Recovery of *Aspergillus fumigatus* aerospora from municipal sewage sludge composting operations in the state of Maine

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**Abstract**

An investigation was conducted to determine the effect of composting activity on ambient and transient viable *Aspergillus fumigatus* aerospora at three composting operations (Westbrook, Bangor, Old Town) in the State of Maine. Meteorological conditions and seasonality were also considered. The purpose of the study was to determine whether composting operations caused increased public health risks due to the generation and dispersal of elevated *A. fumigatus* aerospora concentrations.

Ambient aerospora concentrations at the Westbrook facility did not change during the first year of operation, nor did they differ from concentrations recovered before the composting facility was constructed. Ambient aerospora at Bangor and Old Town were also present at background concentrations. Background aerospora concentrations (<50 CFU/m³) were determined at control sites.

Spatially and temporally restricted increases in transient *A. fumigatus* aerospora concentrations were observed. The greatest increases (up to 1 × 10⁴ CFU/m³) were associated with wood chip manipulation activities. Aerospora concentrations always returned to background levels within 1 hr after the monitored activities ceased.

Meteorological conditions which tended to reduce dust concentrations also decreased *A. fumigatus* aerospora yields. Evidence regarding seasonality as a factor affecting aerospora concentrations was equivocal.

The results of the study demonstrated that residents in the vicinity of the Westbrook, Bangor and Old Town composting operations were not exposed to increased concentrations of *A. fumigatus* aerospora.

**Introduction**

*Aspergillus fumigatus* fæs has been recovered routinely from thermal environments comparable to municipal sewage sludge compost piles (9, 10, 13, 17, 24, 25). The role of *A. fumigatus* as an opportunistic pathogen, recently reviewed by Marsh *et al.* (15) has caused some concern in communities where composting is being adopted as a sewage sludge management technique. Few data exist on the generation of aerospora and their transport due to composting operations (16). Accordingly there is no basis for assessing increased public health risks from *A. fumigatus* aerospora generated during composting. To address this problem, two lines of investigations must be pursued. It is necessary to determine the effect of composting operations on the concentrations of aerospora, and to examine the epidemiological impact of any concentration changes which may have resulted from these operations.

Millner *et al.* (16) investigated the transport of *A. fumigatus* aerospora from composting activities at the U.S. Department of Agriculture Beltsville Agricultural Research Center. They observed that *A. fumigatus* was aerosolized during material manipulation, but aerospora concentration enrichment was limited both spatially and temporally.

In anticipation of the construction of composting facilities in a number of communities in Maine, a
study was performed to evaluate the effect composting activities had on ambient and transient *A. fumigatus* aerospora concentrations at several sites. One site, the Bangor Composting Facility, located in an unobstructed area of an unused runway at Bangor International Airport, had been in operation for several years. At two other sites, Old Town and Westbrook, composting activities were initiated during the course of this study. Both of these sites were located in wooded areas. The study focused principally on monitoring aerospora in the vicinity of the Westbrook site. Sampling began before site construction was completed, and continued through the first year of operations. Seasonally, several control sites were also monitored to provide a comparative basis for evaluating data from the vicinity of composting operations. Ambient aerospora data (samples drawn at least twelve hours after cessation of activity) and transient aerospora data are presented and discussed in this paper.

**Sampling sites monitored**

Ambient aerospora monitoring was conducted along transects at Westbrook, Bangor and Old Town, Maine (Figs. 1, 2, 3 and 4). Transects at

![Fig. 2. A. fumigatus aerospora monitoring stations; Westbrook Composting Facility, 1979-1980.](image)

![Fig. 3. A. fumigatus aerospora monitoring stations; Bangor Composting Facility, 1979-1980.](image)

![Fig. 1. A. fumigatus aerospora monitoring stations; Westbrook area, 1979-1980.](image)