How can *Listeria monocytogenes* survive in soil?

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I am interested on the study of foodborne pathogens and their dynamics in different environments, and I want to know how they can survive and reach to food products to ultimately make us sick.

In soil *L. monocyogenes* can survive and move to food products that get to the consumers. For that reason, I am studying how it can survive in this environment. Initially, *L. monocyogenes* has to deal with other bacteria, the presence of plants and the climatic changes. These factors make of soil a very complex environment, but these bacteria use some mechanisms to stay in soil despite the adverse conditions.

These mechanisms are shown through the genes that *L. monocytogenes* transcribe to produce proteins. These proteins are involved in different ways that are used by the *Listeria* for instance to get energy, to get defense against other bacteria and to protect itself from climate changes. But the study of these survival strategies is not very extensive, therefore it is important to understand properly the dynamics of *L. monocytogenes* in soil and in that way to decipher why, it can get to contaminate the food products we consume.

Aims

- To decipher the mechanisms used by *L monocytogenes* to survive in soil at the genetic and proteomic level.
- Find the relationship of the genes transcribed in adverse conditions with the virulence of *L. monocytogenes*.

In a comparative study, I will inoculate *L. monocytogenes* in sterile soil, but also in the presence of other bacteria and in the presence of plants. Then, I will see which genes will be expressed in this different situations and thereafter which proteins will be synthesized. Additionally, I will analyze how climate changes such as temperature affect the native populations of bacteria and at the same time how this changes affect the survival of *L. monocytogenes*. Once important genes will be identified, I will construct mutant bacteria deleting those genes of interest to study their role in the survival of *L. monocytogenes*.

Lastly, I will also test those mutant bacteria in an animal model to determine the importance of those genes in the process of infection carried out by *L. monocytogenes*.