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IMPACT OF SNOWMELT ON THE POPULATION STRUCTURE OF THE PLANT PATHOGEN *PSEUDOMONAS SYRINGAE* IN AN ALPINE HYDROLOGICAL SYSTEM

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Recent reports reveal that the life cycle of the plant pathogen *Pseudomonas syringae* is associated with the water cycle; it inhabits snow and alpine rivers in particular. In this light, our objective is to model the transfer of populations of *P. syringae* during snowmelt towards the first overland flows in the Southern French Alps. We estimated abundance and the phenotypic diversity (ice nucleation activity, production of toxins, and pathogenicity) of *P. syringae* in the snow cover at three sites in the Southern French Alps and the associated streams. *P. syringae* was detected in the water and the snow cover at all sites during the sampling period (March to June). Abundance of *P. syringae* and population structure was stratified along the depth of the snow cover. In the 10-cm layer of snow in contact with the ground, population sizes were significantly greater and the dominant phenotypes changed during the season relative to that in snow closer to the surface where populations were less dense and more stable. Surprisingly the population structure in adjacent stream water was different from that in snow. Our field observations coupled to microcosm studies have led us to propose a preliminary conceptual model of the processes involved that modify population structure from snowmelt to stream flow. In winter, *P. syringae* arrives in the basin with the first snow falls. Populations in this initial snow layer consist of strains arriving with the snow and those already present on the leaf litter. Populations survive, multiply and die during the winter as a function of organic matter availability, humidity, the low conductivities and the temperature (always ca. 0°C in the snow cover). Then, the meltwater infiltrates gradually into the ground; the geology of the site determines its residence time and its chemistry. The capacity of *P. syringae* subpopulations to survive transport depends on their fitness in face of the conditions determined by water chemistry and residence time.