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Pseudomonas putida is a versatile bacterial species adapted to soil and its fluctuations. Like many other species living in soil, P. putida often faces water limitation. Alginate, an exopolysaccharide (EPS) produced by P. putida, is known to create hydrated environments and alleviate the effect of water limitation. In addition to alginate, P. putida is capable of producing cellulose (bcs), putida exopolysaccharide a (pea), and putida exopolysaccharide b (peb). However, unlike alginate, not much is known about their roles under water limitation. Hence, in this study we examined the role of different EPS components under mild water limitation. To create environmentally realistic water limited conditions as observed in soil, we used the Pressurized Porous Surface Model. Our main hypothesis was that under water limitation and in the absence of alginate other exopolysaccharides would be more active to maintain homeostasis. To test our hypothesis, we investigated colony morphologies and whole genome transcriptomes of P. putida KT2440 wild type and its mutants deficient in synthesis of either alginate or all known EPS. Overall our results support that alginate is an important exopolysaccharide under water limitation and in the absence of alginate other tolerance mechanisms are activated.

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