



MICHIGAN STATE  
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# Identifying the factors affecting cover crop performance in row crops under organic management

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# Introduction

- Promotion of sustainable cropping systems are of great importance for strengthening the economics of rural communities in Michigan.
- Cover crop usage is among the key components needed to ensure profitability and viability of such systems.
- However, even in organic production systems cover crops utilizations remain relatively limited.

# Introduction

- One of the reasons is the complexity in predicting the nutrient supplies delivered by the cover crops, which may vary as a result of variations in
  - weather patterns,
  - soil properties,
  - landscape positions, etc.
- Understanding variations in cover crop performance will contribute to better educated decisions on when, where, and how to use cover crops to maximize the benefits and to maintain sustainability.

# Objectives



- To study the effects of topography and soil properties on cover crop growth.
- To relate cover crop performance to soil carbon sequestration.
- To relate biomass growth to NDVI measurements.

# Biomass and NDVI data

## Biomass sampling dates

1. First

August 9 -2007

Field 38

2. Second

September 27-28 – 2007

Field 38, 97

LTER site



1. NDVI readings at each point
2. Biomass sampling at each point
3. NDVI records for the whole field



# Green seeker optical sensor device



# Soil, topography, and NDVI data

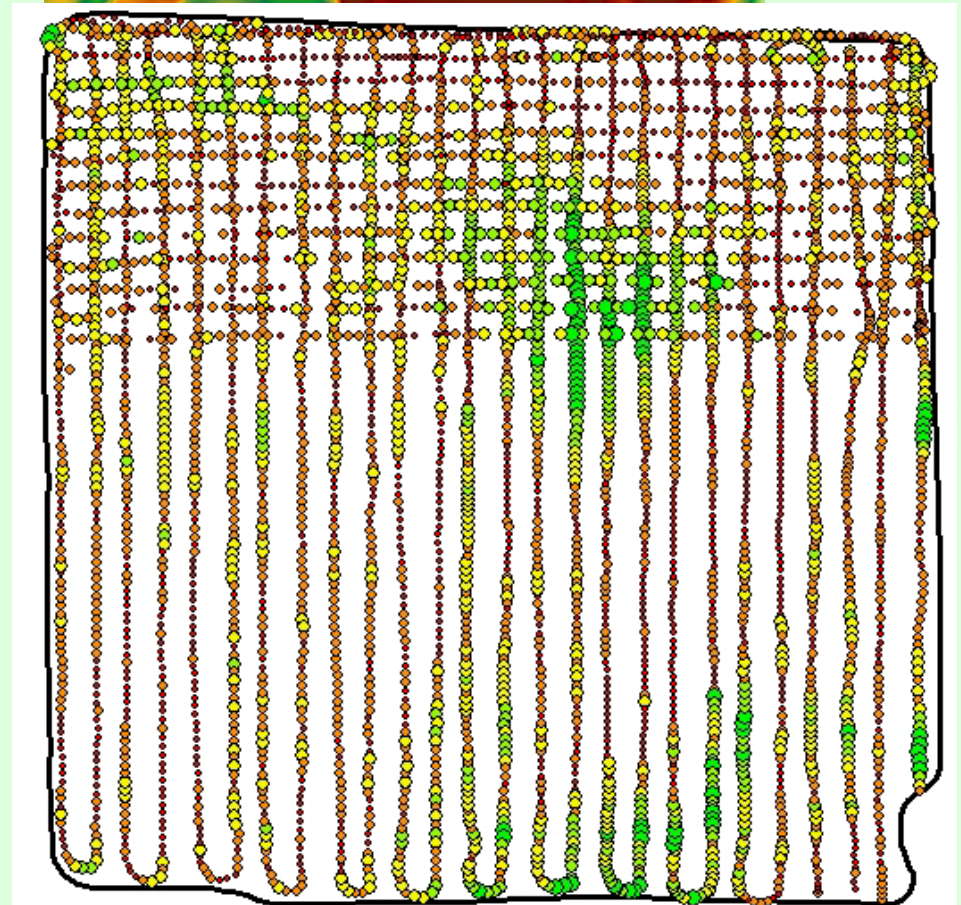
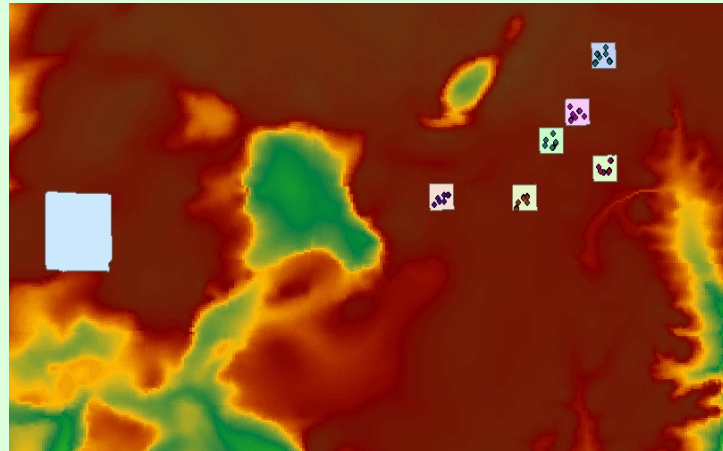
## Soil data available at sampled sites:

- 1) Total C and N
- 2) Soil texture
- 3) Bulk density

## Topographical data available at sampled sites:

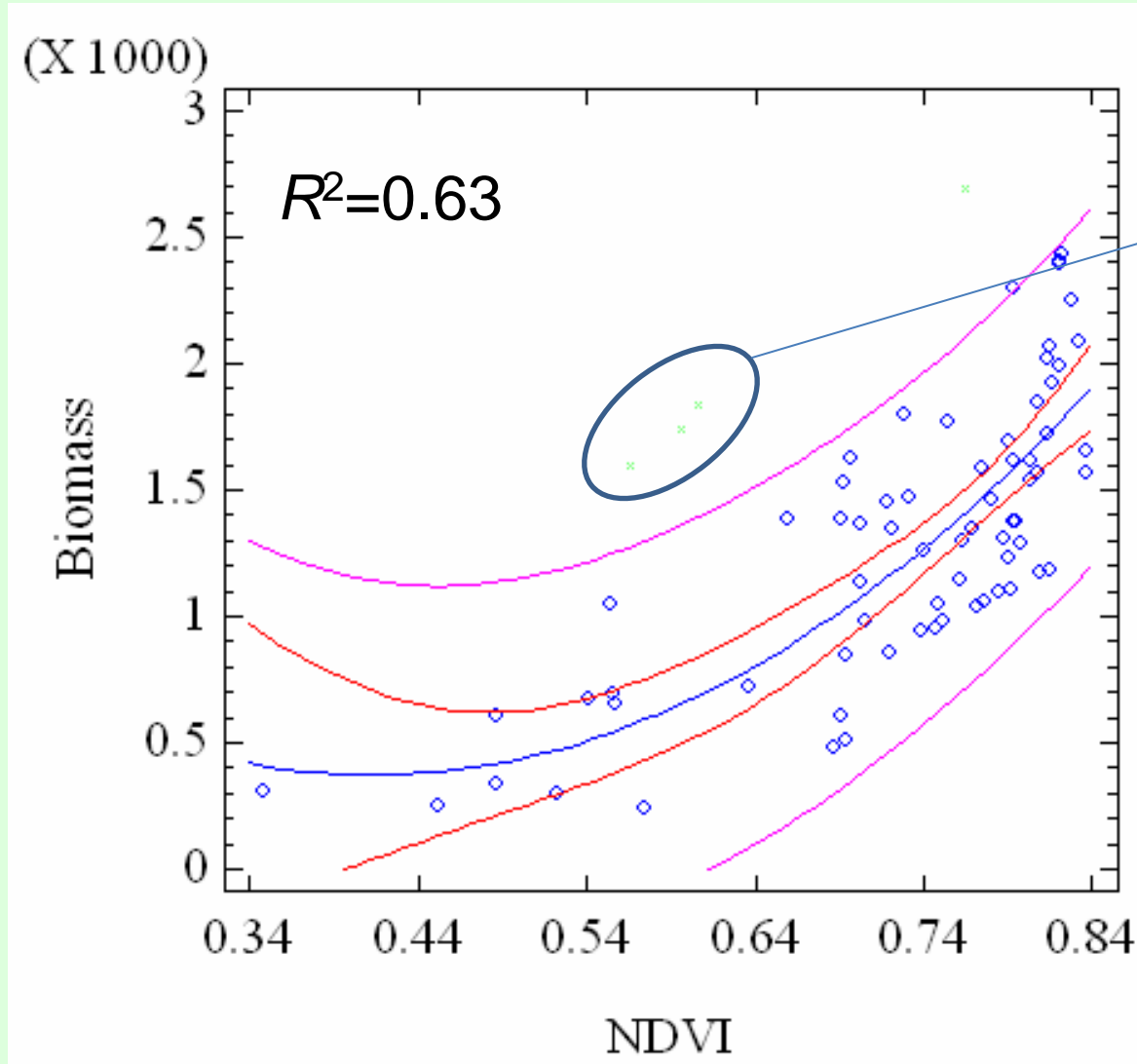
- 1) Elevation
- 2) Terrain slope
- 3) Wetness index
- 4) etc.

## NDVI observations from the Green Seeker optical sensor



# Results: How well can we predict biomass?

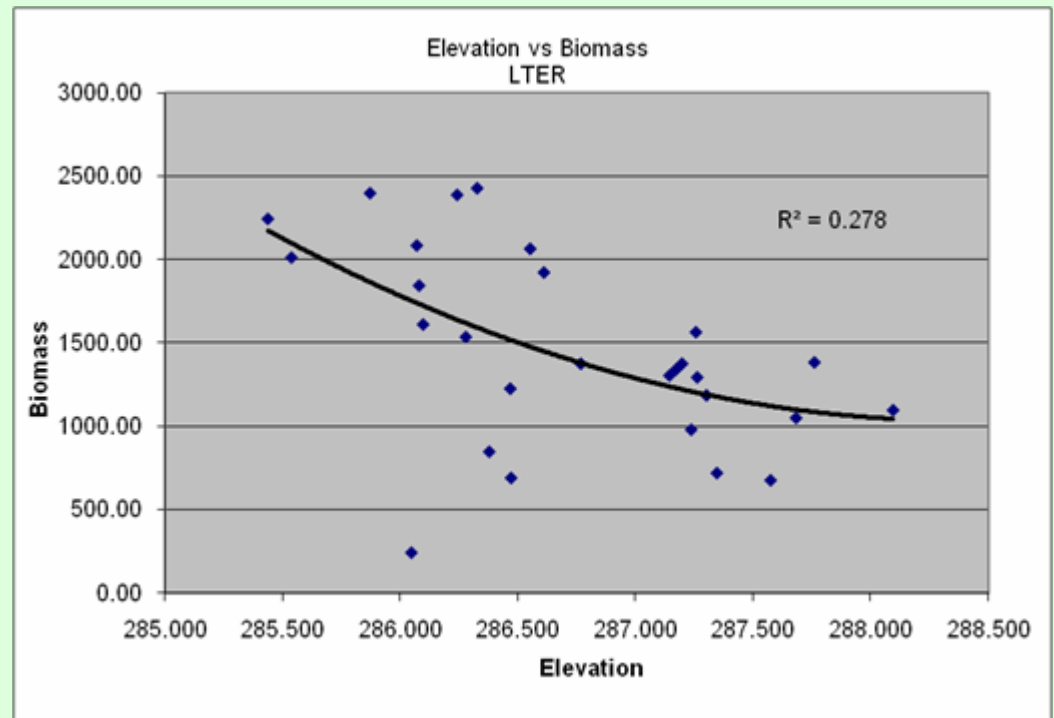
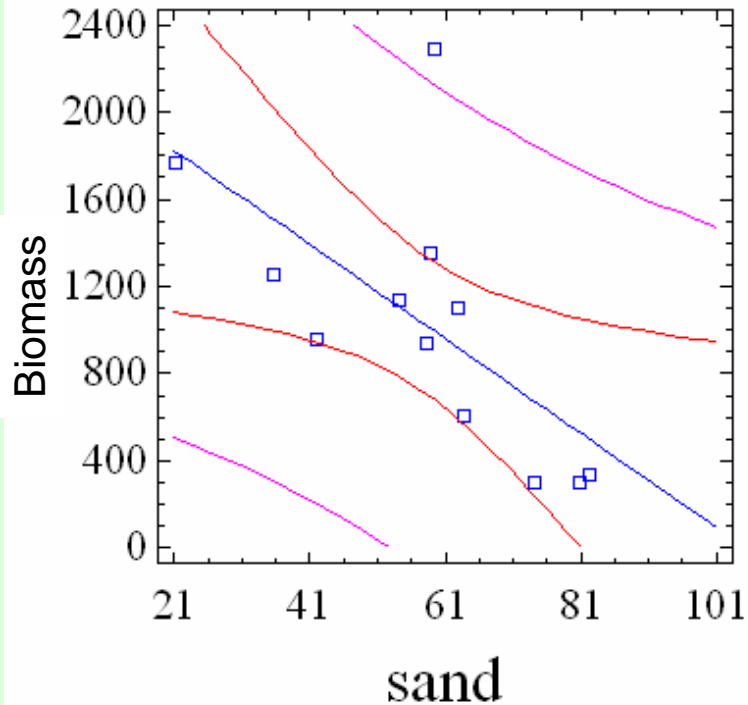
$$\text{Biomass} = 1820 - 7000 \cdot \text{NDVI} + 8450 \cdot \text{NDVI}^2$$



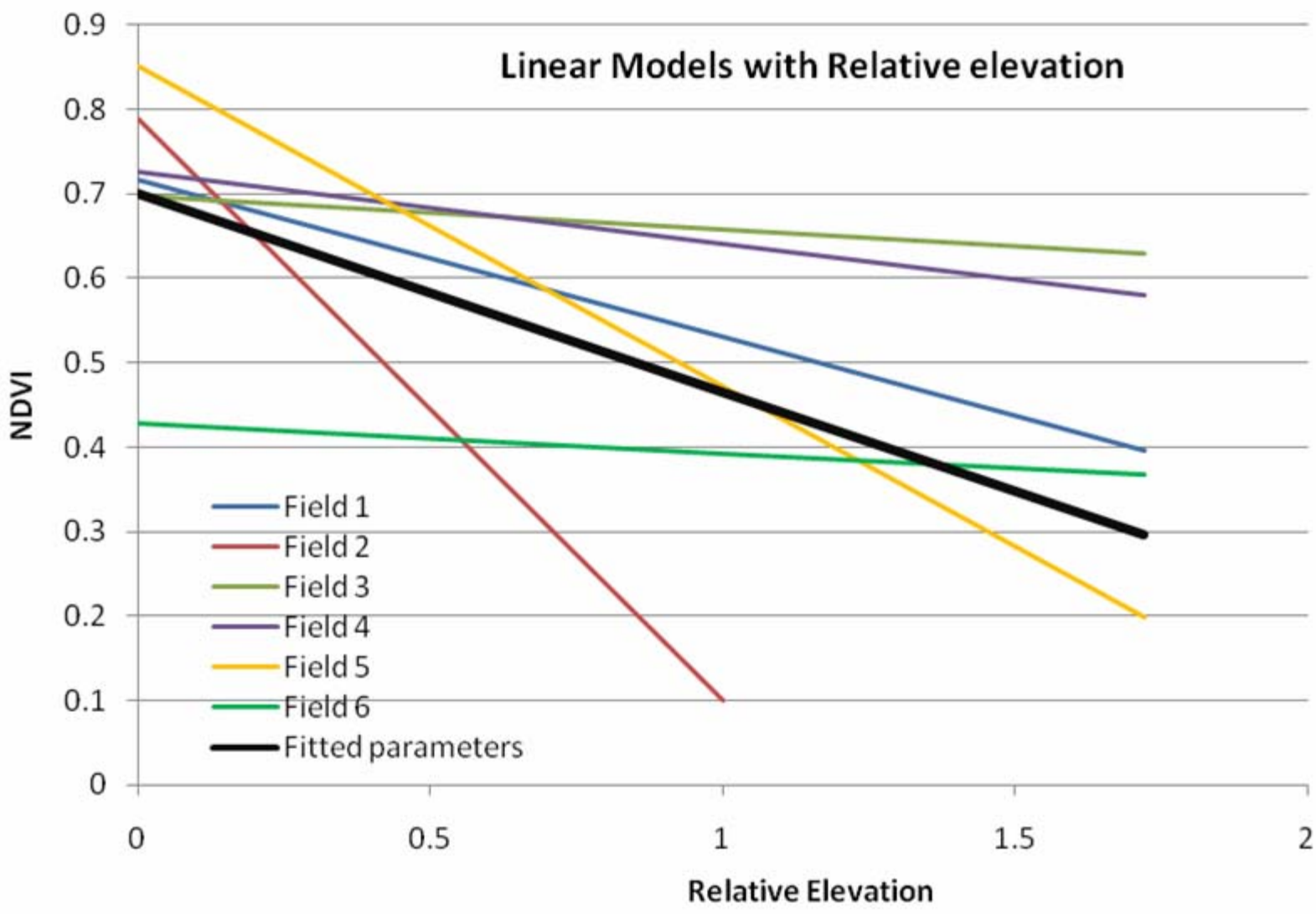
**Grasses  
and weeds**  
(High biomass  
but lower  
NDVI)



# Results: Preliminary assessments of relationships with soil and topography



### Linear Models with Relative elevation



# Summary and conclusions

- NDVI via GreenSeeker™ is a promising tool for predicting clover biomass, especially at early growth stages.
- Preliminary data analyses indicate that red clover biomass is affected by soil properties and topography. However, large small scale variability in both biomass and NDVI data will require special data analyses approaches.