RECRUITMENT OF SEED-ASSOCIATED MICROBES IN ETHNOBOTANICAL PLANT SPECIES AS A RESULT OF SOIL DEGRADATION

Desirae Kissell

MS, Plant Science, University of Arizona

Human Microbiome

Recent attention drawn to promoting good gut health

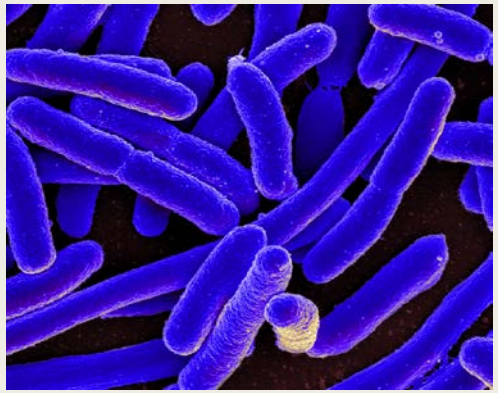
- Probiotics, yogurt, fermented foods

Microorganisms are found **on all human tissues**

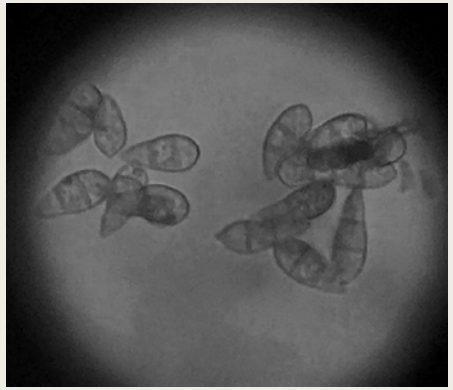
- 10-100 trillion symbiotic microbial cells harbored by each person
- Influences on health and function of host

What are microbes?

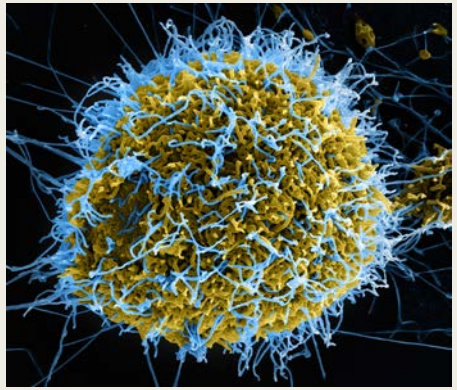
- Living thing that is too small to see with the naked eye
  - Bacteria, Fungi, Viruses, Protists, Archaea



Bacteria



Fungal Spores



Virus

Protist

Archaea

Plant Microbiome

- All tissues of a plant host a diverse community of microorganisms

- Some microbes provide benefit to plant
  - Enhanced nutrient acquisition
  - Improved tolerance to stressors
    - Drought, heat stress

Seed- Associated Microbes

- Microbes may be passed down from mother plant or recruited in the soil
- Increase seedling germination & growth
- Protect against disease
- Potential use for improving agricultural productivity

Velvet Mesquite- (*Prosopis velutina)*

- Provides shade & food source for wildlife
- Source of nectar for bees
- Potential use for rehabilitation of disturbed sites
- Warmer temperatures projected to decrease populations

Tohono O'odham Nation

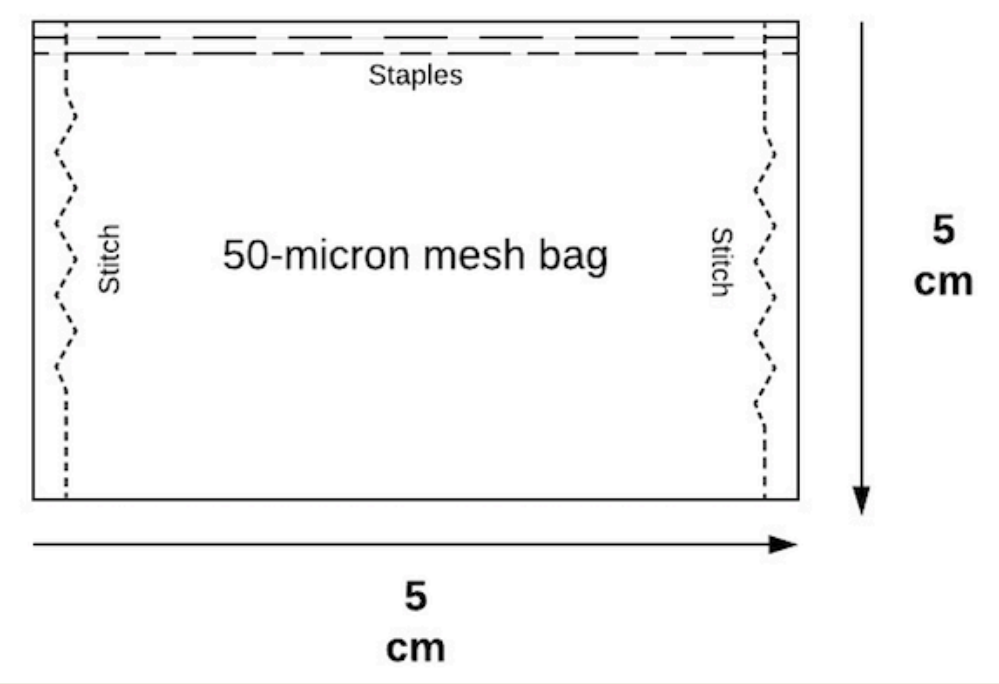
- 70% of members have Type 2 Diabetes
- Mesquite is traditionally important crop
  - Pods ground into flour
  - Bark for baskets
- Glycemic index is 25 percent
  - Slow release food

Objectives

- Examine microbial communities that colonize seeds differ in native vs. degraded soil
- How these microbes may influence the survival, germination, & early growth of mesquite
- Aim to characterize the native microbiomes of these seeds & identify those that may aid in propagation & productivity of plants important to southern Arizona’s Tribal Nations

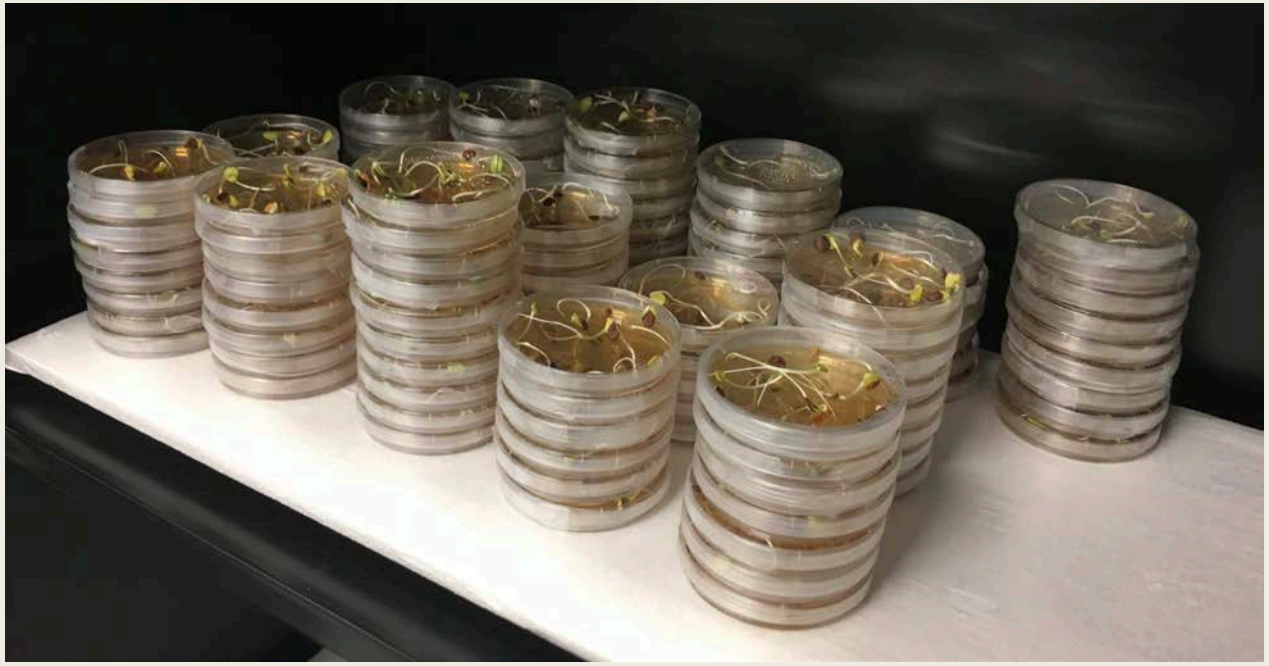
Experimental Design

- 6 sites
  - Paired Design
    - Natural Soil vs. Degraded Soil
- 20 bags per site
  - 18 in ground + 2 controls
- 10 seeds per bag
  - Total of 1200 seeds
- In ground 9 days



Experimental Design

Seed bags in soil → Surface sterilize → Plate on 2% MEA → Score plates

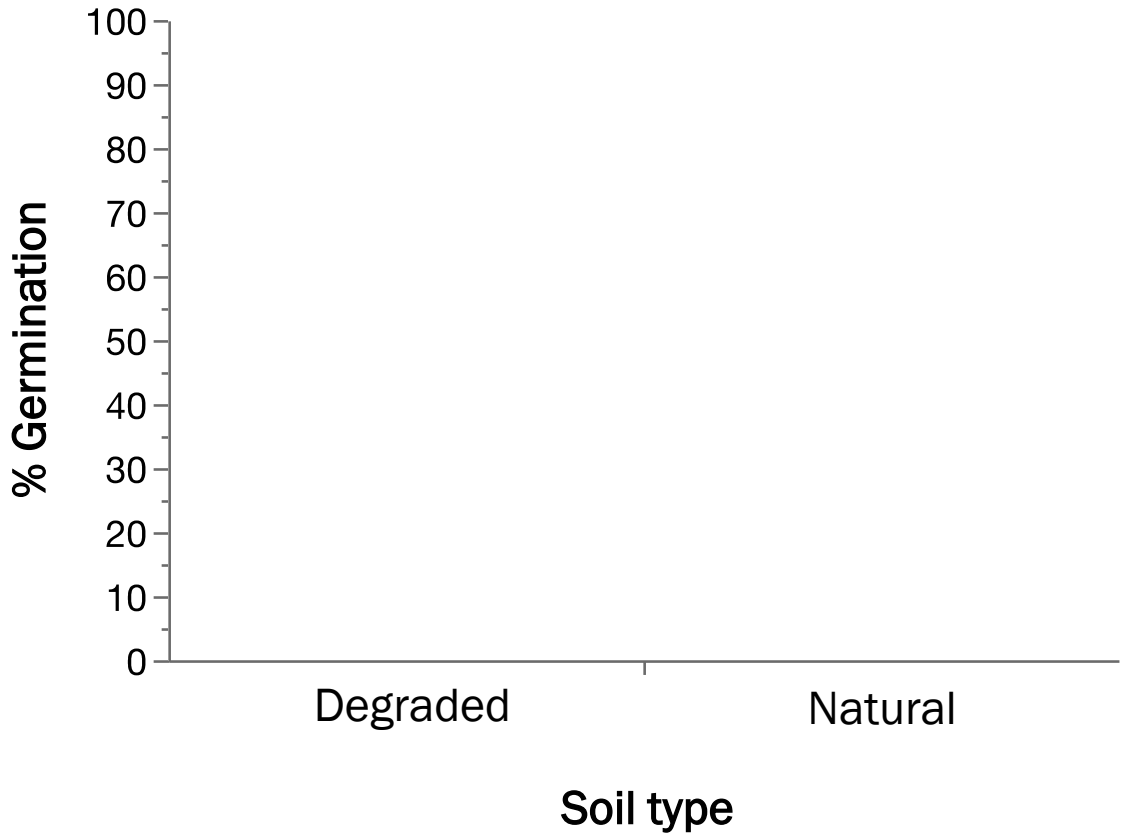


Results

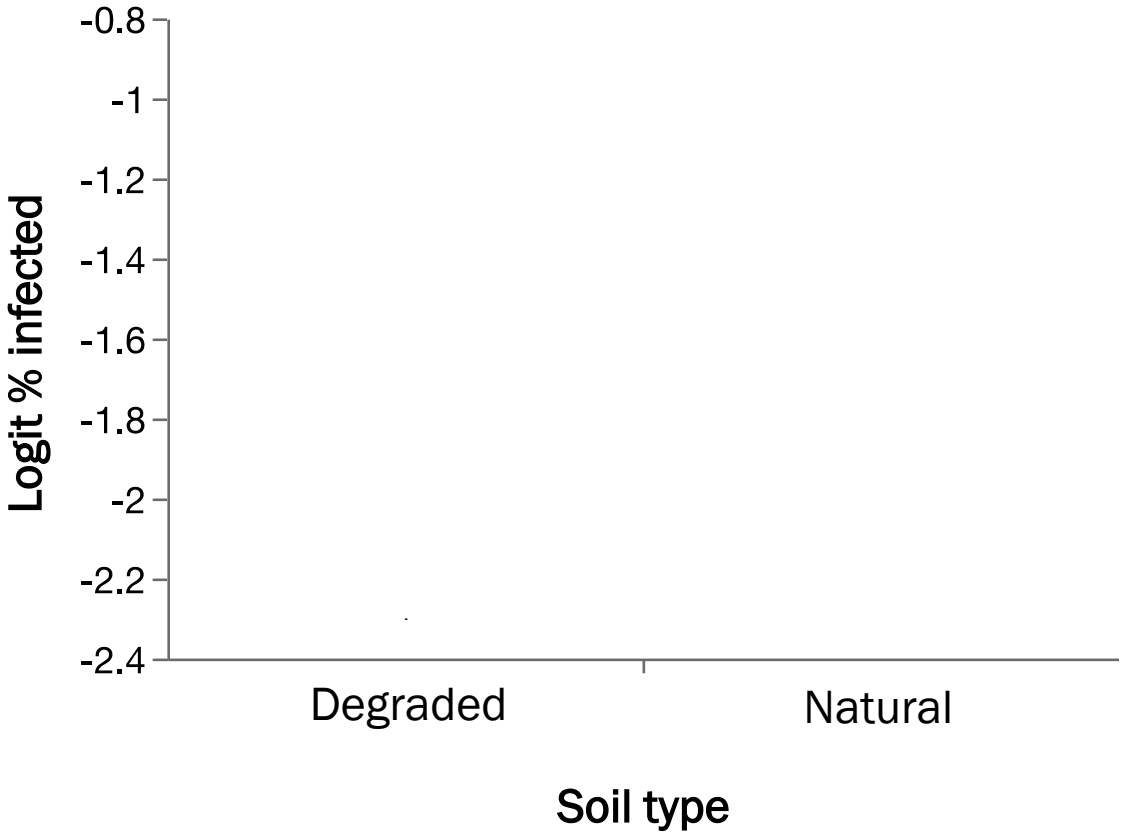
- Obtained 76 bacteria isolates & 9 fungal isolates

- In process of identifying isolates
  - DNA sequencing
  - Microbial Genome Database

No difference in seed germination as a function of soil type



Trend for higher infection frequency in natural soil



Future Directions

- Currently repeating experiment
  - Start of monsoon season
- Outreach
  - Teaching
  - Workshops
  - Community engagement

Acknowledgements

- Dr. Betsy Arnold
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Questions?