

MEASURING THE ABUNDANCE OF AIRBORNE HALOTOLERANT MICROBES

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Abstract: Biogeography studies have shown that microbes can travel long distances in the atmosphere and spread globally. Microbes appear to have no obvious geographical barriers. Baas Becking stated, “everything is everywhere, the environment selects.” This statement suggests that microbes can be everywhere, but their survival depends on the properties of the environment. We investigated this question by sampling the atmosphere for the presence of halotolerant microbes. In the environment, microbes typically grow in freshwater, with little growth at higher NaCl concentrations. Seawater is 2% NaCl; in our experiments, we grow microbes in brines of 10% NaCl. We used R2A medium to create an oligotrophic environment that is more suitable for growing halotolerant microbes from the air or soil. We made two types of R2A media. One is a high-salt R2A medium which we supplemented with 10% NaCl, and the other is a low-salt R2A medium as our control. In addition to the selective media, all the media contained a fungicide cocktail. To collect microbes, we used a method called static air sampling. This is an environmental sampling technique where air is blown directly onto the surface of solid media. We observed about 5 to 10X more colonies on the R2A medium plates than on the high-salt R2A medium plates. In a trial consisting of 6 plates, three of the six were high-salt R2A medium and the other three were R2A medium. Our results showed 43, 29, and 54 colonies on the three high salt R2A medium plates and 459, 527, and 448 colonies on the three R2A medium plates. This led us to conclude that airborne halotolerant microbes are abundant in the atmosphere. We will apply these methods to a wide range of situations. We will conduct experiments to measure microbes in the soil for comparison. Supported by NASA and K-INBRE.

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