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Modeling of wind-initiated liberation of fungal propagules from host plant leaves TREVOR GONZALINAJEC, Univ of California - Berkeley —
Successful airborne propagule dispersal must begin with liberation into the air. The physical shedding mechanism of airborne propagules in the 100-250μm size range are not well understood. Many fungal plant pathogens have propagules in this size range that are shed from the bottom of infected leaves. If turbulent air flow is sufficient to liberate the sporocarps of fungi from leaves then the aerodynamic forces exerted must be sufficient to overcome adhesive forces. In this study I have sought to quantify the magnitude and direction of these aerodynamic forces and their causal flow fields with dynamically scaled physical models. I chose a genus of powdery mildew because maturation of the sporocarp entails morphological changes that lever the sporocarp further away from the leaf surface and out of the viscous boundary layer. Consequently I varied the sporocarp morphology, the boundary layer thickness, and the flow velocity as forces on models were measured with a transducer. Additionally I analyzed the fluid velocity around the models using PIV, which allowed for quantification of the relative importance of shear forces and pressure-gradient forces. The results suggest that forces from steady and unsteady wind alike are insufficient to explain liberation.

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