Logic Model, page 1

Situation

- -CLF outbreaks caused enormous economic damage in last decade
- coffee grower workforce is in an increasingly precarious position
- further outbreaks are likely
- chemical controls and resistance breeding may be insufficient to control epidemics in the long term -biocontrols like WHF show promise but development of commercial strains is so far unsuccessful.

Outputs

- -Fungal ITS sequence library
- -tools for plant metatranscriptome analysis
- -fungal culture library of possible antagonists to CLF
- -methods for direct PCR detection of WHF
- -scientific publications
- -relationships with growers and scientists
- -students trained in mycological techniques
- -practical understanding of forest stands in coffee agriculture
- -additional knowledge for prevention of future CLF outbreaks

CLF = coffee leaf rust (Hemileia vastatrix)

WHF = white halo fungus (Lecanicillium lecanii)

Inputs

- scientific tools applied:
- -agroecological principals
- -mycrobial ecological principles
- -open source analytical tools
- -technological skill share ('omics tools)
- -outreach to communities
- -skill sharing and education (mutually! we have a lot to learn from the growers)

Activities

- -train undergraduate researchers
- -develop dialogue with growers
- -search for disease patterns with point patterns
- -develop new method for analyzing microbiome gene expression
- -DNA, RNA, and culture surveys of the coffee mycobiome

Logic Model, page 2

Knowledge

-higher value assigned to forests in land use planning in agricultural areas -more efficient and productive bioprospecting for protective microbes -more empricial evidence for viability of agroecological farming methods

Conditions

-results may improve agroecological methods -will raise awareness of a low-cost biocontrol -may help to reduce future outbreaks of CLF -all the above may help minimize financial risks faced by growers

Actions

-change land use planning by farmers -new potential biocontrol organisms to put into trial -incentivize forest conservation as a low-cost biocontrol

Outcomes

External factors

- -rust severity on the landscape
- -climate
- -desire to collaborate by growers and students in Puerto Rico

Assumptions

--Lecanicillium lecanii is present and can be detected with PCR methods -At least some antagonistic fungi detected with PCR methods will also be present in culture library.