CH2M Hill
Special thanks to Larry Mullen – SWRC
Roland Rusnell, City of Saskatoon May 25/16

The Composting Process

- The compost process consists of a number of specific steps.
- Appropriate consideration must be given to pre- and post-processing or problems can arise.
- Odours, dust, litter, surface waters, and leachate must be managed during ALL steps.



Heavy Hitters Do The Work

- Microbes found on most organic matter in soils and in the air
- Bacteria characterized by their preferred temperature
  - Thermophillic >55°C
  - Mesophillic 10°C to 50°
  - Psychrophillic -10°C to 40°
- Fungi and Actinobacteria during later stages

Leaf and Yard Waste

- Yard wastes are produced by residents, businesses, and institutions and are the most common feedstock at composting facilities.
- Leaf and yard waste is generally a very clean and contaminant free feedstock.
- Contaminants that are found in yard waste include plastic bags, plastic plant pots and trays, pet wastes, dirt and sod, rocks, and fertilizer containers.

Food Waste and Soiled Paper

- This feedstock generally has a high moisture content and a high density.
- Pre-consumer food waste tends to be less contaminated than post-consumer food waste.
- Soiled paper products (e.g., paper towels, napkins, soiled or waxed cardboard, soiled newspaper, and tissues) are often included in food waste diversion programs. These materials are readily degradable, and they absorb liquids released by food waste.

☑ ACCEPTABLE

Food Waste:

- *Baked goods*
- *Bones*
- *Cereal*
- *Coffee grounds and filters*
- *Dairy products*
- *Eggs/eggshells*
- *Flour and grains*
- *Fruit*
- *Grease and fat*
- *Meat and fish (raw and cooked)*
- *Nuts*
- *Pasta and rice*
- *Sauces*
- *Tea bags and loose tea*
- *Vegetables*

General Types of Technologies

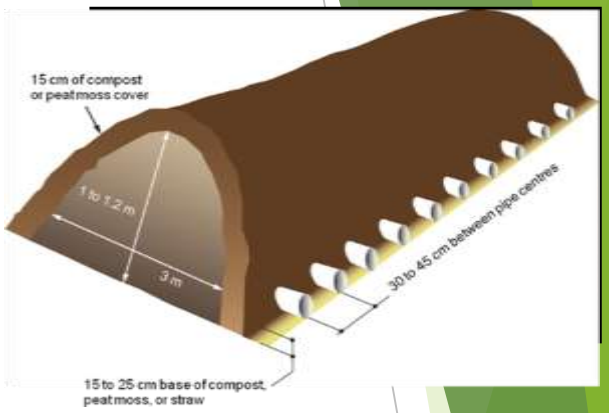
Passively Aerated and Turned	Actively Aerated
Passively Aerated Static Piles Passively Aerated Windrows Bunker Windrow Turned mass bed	Aerated Static Piles/Mass Bed(uncovered and covered) Tunnels Containerized (static and agitated) Channel Agitated bed Rotating drum

(Passively Aerated) Static Pile Method

- Generally appropriate only for leaves, brush and other feedstocks with high C:N ratio.
- Not appropriate for food waste, biosolids, or L&YW that contains large amounts of green grass.
- Piles are constructed in large windrows or cones.
- Piles are turned only a few times per year.
- Method relies on passive aeration (chimney effect).
- Characterized by long processing times.

Passively Aerated Windrow System (PAWS)

- Generally appropriate for leaves, brush and other feedstocks with high C:N ratio.
- Not appropriate for food waste or biosolids.
- Piles are constructed overtop perforated pipes that extend beyond the edges of the pile.
- Method relies on passive aeration (chimney effect). The pipes increase the inflow of air to the pile core.
- Horizontal style is difficult to construct.
- Linear style can be forced air (active)



Bunker Composting Method

- Appropriate for L&YW and other materials with a high C:N ratio.
- Not appropriate for food waste, biosolids, or L&YW that contains large amounts of green grass.
- Piles are constructed within 3-sided enclosures.
- Materials are sequentially transferred from one bunker to the next.
- Method relies primarily on passive aeration.
- Suitable for smaller quantities of material.

Windrow Method

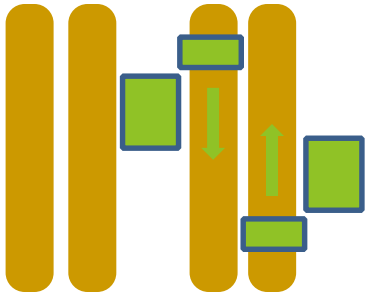
- Suitable for L&YW and food waste.
- Not recommended for biosolids
- Windrows are typically 4 to 12 feet high and 10 to 25 feet wide.
- Aeration primary achieved through passive aeration.
- Mixing or “turning” (with front end loader or specialized equipment) used to re-establish free air space.

Pile & Windrow Turning Methods

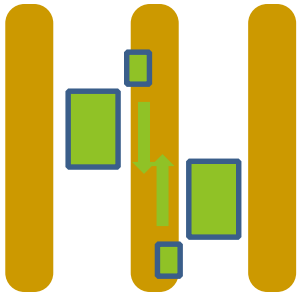
Pile & Windrow Layout

- Windrows should run parallel to the grade of the working pad.
- If possible, orient windrows in a north-south direction.
- Mis-aligned piles or “dog-leg” piles waste valuable space and reduce the capacity of the site.
- Install reference signs, stakes, etc at the ends of windrows to provide equipment operators with a visual guide.
- Make sure piles/windrows are properly sized and spaced for the type and size of turning equipment used.
- Allow enough space around the outside of the pile/windrow area for truck access and for maneuvering turning equipment.

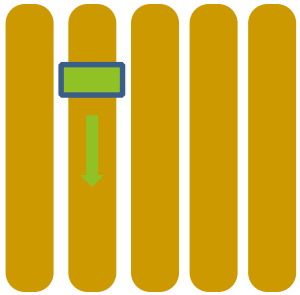
Windrow Layouts



Towed straddle turners

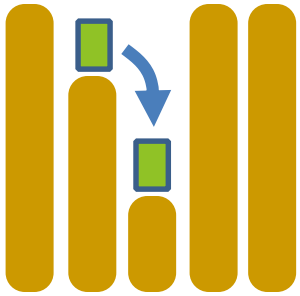


Towed half-straddle turners

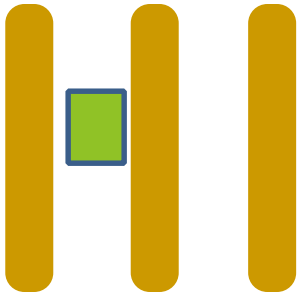


Full straddle turners,

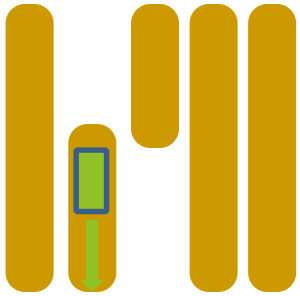
Windrow Layouts



Loader (End method)



Loader (Side method)



Track Hoe

Pile & Windrow Labeling

- Using “batch numbers” allow you to track the movement of windrows/piles within your site.
- Insert labels into each windrow/pile so there is no confusion about what’s what.
- Labels should always be in the same end of the pile so staff don’t have to go looking for them.
- Use wood stakes or signs – plastic or metal signs will become a contaminant if they are mistakenly mixed into a pile.

Other Common Equipment

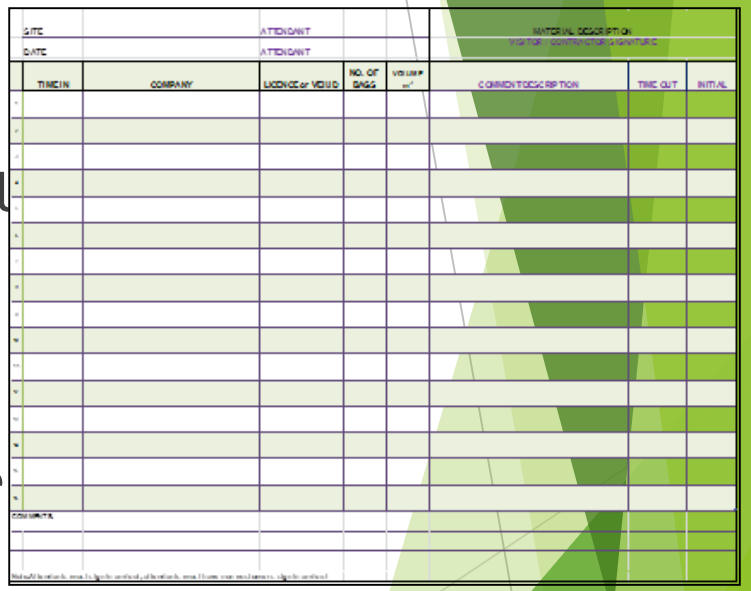
- Wheel loaders
- Grinders
- Mixers
- Windrow turners
- Screens
- Thermometers
- Water Addition Systems
- Bag Openers

Preventing X-Contamination

- Cross contamination is one of the possible sources of pathogens and contaminants in finished products.
- Eliminate/reduce x-contamination by:
  - cleaning equipment after handling fresh feedstocks
  - Soak up leachate with wood chips or shavings so it is not tracked through the facility on vehicle tires.
  - Have separate entrances to feedstock receiving areas and product storage areas.
  - Work from older to newer piles when turning.
  - Manage critters and birds.

Records Management

- Don’t put off updating your Operating Record. It should be done at the end of each operating day.
- The Operating Record must be accessible to Federal/Provincial Inspectors upon request.
- In reality, many sites do not have adequate facilities for housing records. Offsite secure storage is an option, provided the records are readily available if and when needed.



Finished Product Controls

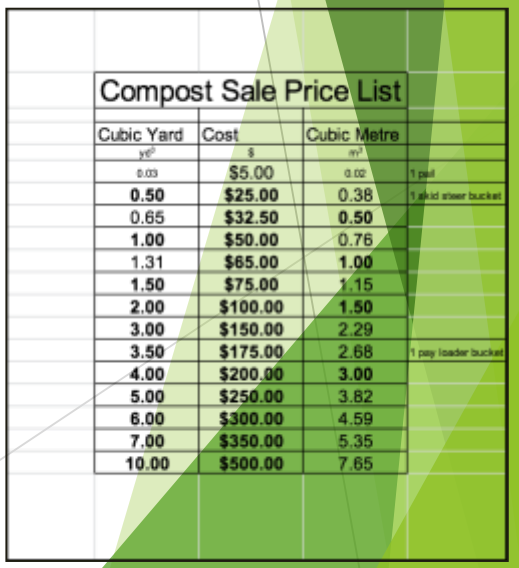
- Implement a system that manages orders and matches sales with production.
- The system should also prevent the distribution of unfinished products . Make sure that only product stockpiles that have gone through full QA/QC process and are ready for release are shipped.
- Label all product stockpiles so there is no confusion about which pile is which.
- Use product load-out sheets to track and reconcile shipments against orders and invoices.


City of Saskatoon

Commercial Compost Purchase

Minimum 5 cubic yards

0001



Compost Sale Price List

Cubic Yard	Cost	Cubic Metre	
yd³	$	m³	
0.03	$5.00	0.02	1 pail
0.50	$25.00	0.38	1 skid steer bucket
0.65	$32.50	0.50	
1.00	$50.00	0.76	
1.31	$65.00	1.00	
1.50	$75.00	1.15	
2.00	$100.00	1.50	
3.00	$150.00	2.29	
3.50	$175.00	2.68	1 pay loader bucket
4.00	$200.00	3.00	
5.00	$250.00	3.82	
6.00	$300.00	4.59	
7.00	$350.00	5.35	
10.00	$500.00	7.65	

Questions? Comments?

Two Old Bags Lying In The Sun

REFERENCES: www.compost.org