

Organics: Yard Wastes

COMMODITY PROFILE

North Carolina Department of
Environment and Natural Resources
DIVISION OF POLLUTION PREVENTION AND
ENVIRONMENTAL ASSISTANCE

MARKETS ASSESSMENT 1998



OVERVIEW

Yard wastes typically include tree and brush trimmings, leaves, and grass from residential, industrial, and commercial sources. Untreated and unpainted wood (including pallets, land clearing debris, and construction debris) can also go to yard waste facilities. In this report, land clearing and construction debris are considered part of the construction and demolition debris waste stream, and pallets are addressed in a dedicated section.

Yard wastes have been banned from municipal solid waste landfills in North Carolina since January 1, 1993. As a result, there are nearly 300 facilities in North Carolina accepting yard wastes, and local governments own more than 80 percent of these facilities. During fiscal year 1996-1997, almost 700,000 tons of yard wastes were processed into compost and mulches by these facilities.

The resulting mulches and composts are either sold or given

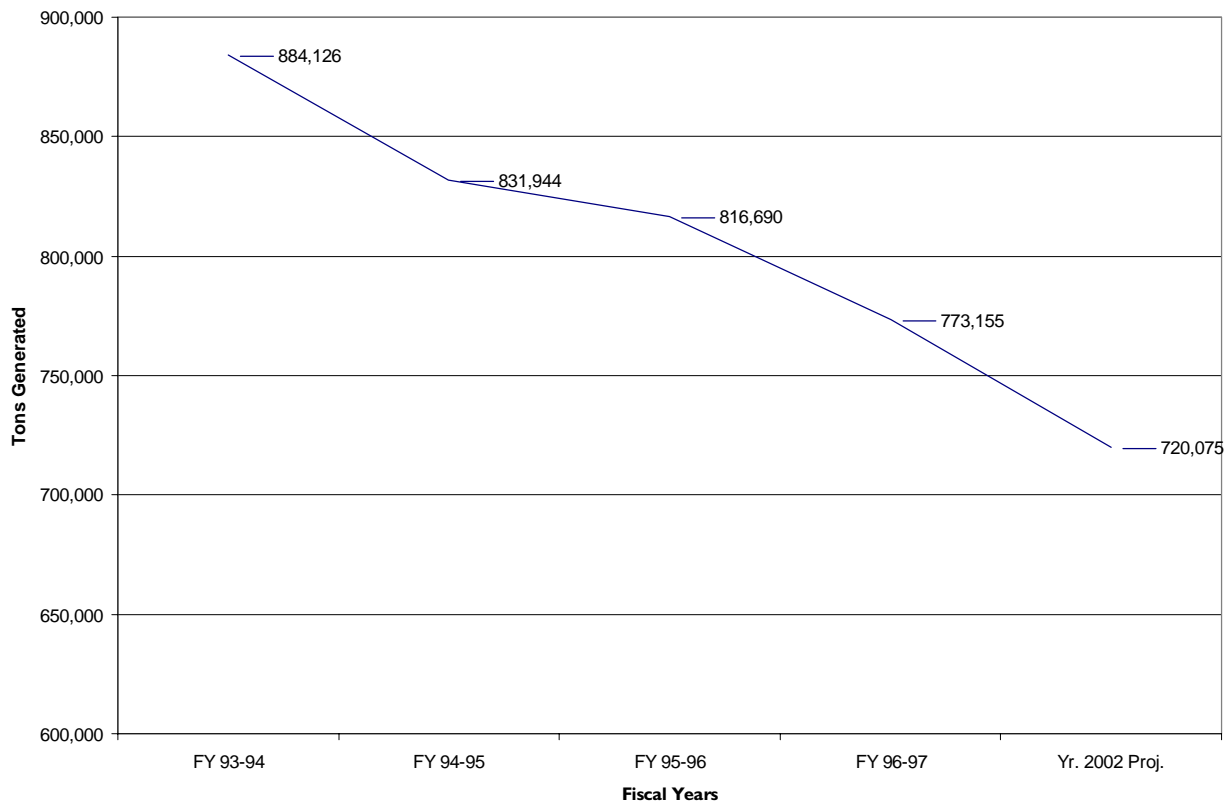
to various end users, including homeowners, landscape contractors, municipal parks and recreation departments, grounds maintenance personnel, nurseries, soil blenders, and farmers. Pricing for bulk sales of these materials varies with quality and degree of processing. Low-grade mulches sell for around \$6 per cubic yard (\$24 per ton) while higher-grade composts sell for \$6 to \$15 per cubic yard (\$15 to \$37.50 per ton).¹ Bagged sales prices are significantly higher (\$150+ per ton).

SUPPLY

Generation

Historically, the amount of yard wastes being landfilled had been steadily increasing as population, residential housing, and commercial development grew. More recently, the trend toward landfill bans on yard waste by local and state governments has decreased the amount disposed. It is estimated that the effect of such legislation was no net increase in yard waste generation (i.e., no new yard wastes entering

Figure 1. Yard Waste Generation



landfills) between 1990 and 1992. Since then, it is estimated that the amount of yard wastes entering the solid waste stream has been declining at a rate of about six percent per year.² Source reduction approaches that have reduced yard waste generation include grasscycling, on-site chipping and mulching, and backyard composting. Recycling approaches include diversion to centralized mulching and composting facilities.

Estimated quantities of yard waste generated in North Carolina during the past several years are shown in Figure 1, along with a projection of yard waste generation in 2002. Generation numbers are based on the quantity of yard waste generated in the United States multiplied by North Carolina's percentage of the population.³ Dividing that number by North Carolina's 1996 population and multiplying by 2000 yields a per capita generation rate that is applied to 1997 and 2002 state population numbers.

Recovery

Legislative bans on yard waste disposal in landfills have created a significant increase in the number of composting and mulching facilities. Nationwide, there were less than 1,000 facilities in 1988. By 1997, that number had grown to nearly 3,300.⁴ In North Carolina, there are 183 local government mulch/compost facilities, 54 local governments

using other public facilities, and 34 private-sector facilities.⁵ The quantities of yard wastes handled by these facilities during the past several years are shown in Figure 2, along with a projection of recovery quantities in 2002.

The increase in tonnage recovered in fiscal year 1996-1997 was due to the increase in yard wastes from hurricanes Bertha and Fran. The projected recovery total in 2002 is less than the total recovered in fiscal year 1995-1996 due to the impact of source reduction efforts (i.e. grasscycling, backyard composting, and on-site chipping and mulching).

The comparison of yard waste quantities generated and recovered in North Carolina in 1997 and projected for the year 2002 is shown in Figure 3.

DEMAND

The types of products usually available from yard waste recovery include leaf compost, yard trimmings compost, and mulches from yard trimmings. Yard wastes can be used as a bulking agent with other organic wastes, such as food waste, animal manure, and sewage sludge to produce composts. Each compost product has slightly different chemical and physical characteristics, but all serve as soil amendments with limited nutrient value. Mulches are characterized by larger particle sizes and less humic matter content.

Figure 2. Yard Waste Recovered

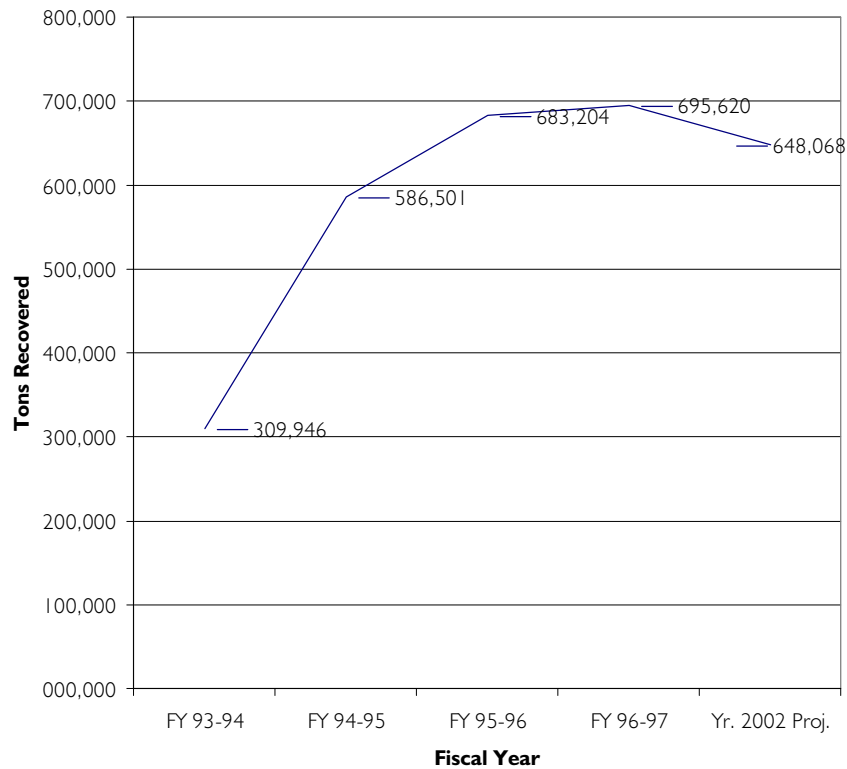


Figure 3. Estimated Generation and Recovery for Yard Waste in North Carolina (tons)

	1997	2002
Generation	773,155	720,075
Recovery	695,620*	648,068

*Excludes approximately 318,000 tons due to Hurricanes Fran and Bertha. A majority of this debris was mulched.

The markets for composts can be divided into six mature sectors, with several other markets emerging. The mature market sectors are agriculture, landscaping, nurseries, public agencies, residential use, and land reclamation/landfill cover.⁶ Emerging markets include:

- Bioremediation of contaminated sites.
- Stormwater runoff filtration and treatment.
- Vapor-phase biofiltration of contaminated exhaust air streams.
- Reforestation of denuded sites.
- Re-vegetation of sites for habitat restoration.
- Restoration of damaged wetlands.
- Erosion control at construction sites.
- Control of plant disease problems (bio-pesticides).
- Remediation of damaged turf grasses and soil compaction problems⁷.

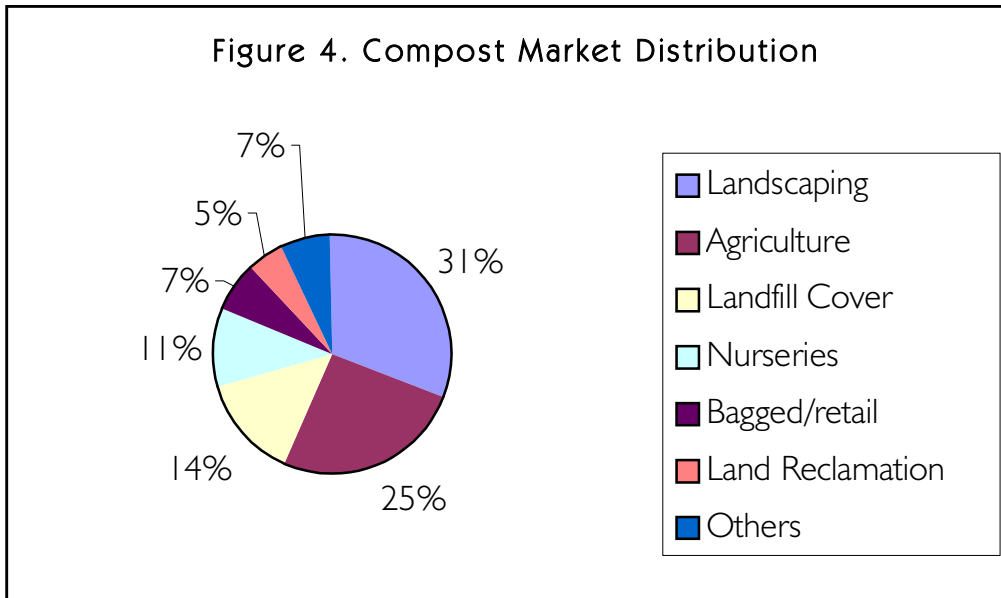
Each market has specific requirements for compost consistency and quality. The most stringent standards apply to

horticultural uses (i.e., nurseries, greenhouses, golf courses, athletic fields, landscaping, etc.). Markets such as agriculture, sod farms, municipal green spaces and field-grown nursery crops would have somewhat less stringent standards. The least restrictive standards would apply to landfill cover and land reclamation markets. The quality standards of the emerging markets have not yet been fully defined.

A 1996 study surveyed market distribution for compost facilities in seven states (California, New Jersey, Ohio, Washington, Minnesota, Florida, and Massachusetts)⁸. That survey estimated compost market distribution as illustrated in Figure 4 with landscaping and agriculture as the largest markets.

Previous studies have estimated the demand for compost in North Carolina to be 13,483,000 tons per year, with the vast majority of that due to agricultural uses (98 percent).⁹ The remaining markets were believed to be able to absorb 232,000 tons per year, which alone exceeded the

Figure 4. Compost Market Distribution



estimated 1994 compost production of 121,400 tons. The current demand for compost is believed to exceed the current available supply (estimated at 177,680 tons in 1996), although specific demand estimates are not currently available.

Prices for finished compost vary widely nationwide and within the Southeast. Bulk sale prices for leaf compost, yard trimmings compost, manure compost, mixed solid waste compost, and biosolids compost in the Southeast ranged from \$3 per cubic yard to \$25 per cubic yard in a 1997 survey.¹⁰ Average values for these products varied from \$6 to \$15 per cubic yard (\$24 to \$60 per ton). In Charlotte, North Carolina, bagged compost is sold for \$3.50 to \$4 for a 45-pound bag (\$155 to \$177 per ton), while bulk sales are \$18.50 per cubic yard (\$74 per ton).¹¹

Mulch sales in the United States are estimated to be \$500 million annually.¹² Landscaping continues to be the major market for mulches, however erosion control markets and bioremediation sites are gaining market share. One reason markets are growing is that equipment has been developed (such as truck-mounted blowers) that spreads mulches quicker and with less labor than traditional manual methods. As with compost, demand for mulches is believed to exceed the estimated current supply (505,520 tons in 1996), although specific demand estimates are not available as no comprehensive market study has been conducted.

Mulches made from yard wastes compete with mulches made from virgin wood chips and bark, as well as mulches made from wood wastes, such as ground-up pallets. Wood mulches have more cellulose than bark mulches, which

have higher lignin content. Cellulosic (wood) mulches break down and decompose faster than bark mulches. Some consumers prefer recycled wood mulch because it is less expensive, and they are more concerned with price than longevity.¹³ Yard waste and recycled wood mulch prices in the Southeast vary from free to \$25 per ton (\$10 per cubic yard);¹⁴ whereas bark and shredded hardwood mulch prices are up to \$40 per ton.¹⁵

Insufficient data on specific compost and mulch market demand exist to make reliable projections for demand in 2002. The demand estimates presented in the study noted above assumed the same level of demand for 2001. Until more reliable data become available, the same estimates are used here.

SUPPLY / DEMAND RELATIONSHIP

Legislation banning yard wastes from disposal in landfills has created a significant supply of mulches and composts made from yard wastes. As solid waste management has traditionally been a municipal responsibility, many of these processing facilities are owned and operated by municipal governments. Recent growth in municipally owned and operated facilities has created a competitive disadvantage for private-sector facilities. Nonetheless, a number of private facilities has been built, but significant investment in yard waste processing facilities by some of the national waste management companies never really developed.¹⁶

Large, centralized processing facilities producing compost and mulch products sold on a multi-state/national basis have not developed, primarily due to the transportation costs of delivering feedstock to processing facilities and the cost of delivering product to market. (A majority of compost/mulch

Figure 5. Estimated Supply and Demand for Yard Waste in North Carolina (tons)

	1997	2002
Supply	683,200	648,068
Demand	13,483,400*	13,483,400*

*Includes agricultural demand at 13,251,400 tons per year

sales are bulk deliveries by truck.) Consequently, the markets and the incoming feedstocks are local. Transportation of yard wastes or produced bulk mulches/composts in more than a 50-mile radius is considered uneconomical (although a distribution limit of 250 miles is suggested for bagged compost).¹⁷

Markets for composted products are beginning to stratify into different levels of a hierarchy that is driven by user specifications. These specifications center on the concept of physical and chemical consistency and include parameters such as particle size, organic matter content, moisture content, bulk density, water holding capacity, nutrient content, soluble salt content, and pH.¹⁸ Higher-end users with stringent product use requirements (i.e., golf courses) are willing to use compost products that meet their demands. Pricing for these products reflects the higher degree of processing and quality control that is necessary. However, composts are not pure alternatives to chemical fertilizers due to their lesser nutrient content. As such, they are largely considered lower-value soil amendments (relative to chemical fertilizers) with limited opportunity for high-value pricing.

The markets for mulches continue to be dominated by the landscaping industry for use in vegetative control. The availability of new materials handling equipment is making mulches more competitive for such applications as erosion control, animal bedding, landfill cover, and bioremediation. The landscaping market also is moving into stratification by recognizing differently-colored mulches as higher-valued products. Some mulch processing companies are investing in colorization equipment to produce dyed mulches of different colors.

The increase in processed yard waste supply in the early 1990s (due to yard waste landfill bans) initially overwhelmed the existing mulch/compost markets. In more recent years, markets have matured to the point where demand equals supply. Potential demand with agricultural uses is considerably greater than supply. With the emergence of new markets for mulches and composts, demand should continue to exceed supply for the foreseeable future, as indicated in Figure 5.

CONCLUSION

The demand for routinely-collected and processed yard waste appears to meet the available supply. Storm-generated yard waste (such as with hurricanes Fran and Bertha) creates short-term supply exceedances of available demand. Efforts to increase market awareness of the benefits of compost and mulches are stimulating demand, as is U.S. EPA's identification of promising emerging markets for composts. An example of these efforts is the *Carolina Composting and Resource Guide*, produced by the Carolina Recycling Association and sponsored in part by the Division of Pollution Prevention and Environmental Assistance.

As the vast majority of generated yard waste in North Carolina already is being diverted from landfills and recycled, there is little potential impact in North Carolina's waste reduction goals. However, the large amount of vegetative debris going to land clearing and inert debris (LCID) facilities is a potential source for additional diversion.

Efforts are needed to accurately estimate demand for compost and mulches in North Carolina by market segment (both existing and emerging). The results of that analysis may lead to assessment and development of policies, procedures, and regulations to stimulate demand for these materials. A secondary benefit is to give municipalities and communities planning organics diversion projects a sense of market demands.

As the final products are likely to always be perceived as a low-value commodity, opportunities for entrepreneurs and investors will be limited to small to medium-scale facilities that are well-planned and well-located with respect to both feedstocks and markets. These facilities also will have to be planned with respect to competition from existing or planned facilities owned by municipal governments.

RECOMMENDATIONS

- The state should continue to sponsor efforts, like the *Carolina Composting and Resource Guide*, to increase awareness of the availability and location of recycled organic products.
- The state should conduct a detailed assessment of the sources and amounts of vegetative debris go-

ing to LCID facilities and evaluate the technological and economic obstacles to increased diversion of these materials.

- The state should sponsor a detailed market demand study to give producers of compost and mulches useful business planning information.

¹ National Composting Prices, *Composting News*, Vol. 5, No. 12, February, 1997, p.4.

² U.S. EPA, *Characterization of Municipal Solid Waste in the United States – 1997 Update*, May, 1998, p. 45.

³ *Ibid.*

⁴ Glenn, J., "Finding Profits in Organics Recycling", *Biocycle*, Vol. 38, No. 9, September, 1997, p.30.

⁵ North Carolina Department of Environment and Natural Resources, *Solid Waste Management Annual Report July 1, 1996 – June 30, 1997*, p. 30.

⁶ North Carolina Department of Environment, Health, and Natural Resources, Office of Waste Reduction, *Assessment of The Recycling Industry and Recycling Materials in North Carolina, 1995 Update*, November, 1995, p. 4-168.

⁷ U.S. Environmental Protection Agency, *Innovative Uses of Compost*, Report Nos. EPA530-F-97-042 through 046, October, 1997.

⁸ U.S. EPA, May, 1998, *op. cit.*, p. 149.

⁹ NCDEHNR/OWR, November, 1995, *op. cit.*, p. 4-169.

¹⁰ National Composting Prices, *Composting News*, Vol. 5, No. 12, February, 1997, p.4.

¹¹ Farrell, M., "Municipal Experiences with Marketing Compost", *Biocycle*, Vol. 38, No. 9, September, 1997, p. 39.

¹² Farrell, M., "Expansion Options for Mulch Producers", *Biocycle*, Vol. 39, No. 5, May, 1998, p. 70.

¹³ Farrell, M., 1998, *ibid.*, p. 74.

¹⁴ National Composting Prices, *op. cit.*, p.4.

¹⁵ Price list, The Mulch Masters, Raleigh, NC, June, 1998.

¹⁶ Glenn, 1997, *op. cit.*, p.30.

¹⁷ NCDEHNR/OWR, 1995, *op. cit.*, p. 4-167.

¹⁸ Recycling Technology Assistance Partnership, *Compost End-Use Guidelines Development Project Final Report*, Washington State Department of Community, Trade & Economic Development, March, 1996, p.4.