P107

Sticking to Thrive: Carbohydrate-binding proteins help *Ralstonia solanacearum* form biofilms and colonize host plants

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Abstract

Lectins, carbohydrate-binding proteins, mediate critical host-bacterial interactions including adhesion to host cell surfaces, interbacterial cohesion, and biofilm formation. *Ralstonia solanacearum* (*Rs*) encodes three lectins that are among the most highly expressed genes in rich media and in planta: mannose-binding lectin LecM, fucose-binding lectin LecF, and xylose-binding lectin LecX. Given that polysaccharides are integral components of both plant and bacterial cell surfaces, we hypothesize that the lectins function in adhesion to the host and/or cohesion between *Rs* cells, aiding in biofilm formation and host colonization. In comparison to rhizoplane colonization, one of the first steps in bacterial wilt disease, all three lectins were upregulated during root endosphere and stem colonization. In plant colonization studies with individual lectin mutants, neither *lecF* nor *lecX* were required for root endosphere colonization, but *lecF* did contribute to colonization of the stem. *In vitro* biofilm assays revealed that Δ*lecF* formed less biofilm than wild-type, while Δ*lecX* hyper-produced biofilms on PVC plates. The expression of *lecF* is increased in Δ*lecX* in comparison to the wild-type, offering a possible explanation for the surprising hyper-attachment phenotype observed. Together, our results show that lectins contribute to critical attachment behaviors in *Rs* and hint at a regulatory link between the lectins.