

August 10, 2009

To: Peter Moe, Landscape Arboretum

From: Neil Carlson, Industrial Hygienist
Tran Huynh, Industrial Hygiene intern

RE: Fungal samples near Landscape Arboretum pile

Outdoor fungal samples were taken at the request of the compost pile operator and the request of nearby residents because of concerns about odors and airborne fungal counts. Before the compost pile turnover fungal counts were the same at all locations. During the compost pile turnover fungal counts down wind of the pile counts were reduced with distance. At 250 feet, counts were several times higher than background and at 800 feet the counts were the same as background.

Recommendations:

Determine a set schedule for compost turnover and notify residents. Previous data from other locations suggest that fungal counts drop back to background within a half hour after the turnover. Please see attached document from the MPCA.

Relocating the site 820 feet away from the nearest neighbors is also an option. The British studies found in most situations that counts were not affected 250 meters (820 feet) downwind of a compost pile. The data from this report appears to support that conclusion. Please see the second attachment "LitReviewCompost."

Consider returning to the 2007 levels of activity at the compost site.

Workers turning over the compost pile should have respiratory protection. . Air filtration in a covered cab may be adequate. If the cab filtration is inadequate, we recommend that workers wear a half face respirator while working with the compost piles. The respirator must have a protection factor of 10; this may be a reusable or disposable device. You should try a disposable N95 respirator with an exhalation valve first because they are more comfortable to wear in warm weather.

Discussion:

The data from the sample show that turning the compost pile does affect the airborne fungal counts in the immediate area downstream from the pile and to a lesser extent 250 feet downwind from the pile. The area 800 feet downwind from the compost pile was not affected the by the turnover of the compost pile.

The strength of compost odor correlates with the strength of airborne fungal counts.

Contact Neil Carlson at 612-626-5714 (carls001@umn.edu) if you have further questions or concerns.

Results

SAS culturable IMA 37 Celsius air samples 30 or 50 liters: July 14, 2009 Before pile turnover

Location	CFU/cubic meter	Primary Organisms (counts per plate)	Percent
1 – At site before turning the compost pile (30 liter)	170	Aspergillus fumigatus (1) Aspergillus nidulans (1) Other (3)	20 20 60
2 – At site before turning the compost pile (50 liter)	80	Aspergillus fumigatus (2) Other (2)	50 50
3 – 250 feet down wind before turning the compost pile (30 liter)	130	Aspergillus fumigatus (3) Aspergillus niger (1)	75 25
4 – 250 feet down wind before turning the compost pile (50 liter)	60	Aspergillus fumigatus (1) Aspergillus niger (1) Other (1)	33 33 33
5 – 800 feet down wind before turning the compost pile (30 liter)	100	Aspergillus niger (2) Aspergillus fumigatus (1)	67 33
6 – 250 feet down wind before turning the compost pile (50 liter)	160	Aspergillus fumigatus (3) Other (5)	38 62

SAS culturable IMA 37 Celsius air samples 30 or 50 liters: July 14, 2009 (Right after turnover)

Location	CFU/cubic meter	Primary Organisms (counts per plate)	Percent
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7 – At site after turning the compost pile (30 liter)	4,980	Aspergillus nidulans (93) Aspergillus fumigatus (26) Mucor sp. (18) Aspergillus niger (4) Other (10)	62 17 12 <10 <10
8 – 250 feet down wind after turning the compost pile (30 liter)	890	Aspergillus nidulans (9) Aspergillus fumigatus (7) Mucor sp. (7) Other (4)	33 26 26 15
9 – 250 feet down wind after turning the compost pile (50 liter)	300	Aspergillus nidulans (7) Aspergillus fumigatus (6) Mucor sp. (2)	47 40 13
10 – 800 feet down wind after turning the compost pile (30 liter)	130	Aspergillus fumigatus (3) Other (1)	75 25
11 – 250 feet down wind after turning the compost pile (50 liter)	80	Aspergillus fumigatus (2) Aspergillus niger (1) Other (1)	50 25 25

Materials and Methods-

The SAS air samples were taken on July 14, 2009. The SAS and contact agar samples were incubated at 25 degrees Celsius.

Fungal organisms were identified by the Scotch tape technique or growth of fungi on the culture plate. The Scotch tape is placed on the edge of a fungal colony and then placed on a slide with a small amount of 85% lactic acid mounting fluid mixed with stain. The gross morphology of the fruiting body is examined under a microscope.

Standard Definitions:

- * - Overgrowth prevented precise determination of plate count percentage
- CFU - Colony forming unit - a distinct separate colony growing on a culture plate
- s/g – sub genus of *Pen/Asp like*
- sp. - Member of a genus
- spp. - Members of a genus
- pres. - a best attempt at species or genera identification based on the morphology of the fruiting structures
- m³ - Cubic meter
- CFU/plate - colony forming units per plate
- Plate count - percent of total organisms identified
- DG-18 - Dichloran Glycerol agar
- IMA – Inhibitory Mold Agar
- Aggressive - a disturbance or agitation air sampling technique
- Passive - a nondisturbance air sampling technique