

Testing Tropical Endophytes as a Means to Promote Plant Growth in Temperate Agroecosystems

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The United Nations is forecasting that global populations will reach 9.7 billion people by 2050 & 11.7 billion people by 2100. Current intensive agricultural practices are heavily reliant on petrochemical fertilizers & extensive irrigation. Developing alternative agricultural technologies will allow us to feed increasing human populations in a more sustainable manner.

We cultured & categorized several strains of endophytic diazotrophs collected from organic Kona Coast coffee plants. We then inoculated economically important crop plants (e.g. corn & tomatoes) with those endophytes & recorded changes in plant physiology & phenology.

Endophytic microbia, or endophytes, are bacterial or fungal symbionts that live within a plant without causing disease or harm to the plant host.

How do endophytes help plants?

In an exchange for carbohydrates, the symbiotic endophytes provide a variety of goods and services to their host plants.

- Diazotrophic endophytes fix atmospheric nitrogen into a usable form for the plant
- Produce phytohormones (e.g. auxins)
- Increase the bioavailability of phosphate & other limiting nutrients from the soil
- Convey stress tolerance
- Provide resistance to diseases & pathogens



Tomatoes inoculated with *Coffea arabica* consortia



Tomato seedlings grown in low nutrient soil.

Above: Time= 10 weeks, n=60

Right: Time = 8 Weeks, n=100

