



# Environmental Fact Sheet

## LEAF AND YARD TRIMMING MANAGEMENT: COMPOSTING VERSUS RESIDENTIAL BURNING - ADDENDUM

*This addendum supplements EPA publication number EPA-452/F-93-010 with additional information regarding air pollutant emissions and potential health effects from the burning of leaves and yard trimmings. Table 1 provides emission factors for particulate matter, carbon monoxide, and hydrocarbons for a number of leaf species. Table 2 provides a list of leaf burning pollutants and their associated biological effect criteria, as well as the populations most affected by these pollutants. Table 3 presents leaf incineration emissions of a number of polycyclic aromatic hydrocarbons.*

Table 1. Emission Factors for Leaf Burning <sup>1,2</sup>

Leaf Species	Particulate <sup>a,b</sup>	Carbon Monoxide <sup>a</sup>	Hydrocarbons <sup>a,c</sup>
	lb/ton (kg/Mg)	lb/ton (kg/Mg)	lb/ton (kg/Mg)
Black Ash	36 (18)	127 (63.5)	41 (20.5)
Modesto Ash	32 (16)	163 (81.5)	25 (12.5)
White Ash	43 (21.5)	113 (57)	21 (10.5)
Catalpa	17 (8.5)	89 (44.5)	15 (7.5)
Horse Chestnut	54 (27)	147 (73.5)	39 (19.5)
Cottonwood	38 (19)	90 (45)	32 (16)
American Elm	26 (13)	119 (59.5)	29 (14.5)
Eucalyptus	36 (18)	90 (45)	26 (13)
Sweet Gum	33 (16.5)	140 (70)	27 (13.5)
Black Locust	70 (35)	130 (65)	62 (31)
Magnolia	13 (6.5)	55 (27.5)	10 (5)
Silver Maple	66 (33)	102 (51)	25 (12.5)
American Sycamore	15 (7.5)	115 (57.5)	8 (4)
California Sycamore	10 (5)	104 (52)	5 (2.5)
Tulip	20 (10)	77 (38.5)	16 (8)
Red Oak	92 (46)	137 (68.5)	34 (17)
Sugar Maple	53 (26.5)	108 (54)	27 (13.5)
Unspecified	38 (19)	112 (56)	26 (13)

<sup>a</sup>These factors are an arithmetic average of the results obtained by burning high- and low-moisture content conical piles ignited either at the top or around the periphery of the bottom. The windrow arrangement was only tested on modesto ash, catalpa, american elm, sweet gum, silver maple, and tulip, and the results are included in the averages for these species.

<sup>b</sup>The majority of particulates are submicron in size.

<sup>c</sup>Tests indicate hydrocarbons consist, on the average, of 42% olefins, 32% methane, 8% acetylene, and 13% other saturates

**Table 2. Biological Effect Criteria and the Human Populations Sensitive to Various Pollutants Associated with Leaf Burning<sup>2</sup>**

<i>Identified Pollutants</i>	<i>Biological Effect Criteria</i>	<i>Sensitive Populations<sup>a</sup></i>
Particulates	Pulmonary function	Asthmatics; persons with cardiopulmonary and/or cardiovascular disease including coronary ischemia (coronary artery disease); persons with bronchitis, emphysema, and/or atelectasis; and young children (0-6 years)
Carbon Monoxide	Carboxyhemoglobin	Smokers; persons with cardiopulmonary and/or cardiovascular disease; asthmatic children; pregnant women; and infants
Aliphatic Hydrocarbons	Pulmonary function	Persons with cardiopulmonary and/or cardiovascular disease
Aldehydes	Peroxidation of phospholipids in alveolar surfactant	
<sup>a</sup> The general population may also experience adverse health effects; however, this table attempts to emphasize those particular groups who will be hypersensitive to each pollutant.		

**Table 3. Polycyclic Hydrocarbon Emissions from Incineration of Leaves<sup>2</sup>**

<i>Polycyclic Hydrocarbons</i>	<i>Composite Emissions<sup>a</sup></i> (nanograms per gram of leaves burned)	
	<i>Mean</i>	<i>Range</i>
Anthracene/Phenanthrene	4970	3480-7300
Methyl anthracenes	3967	3000-5200
Fluoranthene	2108	1400-3000
Pyrene	1562	1000-2200
Methylpyrene/Fluoranthene	1152	360-1100
Benzo(c)phenanthrene	112	0-280
Chrysene/Benz(a)anthracene	523	210-780
Methyl chrysenes	253	0-750
Benzo fluoranthenes	377	0-780
Benzo(a)pyrene } Benzo(e)pyrene }	193	120-280
Perylene	110	0-290
3-Methylcholanthrene	0	-
Ideno(1,2,3,-cd)pyrene	245	0-760
Benzo(g,h,i)perylene	51	0-115
Dibenzo(a,h)anthracene	0	-
Dibenzo(c,g)carbazole	0	-
Dibenzo(a,i and a,h)pyrenes	0	-
Coronene	0	-
<sup>a</sup> An emission composite of mean yield and range of values of six replicates of three leaf species (red oak, sugar maple, and sycamore)		

## REFERENCES

1. Compilation of Air Pollution Emission Factors - Volume 1: Stationary Point and Area Sources. Fourth Edition and Supplements, AP-42. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. September 1985 through September 1991.
2. Air Quality, Health and Economic Impacts of Leaf Burning. Air Program Development Section, Air and Quality Division, Iowa Department of Environmental Quality, Des Moines, Iowa. June 1982.