Leaf Composting “Windrows of Opportunity”
Video Transcript

Time	Video	Audio
0:00	Text: CT DEP Recycling Program: Leaf Composting: Windrows of Opportunity	Music
0:28	Image of tree in fall with bright leaves	Autumn brings a multitude of colors to New England and thousands of tons of leaves that require disposal.
0:35	Landfill and garbage collection footage	To help reduce the amount of waste that must be incinerated or landfilled in Connecticut, leaves and other useful waste materials must be recycled.
0:45	Image of windrows	The Connecticut Department of Environmental Protection, or DEP, recommends composting as the best leaf recycling method.
0:52	Image of birds at landfill	Composting reduces the volume of solid waste being burned or buried, decreases disposal costs, and provides communities with a beneficial end product.
1:03	DEP staff working to educate people about environmental issues and planning composting sites	With statewide composting operations as a goal, the DEP, through training seminars, publications, and technical assistance, is now helping to plan, site, and design leaf collection and processing operations across the state. Composting, a relatively inexpensive means of recycling leaves, can greatly reduce a municipality’s waste stream.
1:30	Scientist looking at microorganisms through a microscope	The bulk of the work is accomplished by the action of tiny natural organisms on…
1:35	Leaves and composted soil	…leaves that break down organic material into a useful soil-like compost.
1:40	Footage of composting process: leaf collection, turning windrows, compost,	Over the next several minutes, you will review the DEP site selection and preparation guidelines, see a number of leaf collection procedures, examine the "windrow and turn" method of composting, understand

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	and gardening	the biological process of leaf composting, and learn about various options for utilizing the leaf compost. Composting sites must be located at least 200-250 feet from residential or business complexes, 100 feet from property lines, and surface water. A separation of 5 feet should be maintained between the bottom of the windrows and seasonal high groundwater or bedrock.
1:40	Footage of leaf composting sites	Well in advance of the leaf collection season, a composting site must be selected, registered, and designed to conform with all DEP guidelines. The site must be large enough to accommodate all of the leaves to be collected. 4-6% of a municipality's total solid waste stream is a good estimate for computing leaf volume. Approximately 1 acre will be needed for every 6,000 cubic yards of leaves collected. A site with a 2-5% slope will allow for proper drainage and minimize standing water, which causes odor.
3:00	General leaf collecting	The first requirement for any leaf collection system is to gather leaves, which are free of physical contaminants. The process can involve municipal collection, contracted collection, or drop-off by residents and grounds keepers. All choices municipalities make regarding collection techniques and equipment will affect collection and processing costs, as well as end product quality. Loose leaves can be picked up at curbside or in the street. Either way is labor intensive. Vacuum trucks, catch basin cleaners, and front-end loaders with dump trucks, are used to pick up loose leaves.
3:44	Vacuum leaf collection	As a rule, vacuum collection is the most costly method. Although inefficient for collecting wet or frozen leaves it does offer the advantage of leaf shredding and compacting during collection.
3:55	Basin cleaner leaf collection	Basin cleaners work well on wet leaves, but the initial cost is significantly higher than a vacuum.
4:01	Front-end loader leaf collection	Front-end loaders with dump trucks are most efficient with damp or frozen leaves.

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4:07	Bags of leaves	Leaves may be collected in plastic, or specially designed biodegradable paper bags, both of which are more efficient than bulk collection. Plastic bags do not decompose, so they must be emptied and removed from the site. Biodegradable paper bags are convenient, can hold a greater volume of leaves than the plastic, and have been successfully composted. Paper bags can be included in the windrows, but do require more handling, shredding, and water, and may increase composting time. Drop-off sites can be used to collect bagged leaves. People using these sites should be required to empty their own bags and encouraged to reuse them.
4:53	Front-end bucket loader moving piles of leaves	The basic piece of equipment needed in any type of composting operation is a front-end bucket loader. This loader is used to form the leaves into long, narrow piles called windrows, and to turn or aerate the windrows during the composting process. Among the alternatives available, the "windrow and turn" method of leaf composting may be the most common and cost effective. This method balances efficiency and operational simplicity.
5:10	Footage of windrows	Windrows are built on the compost "pad", the site surface upon which the composting takes place, and run parallel to the direction of slope. Being triangular in shape, windrows should measure 10 to 16 feet wide at the base with a height of 8 to 12 feet. The greater the height, the more frequent turning is required. The length can be several hundred feet depending upon the site size. A 2-5 foot space should be left between the first two windrows, and a 20-foot aisle between successive pairs.
6:00	Trucks dumping leaves into windrows or into temporary storage areas	As truckloads of loose leaves arrive at the prepared composting site, they are deposited directly into windrows minimizing handling and space requirements. Compacted leaves, such as those from vacuum or compactor trucks, must be fluffed for proper aeration

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		when they're deposited into windrows. Loose leaves can be placed in a temporary receiving area, for a few days only, because decomposition in large piles may cause odor problems.
6:30	Tub grinder working to shred leaves	If leaves are shredded before they're put into windrows the composting time is shorter. However, this technique increases the turning frequency and operating costs.
6:40	Tub grinders and manure spreaders working at compost sites	Various methods can be used for this shredding process. Tub grinders and manure spreaders have been successfully used to shred leaves as well as to break open biodegradable paper collection bags.
6:53	Composting footage of leaves and windrows	A windrow reduces to about half its initial size in one or two months, and it then can be combined with another windrow. During the winter, when half of all composting takes place, the windrow height should be kept at maximum to provide enough bulk for insulation. A successful composting operation relies on the proper balance of nutrients, oxygen, temperature, and moisture available to the microorganisms on the leaves.
7:24	Man watering windrow to help aerate	Moisture is a key composting ingredient, and water should be added as needed to achieve a 40 to 60 percent moisture content. That's about the consistency of a wrung out sponge. A "hand squeeze" test should be given to incoming leaves to check for moisture. If no water drips out, then the leaves should be wetted before being placed in the windrow. If there is no water source at the site, a water-hauling vehicle with a mechanism for spraying water will be needed.
8:19	Footage of leaves	Turning leaves during a rainstorm may add necessary moisture. Over-watering is normally not a problem with fresh autumn leaves. If not enough water is added at the start, the process slows down significantly. Less water will be needed during later stages of decomposition because the leaves become more absorbent. Leaf composting is an

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		"aerobic" process - that is, it requires oxygen as well as water. Windrows must be periodically "aerated," or turned, to maintain a proper balance of air and moisture. The frequency of windrow turning is primarily determined by temperature, but should be accomplished at least once a month to prevent compaction. Turning may also be required if odor or excess moisture develop.
8:44	Man uses to measure temperature of windrows	A long stem-type thermometer capable of reading to 200 degrees Fahrenheit is used to measure windrow temperature. Temperature measurements should be taken every 50 to 75 feet twice a week. As microbes use up oxygen, activity slows and the temperature falls. When the internal temperature drops below 100 degrees Fahrenheit or exceeds 140 degrees Fahrenheit, windrows should be turned. Excessively low or high temperatures will slow down or even stop the composting process.
9:22	Front-end bucket loader aerates leaves	Using a front-end bucket loader to turn the windrows eliminates the need for special equipment and can do the job efficiently. Loaders turn the windrows by lifting the leaves high and letting them cascade into a new location. This creates a "mixing" effect. If the leaves seem dry, water should be added.
9:43	Windrow-turning machine aerates leaves	Windrows can also be aerated by using a special windrow turning machine. Some commercial composters, operated by one person, can turn 100 to 1000 tons of leaves per hour. As these machines move through the windrow, the flails shred, turn, mix and blend, maintaining a well-aerated windrow. Shredding, along with frequent turning, accelerates composting, reduces volume, and results in a finer, more uniform end product.
10:18	Woman keeping records	Optimum windrow temperature and proper site maintenance minimize time loss and

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		odor problems. By keeping good records and correcting undesirable conditions, the composting process will process will proceed at a steady rate.
10:33	Image of windrows	Time, odor and temperature can be indicators that the compost process is nearing completion.
10:46	Man taking compost from windrow and putting it in a plastic bag	If the leaves have been composting for 8-10 months, and do not produce an offensive odor or reheat after turning, the process is complete. After an 8 month period, check for compost stabilization by placing a sample of compost into a plastic bag, add water until moist, seal it, and store in the sun for one or two days. The compost is ready to be "cured" if no offensive odor or excess moisture result when the bag is opened. A brief "curing" or "finishing" period is needed to complete the biological process. The compost may remain in windrows or be placed into large piles where it should be left for at least one month before use.
11:25	Machinery processing compost	Post-processing, including screening, shredding, or grinding is optional. This not only reduces the volume, but breaks up clumps of leaves in the finished compost, giving a more uniform and marketable end product without physical contaminants.
11:44	Chemist testing soil	A chemical analysis of compost may be necessary depending on the leaf sources and the intended use for the compost. Appropriate compost analysis can be obtained through the…
11:54	Photo of sign for the Connecticut Agricultural Experiment Station	…Connecticut Agricultural Experiment Station in New Haven or any private soil-testing laboratory.
12:01	Image of a gardening center	Leaf compost is a soil-like material valued primarily as a soil additive, but it's not a fertilizer.
12:10	Using compost to help landscaping in	Parks Departments use compost as mulch or to resurface playing fields.

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	parks	
12:14	Using compost on the side of a highway	Highway Departments use compost for road maintenance and erosion control projects.
12:20	Using compost to re-design land features	Public Works Departments use it to enhance final landfill cover.
12:24	Gardening center	Private landscapers, nurserymen, greenhouse businesses…
12:28	Applying compost to the top of soil	…and cemeteries use it as a soil enhancer. Agricultural producers use it to improve soil conditions and crop production,…
12:37	Using compost in gardens	and residents use compost for home gardening and landscaping.
12:43	Scenic images of CT foliage	As we enjoy the autumn colors this fall remember that leaf recycling through composting is one big step we all must take towards helping preserve our environment.
12:56	Text: CT DEP 70 Elm St. Hartford, CT 06106 Leaf Composting “Windrows of Opportunity” Presented by: The Connecticut Department of Environmental Protection, Waste Management Bureau Leslie Carothers, Commissioner Copyright 1990 The Connecticut Department of Environmental Protection, Recycling Program	For more information and for assistance in planning a leaf recycling operation, please contact the Recycling Program of the Connecticut Department of Environmental Protection, at the address on your screen.

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