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Host-microbiome co-propagation: a novel agricultural tool copied from fungus-growing ants

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Fungus-growing ants engineer complex microbiota during the gardening of their cultivated fungi. Specifically, the ants co-propagate their fungal crop together with diverse communities of beneficial bacteria and yeasts, thereby engineering a beneficial crop-microbe consortium. I adapted these fungicultural principles to develop an efficient method of plant-bacterial-community co-propagation that enhances plant growth by selecting indirectly on root-associated (rhizosphere) bacterial communities while selecting directly on plant biomass. Next-gen surveys confirm that bacterial communities rapidly evolve differences between replicated selection-lines that are selected for either growth-enhancing versus growth-attenuating effects on plants. Beneficial rhizosphere bacteria can greatly enhance fitness of host-plants, for example by solubilizing nutrients or secreting protective antibiotics, but the exact mechanistic effects of the microbiota evolving in my experiments remain to be studied. Because my co-propagation methods were bio-inspired by fungus-growing ants, natural-history observations (e.g., study of outlandish ant-fungus symbioses) therefore can generate innovative ideas with economic applications.