



## Bacterial strains as probiotic inoculants in agriculture

*Auburn University is seeking licensing or development partners for bacterial strains with demonstrated or potential activity in a variety of agricultural applications.*

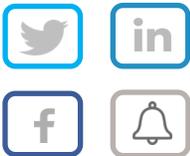
### Lead Researcher:



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Reference: PGPR



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**Overview:** Thousands of bacterial strains have been isolated and characterized at Auburn, many of which exhibit characteristics for potential utility for one or more of the following areas:

- Plant growth promotion
- Disease resistance in plants
- Drought resistance in plants
- Nematode control
- Root pest control
- Nitrogen fixation
- Phosphate solubilization
- Turf & pasture grasses
- Additive for enhanced performance
- Plant emission (N<sub>2</sub>O) control
- Disease resistance and growth promotion in fish

**Description:** Many bacteria form beneficial relationships with plants, very often with the roots of plants. These types of bacteria are generally known as plant growth promoting rhizobacteria or PGPR, a term first coined by Dr. Joseph Kloepfer. Such strains are finding utility as microbial inoculants to promote plant growth, provide biological disease or pest control, and other applications. Bacterial inoculants can be used to treat seeds, soil or leaves, and also as part of a feed for use in animal health. The global market for agricultural biologicals products was estimated to be \$5.3 billion in 2017, with a projected 5-year annual growth rate of 11.5% (BCC Research).

Dr. Kloepfer's laboratory has isolated and screened several large bacterial libraries for agricultural activity. Strains are available for testing and licensing for a variety of applications.

### Partnering Opportunities:

- This technology is available for exclusive or non-exclusive licensing on strain-by-strain and field of use bases; screening and initial evaluation can be done under an option agreement
- Joint development opportunities available, including funded research and joint proposals
- Lab also has capacity for early screening of external bacteria strains



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## Bacterial strains as probiotic inoculants in agriculture (Page 2)

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**Status:**

- Thousands of bacterial strains were isolated by and are proprietary to Auburn University.
- Effectiveness has been shown in numerous applications, including drought tolerance (see photo below), plant growth promotion (see reference), plant health (see reference), nematode control (see photo on previous page and reference below), reducing nitrous oxide emissions (US Patent [9,266,786](#)) and aquaculture health.
- Demonstration ranges from lab scale to field testing; additional unscreened strains available.
- Some strains have been selected and screened for specific traits, such as nitrogen fixation or phosphate solubilization.
- A low cost additive has been shown to enhance performance of *B. velezensis* strains
- Libraries contain both spore-forming and non-spore forming strains.
- Several strains have been licensed for certain applications, including some on the market.

**References:**

- Kloepper, et al, "Induced systemic resistance and promotion of plant growth by *Bacillus* spp.," *Phytopathology* 94(11), p1259, 2004. ([Link](#))
- Adesemoye, et al, "PGPR Allow Reduced Application Rates of Chemical Fertilizers," *Microbial Ecology* 58(4), p921, 2009. ([Link](#))
- [*Nematodes*] Xiang, et al, "Biological control of *Heterodera glycines* by spore-forming plant growth-promoting rhizobacteria (PGPR) on soybean," *PLOS ONE* 12(7): 30181201 ([Link](#))

