

Yard Waste Management in North Carolina

NCDENR Composting and Land Application Branch

History: Yard Waste management in North Carolina became a larger issue in 1993 when the material was banned from NC landfills. Yard waste disposal bans and new markets for this type of material after it has been processed, has made the handling of yard waste a more prominent issue in the solid waste arena.

The following is provided to clarify issues pertaining to solid waste management facilities that accept yard waste. This document should be utilized for solid waste compost facilities (SWC), yard waste notification sites (YWN), solid waste compost demonstration approvals (SWCD), fully permitted facilities that include composting in the operation plan (or RAL), land clearing and inert debris (LCID) facilities, and treatment and processing facilities (T&P).

The following definitions will apply in this document (regulatory definitions include citation of Rule):

“Active Composting”- Method of composting that involves increased levels of management in order to produce a finished product within a short duration (14 days to 6 months).

“Composting” 15A NCAC 13B .0101(8) means the controlled decomposition of organic waste by naturally occurring bacteria, yielding a stable, humus like, pathogen free final product resulting in volume reduction of 30-75 percent.

“C:N ratio”- The ratio of the weight of organic carbon (C) to that of total nitrogen (N) in an organic material. While C:N ratio is not a term contained in Rules, it is a factor that should be considered when determining the appropriate method of yard waste management.

“Feedstock”- Raw material for the compost process.

“High C:N ratio Yard Trash”- means solid waste resulting from landscaping and yard maintenance such as brush, tree limbs, and similar vegetative materials that has a C:N ratio higher than 75.

“Land Clearing Debris” 130A-290(a)(15)- means solid waste which is generated solely from land-clearing activities.

“Land Clearing Waste” 15A NCAC 13B .0101(23) means solid waste which is generated solely from land clearing activities such as stumps, trees, limbs, brush, grass, and other naturally occurring vegetative material.

“Low C:N ratio Yard Trash”- means solid waste resulting from landscaping and yard maintenance such as grass clippings, bush trimmings, and similar vegetative materials that has a C:N ratio less than or equal to 75.

“Passive Composting”- Method of composting in which there is little management and manipulation of the materials after they are mixed and piled. Turning occurs infrequently (On-Farm Composting Handbook). Duration can be from 6 months to 2 years.

“Thermophilic temperatures”- Temperatures above 105 degrees F.

“Untreated and unpainted wood waste”- means solid waste wood material that has not been glued, treated with preservatives, painted, stained, or varnished.

“Yard Trash” 130A-290(a)(45)- means solid waste consisting solely of vegetative matter resulting from landscaping maintenance.

“Yard Waste” 15A NCAC 13B .0101(56)- Yard Waste means “Yard Trash” and “Land Clearing Debris” as defined in GS 130A-290, including stumps, limbs, leaves, grass and untreated wood.

The term yard waste includes several types of waste as stated within the definition. The types of waste and their respective management options depend on several factors:

- 1) Nitrogen content of the waste
- 2) Spontaneous combustion risk
- 3) Potential for pathogens
- 4) Herbicide/pesticide content
- 5) Criteria set forth in the rules
- 6) Needs of facility
- 7) Desired end product

Management Options

Composting:

Composting has been utilized in most states as an effective process to manage yard waste. Composting has been recognized within North Carolina since 1888 as a method of handling waste (“Compost Formulas, Analysis, and Value” Bulletin Number 61 NC Agricultural Experiment Station). Composting is a controlled process that reduces the potential pathogen load, herbicide/pesticide content of the waste and potential for spontaneous combustion by managing low carbon to nitrogen ratio waste (Table 1 includes C:N ratios for several feedstocks). Composting also provides a volume reduction in the amount of waste that was introduced into the process (30-75% reduction) while also producing a marketable product. Specific parameters for optimizing active composting have been listed in Table 2.

Boiler Fuel:

The production of boiler fuel is an additional outlet for the disposal of yard waste. Ground material that is not distributed to the public and is used as a fuel source may contain all components of yard waste including yard trash. However, large volumes of low C:N ratio material in the waste stream may not be suitable for use as a boiler fuel. It is important to note that this material is often stockpiled prior to grinding. Stockpiling should not create excessive temperatures (>110 F), attract vectors, or produce objectionable odors.

Mulch:

High C:N ratio yard trash and land clearing waste can be ground and utilized as mulch. The potential for spontaneous combustion, pathogens and pesticide / herbicide residue prevents other yard trash materials like grass clippings and bush trimmings from being used directly as mulch. It is important to note that all yard waste components may be ground into a “mulch like” product prior to placing in compost windrows. Several municipalities stockpile yard waste prior to hiring a contract grinder to process the material for windrow composting.

Passive Composting:

An additional process that is utilized by several facilities in NC is passive composting. Passive composting involves a lower level of management compared to conventional composting. In this process, feedstocks are allowed to compost on their own with or without being mixed with other feedstocks. Turning of the material occurs on an infrequent basis but monitoring of the material is still required to assure that moisture levels are appropriate and temperatures do not indicate the potential for spontaneous combustion. Leaves are an example of a material that is often passively composted. Leaves compost without being blended with low C:N ratio feedstocks like grass clippings. The process takes from six months to two years depending on the level of management. Numerous facilities have a customer base that prefers a “leaf compost” rather than a mixed yard waste compost. In result, passive composting is utilized to meet this demand while also allowing facilities to handle large volumes of leaves with less management. Regular monitoring of the passive compost piles is required to document elevated thermophilic temperatures to achieve pathogen reduction (131 degrees F for 3 days) and to monitor the material for excessive temperatures (>160 degrees F) that could lead to spontaneous combustion. Infrequent turning events can produce pockets of anaerobic conditions within the material. The anaerobic pockets can release odors when the material is turned.

Note: Rule .1406(10) requires that all Type I composting facilities, whether they utilize active or passive composting management options, must maintain the compost process at or above 131 degrees F and are aerated to maintain elevated temperatures.

Passive and active composting achieve the same end result: a finished product that may be distributed in accordance with the requirements of 15A NCAC 13B .1407.

Management Options for Specific Feedstocks

Leaves: Yard Waste Notifications (YWN) require that leaf piles be managed to include at the very minimum annual turning (passive composting). In order for any compost facility to produce leaf compost with a passive compost process, clean loads of leaves (source separated) must be delivered to the facility without contaminants. In most instances, a leaf collection program will have to be implemented by the municipality to keep other yard trash out of the waste stream. Acceptance of leaves from the general public may be limited because of the increased risk for contaminants. Leaf compost piles shall be monitored for pathogen reduction (3 days at or above 131 degrees F) and to prevent excessive temperatures (>160 degrees F). Temperature monitoring after pathogen reduction is recommended at least monthly or more often as dictated by observation. The leaves should be turned as needed to break up areas of anaerobic activity and additional moisture may have to be added to the leaf piles to assure that the moisture content is sufficient for passive composting. Leaf windrow dimensions are dependent on the turning equipment available but a height of 12’ and width of 20’ should not be exceeded unless other dimensions have been approved (minimum dimensions of 6’ in height and 9’ in width). Leaves that are passively composted should stay at the site for a minimum of six to twelve months for sufficient decomposition prior to distribution as leaf compost. Leaves may also be managed within an active composting process.

Grass clippings, bush trimmings, other vegetative matter resulting from landscaping maintenance: These specific yard trash components must be actively composted at elevated thermophilic temperatures. Active composting is required to minimize the development of anaerobic conditions and potential for spontaneous combustion based on the types of feedstocks utilized (primarily grass clippings). At Type 1 facilities the requirement (.1406(10)) is that the compost process shall be maintained at or above 131 degrees F for 3 days and aerated to maintain elevated temperatures. The composting process with elevated temperatures also provides a reduction in pathogen levels and some degradation of pesticides and herbicides.

Stumps, trees, limbs, untreated and unpainted wood waste: This material may be ground and used directly as mulch or utilized as a carbon source for the composting process. The material can also be utilized as boiler fuel.

Questions related to yard waste management

Are leaves yard trash? Leaves are not specifically included in the definition of yard trash, but the Section considers them as yard trash. Management options as noted above include active composting with other yard trash, less intensive measures to include passive composting and use as boiler fuel.

Do leaves contain pathogens, herbicides/pesticides? Leaves are not expected to contain high levels of pathogens, herbicides or pesticides compared to other yard trash components (grass clippings, bush trimmings).

What types of solid waste facilities can manage leaves? Leaves should only be managed at solid waste compost facilities (SWC), yard waste notifications (YWN), solid waste compost demonstration approvals (SWCD), facilities that have composting written into their operation plan, treatment and processing facilities that only distribute the leaves as boiler fuel (T&P, T&PN) and land clearing and inert debris (LCID) facilities.

Is yard trash subject to spontaneous combustion? This is a primary concern with this particular waste stream. Low C:N ratio yard trash has the potential to generate heat if not managed appropriately. Grass clippings do have the potential to cause spontaneous combustion where pile moisture levels drop below 40% and temperatures reach 450 degrees F. Piles should be turned or divided when temperatures reach 160 degrees F. Under most circumstances leaves are not expected to spontaneously combust because of their higher C:N ratio but the potential is there. Observations may be made that indicate that heat is being generated. The facility shall investigate (i.e. temperature monitoring) to assure that excessive temperatures are not being generated and that appropriate measures including dividing the pile are utilized to prevent excessive heat buildup.

How is the C:N ratio determined? The C:N ratio cannot be determined in the field but can be determined by laboratory analysis (NCDA waste analysis). This test is recommended to all facilities to ensure a balanced C:N ratio for composting (20:1 – 30:1) but is not required. Table 1 provides C:N ratios for various yard waste materials. Some judgment has to be utilized during site visits to determine if materials that appear to have low C:N ratios are being managed properly.

What are the considerations for stockpiling yard waste? Grass clippings are one feedstock that should not be stockpiled for more than a week prior to incorporation into the windrows. Odors and vector attraction problems are the main issues with extended storage frequencies for grass clippings. Stockpile areas should allow vehicle access and sizes should be limited to the volume and dimensional requirements within the operation plan. If there is not an operation plan that lists dimensions for stockpile areas sizes should be limited to 30' in height, 50' in width and no limitation on length as long as buffer and operation plan requirements are met. There are no specific limitations on stockpile storage timeframes unless listed in the permit or operation plan. Numerous facilities will contract grind on a semi annual or quarterly basis.

Additional Questions?

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The regulatory underpinning to this guidance is:

15A NCAC 13B .1401 REQUIREMENT FOR PERMIT

(a) All persons whose purpose is or includes the production of compost from solid waste or solid waste co-composted with other wastes shall not construct, operate, expand or modify a facility until a currently valid permit for a solid waste compost facility is issued by the Division. This provision also applies to facilities that accept, store, or produce compost or mulch from yard waste or from residues from agricultural products and processing. General Provisions, Siting, design, application, operational, distribution, and reporting requirements shall be in accordance with Rules .1402, .1403, .1404, .1405, .1406, .1407, and .1408 of this Section.

15A NCAC 13B .1406 OPERATIONAL REQUIREMENTS FOR SOILD WASTE COMPOST FACILITIES

(10) Compost process at Type 1 facilities shall be maintained at or above 131 degrees F for 3 days and aerated to maintain elevated temperatures.

References

Rynk, Robert. "On-Farm Composting Handbook" NRAES- 54. Ithaca, New York: Northeast Regional Agricultural Engineering Service. 1992.

"Compost Formulas, Analysis, and Value" Bulletin Number 61 Agricultural Experiment Station (NC) 1888.

FEEDSTOCK CHARACTERISTICS

Table 1

Material	% N (DM)*	C:N ratio	Moisture %	Bulk Density (lbs/cu yd)
Grass Clippings	2.0-6.0	9.0-25.0	82	300-800
Leaves	0.5-1.3	40.0-80.0	38	100-500
Shrub trimmings	1	53	15	429
Tree Trimmings	3.1	16	70	1296
Sawdust	.06-.08	200-750	19-65	350-450
Sewage Sludge	2-6.9	5.0-16.0	72-84	1075-1750

*Source: On-Farm Composting Handbook

*DM- Dry matter basis

CONDITIONS FOR ACTIVE COMPOSTING

Table 2

Condition	Reasonable Range	Preferred Range
C:N ratio	20:1-40:1	25:1-30:1
Moisture Content	40-65%	50-60%
Oxygen Concentration	> 5%	> 5%
Particle size	1/8 - 1/2"	1/8 - 1/2"
pH	5.5 - 9.0	6.5 - 8.0
Temperature (deg F)	110 - 150	130 - 140

*Source: On-Farm Composting Handbook