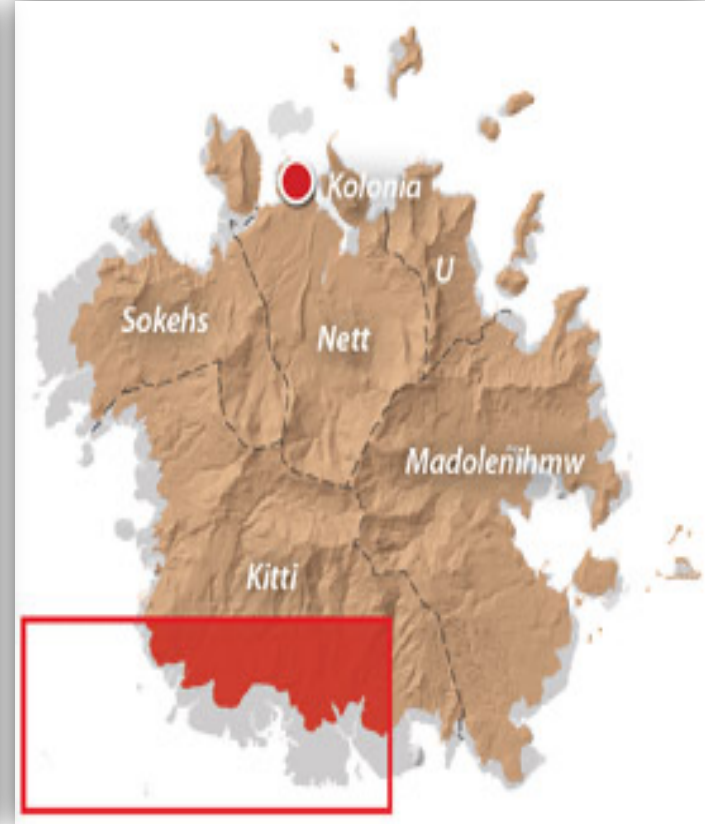


Natural and Artificial Rehabilitation of Degraded Soils (*Mal*) of Pohnpei island, FSM

Macmillan Willyander , Pohnpei
Our Lady of Mercy Catholic High School
Mentor: Dr. Nat Tuivavalagi



Introduction

- “*Mal*” is the Pohnpeian word for barren or degraded soil, too poor to support crop growth
- Occupies at least 15% of land in Pohnpei (Ioanis, 2015).
- It has been controversial whether these *mal* soils could be made productive.
- A few studies have clearly indicated that the *mal* lands could be rejuvenated, however, no management strategy has been properly documented or widely known to the local farmers thus leading to the continuing destruction of virgin forests whenever new land is needed for agriculture, while *mal* lands remain idle
- Rather than clearing virgin forests for use of agriculture, we should utilize the currently unproductive and unutilized degraded mal lands that currently cover huge areas of the main island of Pohnpei.

Objective & Hypothesis

Objective

- To determine whether there has been some rehabilitation of *mal* soil.

Hypothesis

- It was hypothesized that some *mal* of Pohnpei have been transformed and rehabilitated both naturally and artificially into productive soils.

Methodology

1
Literature
Search

2
Field Visits and
Soil Sampling

5
Interview
Questionnaires

4
Greenhouse
Studies

3
Photography
Evidence



Results and Discussion

1- Literature Search

mal?

- According to the Pohnpei's Soil Book, *mal* is one of the most infertile soil on the island
- Soil name: Umpump soil
- Soil family name: **Clayey, oxidic, isohyperthermic, shallow Typic Acrorthox**
- Most obvious vegetation on the *mal* is the DEER FERN
- Formation of *mal*:
 - 1) Topography
 - 2) Continuous burning



Results and Discussion

2- Field Visit and Soil Sampling

Mal Soil Vegetation No. of Earth Worms
(in 6" x 4" x 6" deep)

Fern

0

Fern/Grass

0

Grass

12

Forest

20



Results and Discussion

3- Photographic Evidence

- 3 photos taken different years shows *mal* area transitioning

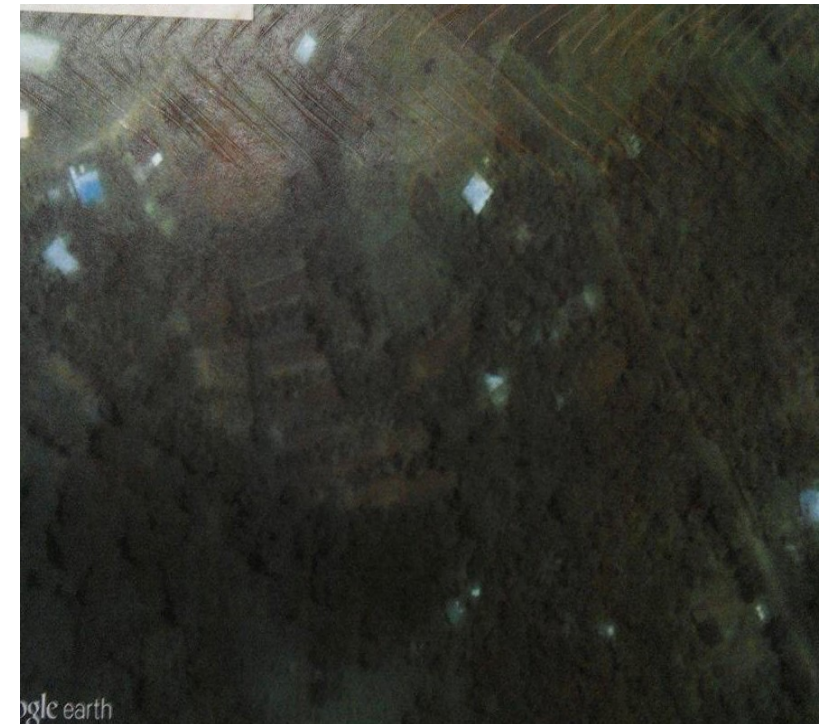
2002



2005



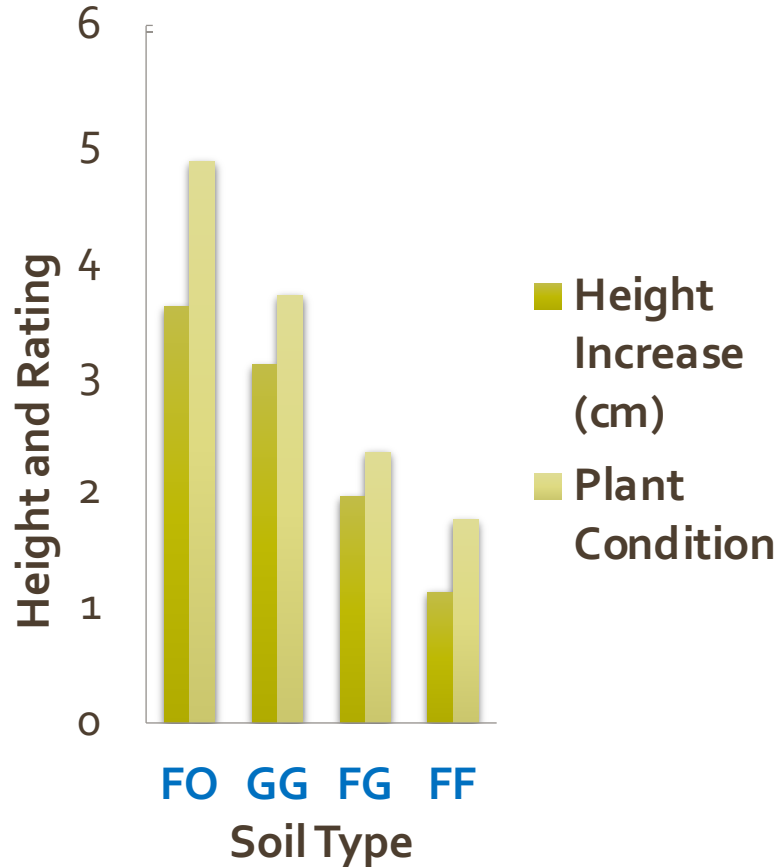
2016



Discussions and Results

4- Greenhouse studies

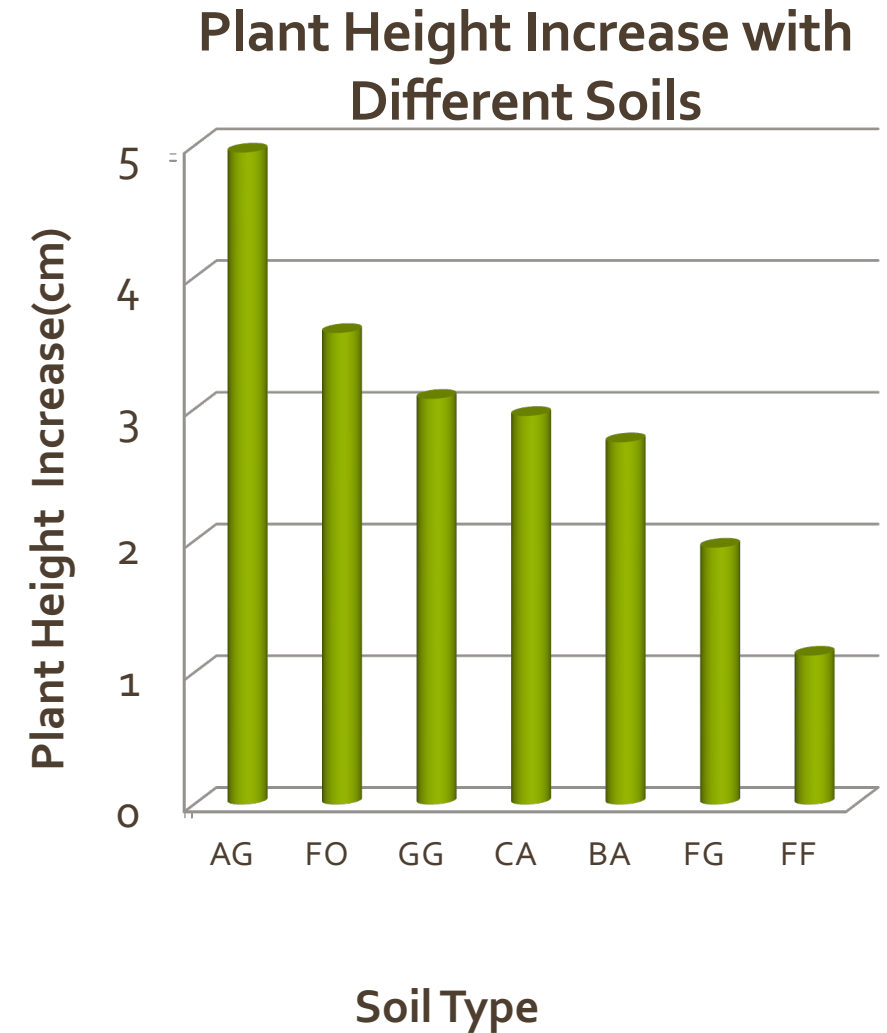
Plant Condition & Height Increase Correlation



- Fertility changes in a transitioning mal:
 - FF(Fern)- original *mal*
 - FG(Fern/Grass mixture)- FF transitioning to fern and grass
 - GG(Grass)- FG transitioning to 100% grass
 - FO(Forest)- transitioning to Forest

Comparing Fertility of *mal* soil with fertility of other soils in Pohnpei

- Study confirmed that the *mal* soil (FF) is less fertile than other soils looked at



Results and Discussion

5- Interviews

- 34 interviewees
 - 24 male and 10 female
 - Ages of 20's-60's
 - 29 current farmers, 5 retired farmers
- 59% of the interviewees stated that *mal* is a treeless area that consists of mostly ferns
- 85% stated that *mal* was there before they were born
- 50% stated that they had no clue on how the area became a *mal* in the first place
- 56% stated that the best artificial intervention is applying dead leaves or compost the *mal*
- 12% stated that the best natural interventions are:
 - Seeding by bird droppings
 - High rainfall which Pohnpei island receives



Statement by interviewed farmers:

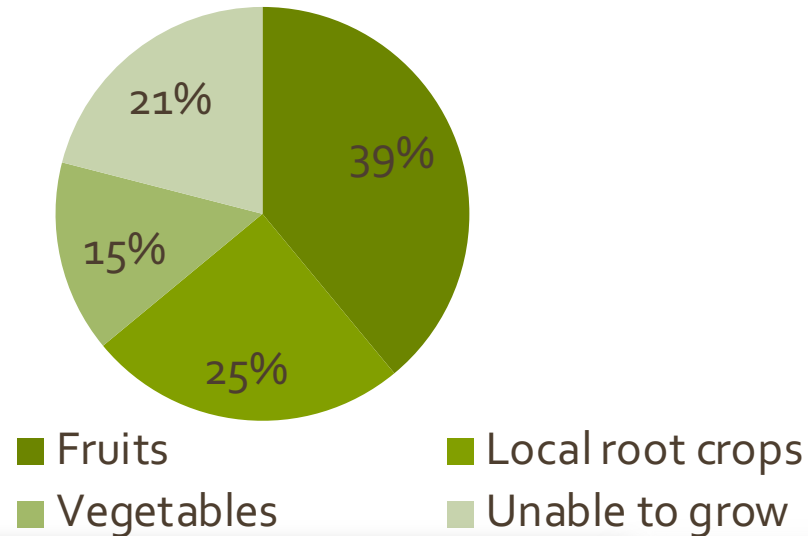
With regard to *mal* rehabilitation

- *Mal* is been rehabilitated by both natural and artificial means

With regards to the crops they are growing on the *mal*

- Fruits (39%)
- Local root crops: e.g.. Taro(25%)
- Vegetables(15%)
- None(21%)-tried to grow on *mal* but failed

Farmers growing Food Crops



Conclusion

Summary

- Photos taken over the years show that various mal areas have rehabilitated naturally and are now in forest
- During the natural rehabilitation process a *mal* transitioned from being a fern land to a grassland, and from a grassland to a forest.
- Interviewed farmers pointed out that the *mal* land had been made productive by natural means and human intervention
- In conclusion, our hypothesis is accepted.
- *Mal* of Pohnpei have been transformed and rehabilitated both naturally and artificially into productive soils.

Recommendations

In order to rehabilitate *mal*:

- Plant trees (hibiscus/NO₂-fixing trees)
- Add organic matter/compost/fertilizer - if needed
- Take care of the birds (no hunting)
- Promote proper farming management (NO Burning)
- Do awareness programs for villagers



Acknowledgments

Special Thanks To:

- Dr Nat Tuivavalagi
- Mr. Rickeyes Ikins
- Ms Marla Pretrick
 - NRCS-USDA
- Agriculture Staff
 - Interviewees
- STEP-UP Program

