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## BIOLOGICAL NITROGEN FIXATION FOR ADVANCED CROP NUTRITION

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**N**itrogen fertilizer has been an important part of increased grain production. Now there is a better way. Biological nitrogen fixation (BNF) by plant-associated bacteria has the potential to provide a sustainable and efficient source of nitrogen to crop roots. However, the abundance of fertilizer and residual nitrogen in agricultural soils has repressed BNF in natural rhizosphere microbes. Pivot Bio has developed a method to provide nitrogen to cereal crops by reawakening BNF in a naturally-occurring microbe. We have identified a novel bacterium that colonize the surface of corn roots at high levels and contains the genetics encoding nitrogen fixation. We fine-tuned the genetic regulation of BNF to allow the microbes to fix nitrogen in the presence of exogenous nitrogen in the lab, greenhouse and field. We also optimized the bacteria for nitrogen release to the roots, showing ammonium excretion *in vitro* and incorporation of biologically-fixed nitrogen into plant shoot tissues by isotopic studies. Corn plants inoculated with the resulting microbes show increased biomass in nitrogen-deficient greenhouse conditions and increased yield in field conditions compared to un-inoculated controls. One of these microbes is currently in large- acre, pre-launch field trials as

an in-furrow corn inoculant. By producing 28-40 kg nitrogen per hectare in corn, these microbes are the first commercially-viable example of BNF as a nitrogen management solution, and the first step toward replacement of synthetic nitrogen fertilizers with an alternative that's better for both growers and the environment.

### Biography

Sarah Bloch is a Senior Scientist at Pivot Bio, an agtech company based in Silicon Valley that is pioneering a ground breaking approach to crop nutrition. She spear heads the research and development of Pivot Bio's non-transgenic microbial solutions to deliver nutrients to crops in a more sustainable and efficient manner than traditional chemical fertilizers. As Pivot Bio's Strain Optimization Team Lead, she integrates unique strain optimization technology to improve plant growth-promoting phenotypes in plant-associated bacterial strains. She holds a PhD from the Department of Biochemistry, Molecular Biology and Biophysics from the University of Minnesota. Her graduate work focused on microbial engineering for the sustainable and low-cost production of valuable plant natural products.

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