Reuniting the Three Sisters:
Cultural and Agronomic Underpinnings of Corn, Squash, and Bean Intercropping

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Collaborative science with Native farmers can overcome barriers to improve soil and community health

Introduction

- This is a cross-disciplinary project that combines both anthropological data, and soil health measurements
- By working collaboratively with Native gardeners, our research will provide evidence for the socio-cultural, nutritional, and agroecological benefits of rejuvenating Native agriculture. **(see Figure 1)**
- Our work will help to support increased awareness of the cultural, nutritional and environmental value of Three Sisters (3SI) to Native communities, as well as improved agricultural practices for soil health.

Materials & Methods

Anthropological Methods

- Focused on cultural ties to gardens, as well as exploring the relationships between soils, plants, and people in the 5 midwestern Tribal communities that we are collaborating with (**see Figure 2**). Example questions for interviews:
  - *Who taught you about your cultural ties to soil?*
  - *What characteristics make a soil good?*
  - *Does your tribe incorporate soils into cultural stories?*

Soil Science Methods

- Analysis of soil samples collected from within 3SI gardens and comparing them to monocrop (single species) plots, in order to quantify the differences in soil health between Native agriculture and contemporary agricultural practices. **(see Figure 3)**

Preliminary Observations

- Participating Native communities value biodiverse cropping systems, both for agroecological and cultural reasons.
- Soil and agriculture are incorporated into cultural stories and ceremonies.
- Sustainable use of natural resources is highly valued.
- Biodiverse cropping systems score higher during soil health analysis than do single species systems. (McDaniel and Grandy, 2016)
- Native gardening culture favors site specific management, rather than a one-size fits all approach.
- Cultural values determine whether an agriculturalists will act with respect to the environment.

Discussion

- More seasons of controlled garden plots to gather soil health data are needed, as well as more seasons of ethnographic data collection.

References: SEE QR CODE

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Figure 1: Plant-soil-human connections in the 3 Sisters Native agriculture system. Arrows point to connections amongst components, with themes within arrows important aspects of that connection.

Citizen Science Benefits:

- Puts the generation of farm knowledge back into that hands of the famers, helping create feelings of empowerment
- Helps to build interconnections between farmers
- Helps researchers to see agricultural problems from a different perspective
- More data! (Ryan et al. 2018)

Barriers to gardening within collaborator communities

- Lack of agricultural knowledge
- Not enough time to build and maintain a garden plot
- Animal damage
- No water source near garden
- Inability to find available space for a garden
- Networks of gardeners within some communities not yet built so new gardeners lack outside assistance
- Childcare issues
- Lack of access to seeds and gardening equipment

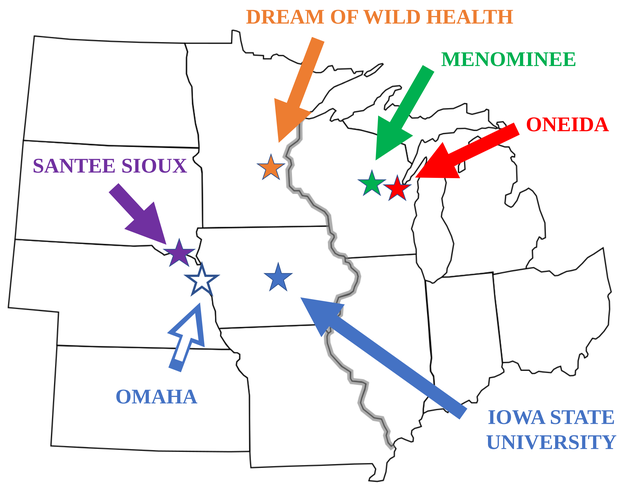

Figure 2. Map of the Upper Great Lakes region of the US showing locations of collaborator tribal communities.

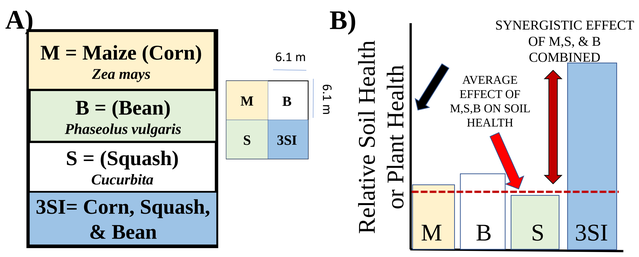

Figure 3: Layout of experimental design and hypothesis. A) crops and block design with 6.1×6.1 m. B) shows hypothesized individual outcomes of soil and plant health, and synergism we expect from the 3 Sisters Intercropping (3SI)