Letter to the Editor: Conidial Release in Helminthosporium

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Recently, to explain an observed diurnal pattern of spore release, Leach (5) has renewed the discussion of relative humidity-triggered violent spore release by the Helminthosporia. Earlier observations on this form of spore release are at variance with each other (4, 6). Indeed, Leach himself reports direct visual evidence that opposes his indirect observations and opposes his conclusion that violent conidial release triggered by changes in relative humidity is important for *Helminthosporium turcicum*. In spite of the variance of opinion about the existence of the mechanism, little has been done to quantify its possible importance by specifying the percentage of total spore removal by this means in the field or to detail the energetics of the process.

Meredith (6, 7), Kenneth (4), and Leach (5) observed conidia of *Helminthosporium* spp. undergoing drying by direct visual observation. In addition, Leach trapped spores released in a humidity chamber and, in a separate apparatus, observed the light scattered (Tyndall effect) by released conidia as they passed through a narrow beam of light in an otherwise darkened space. The rapidity of drying varied among observations. The faster drying, by a few seconds, in Meredith's experiment (7) was reckoned by him to account for the variance between Kenneth's observations and his own on *H. turcicum*.

It is most important for epidemiologists, wishing to evaluate the significance of violent release, to know the percentage of the initial spore pool that is released by this mechanism. Unfortunately, in the cases where violent release was reported, the percentage removal was not reported. Thus, it is not yet possible to predict the contribution of this mechanism to the diurnal pattern of spore release observed by Leach (5).

In our own observations on spores of *H. maydis* undergoing rapid drying, we did not observe any forcible release of these conidia. Spores were viewed directly with a dissecting microscope through the transparent top of the sample chamber while the relative humidity of the air in the chamber was changed from 100% to about 5% relative humidity in 1 minute. Observations were continued for 10 minutes. Although conidiophores were sometimes seen to twist on drying, the conidia remained attached. This is in agreement with Kenneth's (4) and Leach's (5) direct visual observations, but at variance with Meredith's (7) observations on *H. turcicum*. Although Meredith (7) did not mention how many *H. turcicum* spores were forcibly removed he did indicate (6) that only in a "few instances" were the conidia of *H. gigantea* so removed.

The main purpose of our letter is to help put this violent spore release mechanism into perspective for epidemiologists. Kenneth's (4), Meredith's (6), and our own observations all indicate that it is probably not of primary importance for the epidemiology of these *Helminthosporium* spp. It still remains, however, to estimate the percentage removal from Leach's (5) trapping data. Leach gives insufficient information to do this accurately, but we have made an estimate in the following way. Leach induced "heavy" spore production on lesions that were 20×150 mm. From our experience, heavy sporulation might mean 100 or more spores per mm^2. Therefore, he could have placed samples containing about 3×10^5 spores into his "spore release apparatus." Obtaining, by integration of the data presented in his Fig. 4 - 9, the total number of spores trapped and comparing it with our estimate of the initial number present, we find that the percentage removal could have been as little as 0.1 to 1%. Although fault can be found with our estimate, it is clear that such a calculation is important for epidemiologists.

The mechanism by which conidia of Helminthosporia might be actively released into the air is not clear. Rate of drying does not seem to matter since drying was rapid under conditions imposed by Meredith (7) whereas Leach (5) observed release when drying was much slower. Although clarifying the mechanism may deserve further attention, its importance to epidemiology has not yet been shown.

An alternate explanation of diurnal patterns of airborne Helminthosporia conidia can be made in terms of diurnal patterns of spore production (5, 9) and diurnal patterns of wind speed and turbulence (1), and it does not seem necessary to invoke a mechanism which accounts for, at most, only a small percentage removal to explain the observed patterns of these spores in the air. Most of the conidial release can probably be understood in terms of the action of wind as discussed in earlier papers (2, 3, 8).

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