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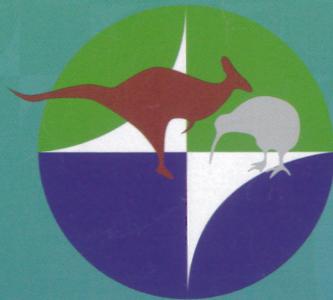
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Occurrence of the ice nucleation active bacterium *Pseudomonas syringae* in precipitation is linked to air mass properties and their trajectories.

World-wide geographic distributions of populations of the ice nucleation-active bacterium *Pseudomonas syringae* have no marked patterns. Its regular occurrence in fresh rain- and snow-fall suggests that air masses contributing to precipitation are vectors for long distance dissemination of this bacterium thereby explaining the lack of patterns. To elucidate the conditions favorable for dissemination of *P. syringae* via precipitation, 88 samples of freshly fallen rain and snow, collected from 2006 – 2010 in southern and central France, were analyzed for microbiological and chemical composition. Physical properties of the air masses associated with the precipitation (temperature, relative humidity, etc), at several altitudes and for up to 5 days before the precipitation event, were obtained from the HYSPLIT model. The bacterium was detected in 72% of rain samples, but in only 12% of snow samples (the lower limit of microbiological detection was 5 bacteria / L). Two physical parameters had marked effects on the presence of *P. syringae* in samples. Air masses from the Iberian Peninsula or Mediterranean Sea contributed to 74% of the samples harboring *P. syringae* whereas these air masses contributed to only 50% of all precipitation events sampled. In contrast, air masses from the North contributed to only 9% of samples carrying the bacterium but contributed to 32% of all samples. Minimum temperatures below -5°C or above 20°C during the trajectory were deleterious to the presence of this bacterium. None of the chemical properties were as indicative of the presence of *P. syringae* in precipitation as were these physical environmental parameters.