

**Problem:**

**Replant disease (RD)**

- Globally relevant disease
- Reduced tree fruit growth
- Resulted from repeated plantings of genetically related tree fruit
- Abiotic factors contribute
- Primarily caused by soil borne pathogenic microorganisms

**Solutions:**

**1. Soil Disruption**

- Technique to reduce microbes in soil
- Growers use chemical fumigation/ solarization or replacement of the soil
- Greenhouses use steam autoclave (high pressure and temperature)

**2. Crop Rotation**

- A crop grown for anything besides selling for cash
- Different crops have different benefits
- Alfalfa: Increase nitrogen

**Innovation:**

- Combination of only sustainable techniques
- Focused on developing beneficial microbiome

**Audience:**

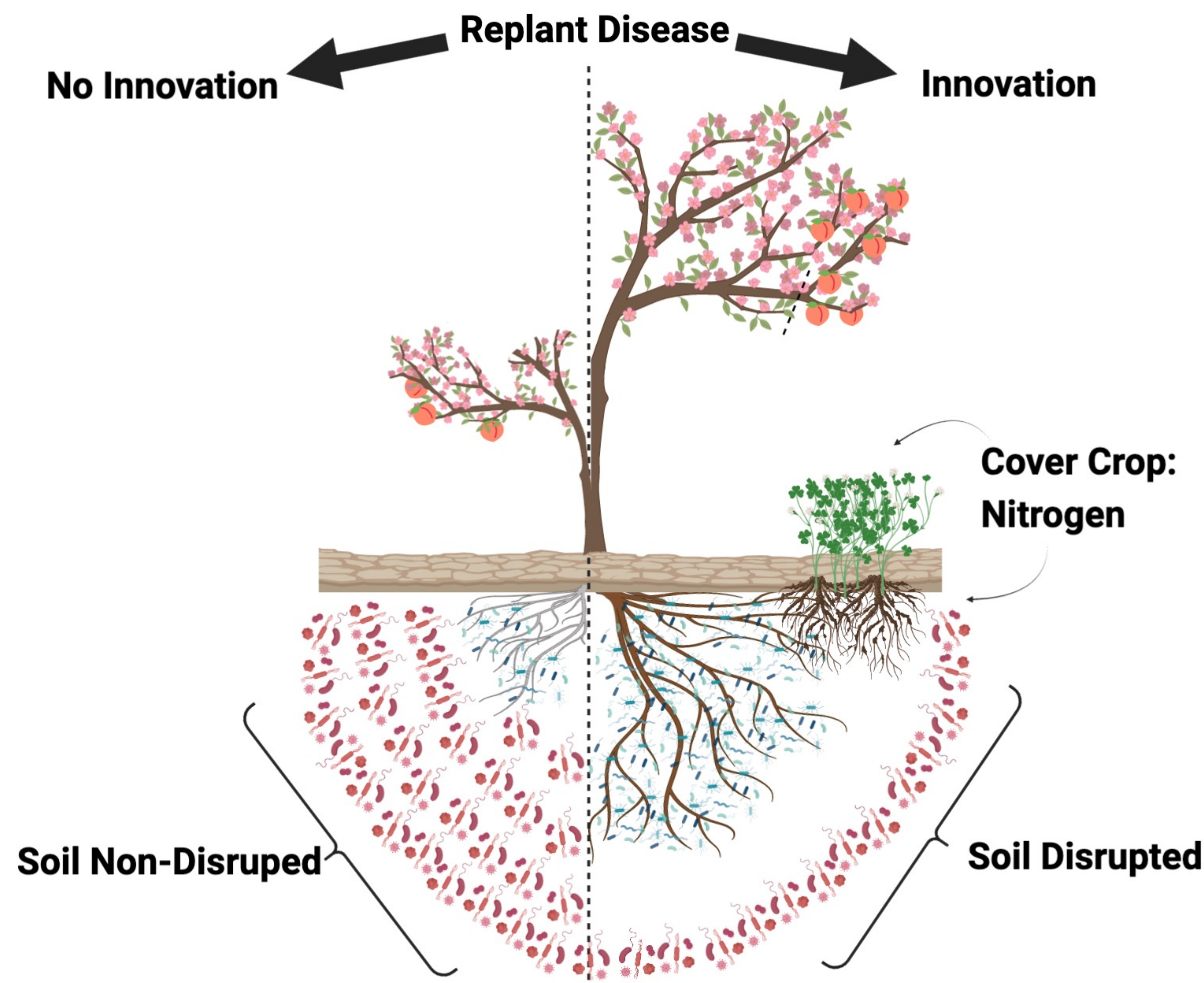
- Working with Peach growers in Palisade Colorado
- Applicable to orchard experiencing RD worldwide

**Procedure:**

- We hypothesize that cover crops grown in disrupted soils could be employed to beneficially alter the microbiome of soil from peach orchards suffering from RD
- Grew four different crops corn, tomato, fescue, and alfalfa were grown in disrupted and non-disrupted RD soil from Grand Junction, CO under greenhouse conditions
- Steam autoclaving was used to disrupt the soils
- Reincorporated cover crops into the same soil
- Planted RD susceptible Lovell peach saplings



**Main Findings:**



**Soil disruption significantly increased rotation crop health (height, flowering, biomass)**

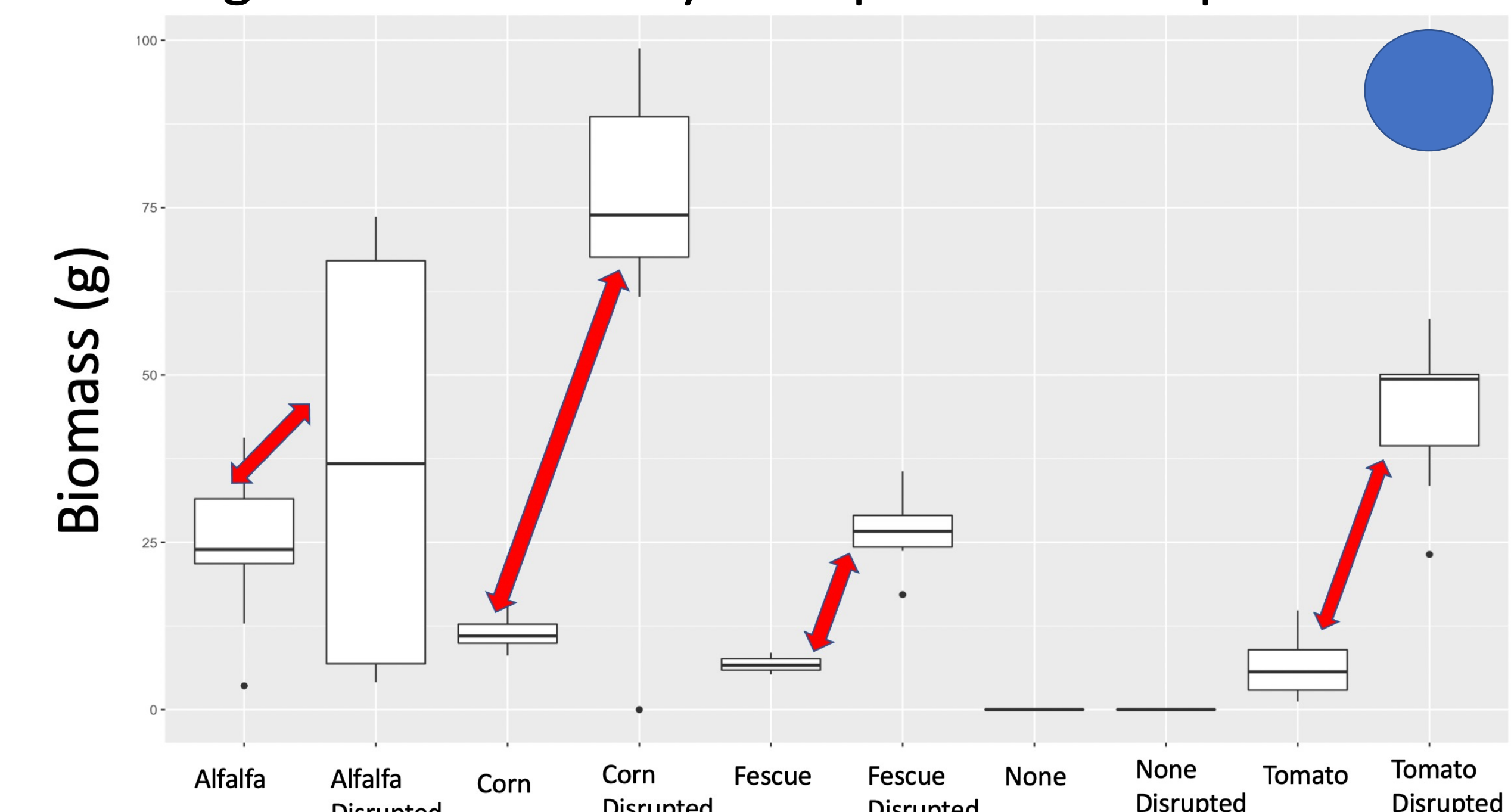
**Peach trees grown in non-disrupted soils were significantly healthier (leaf health, biomass)**

**Best treatment for peach was alfalfa cover crop in non-disrupted soils (peach height, leaf health, and biomass)**

**Higher available nitrogen in alfalfa and tomato treatments was positively correlated with peach biomass**

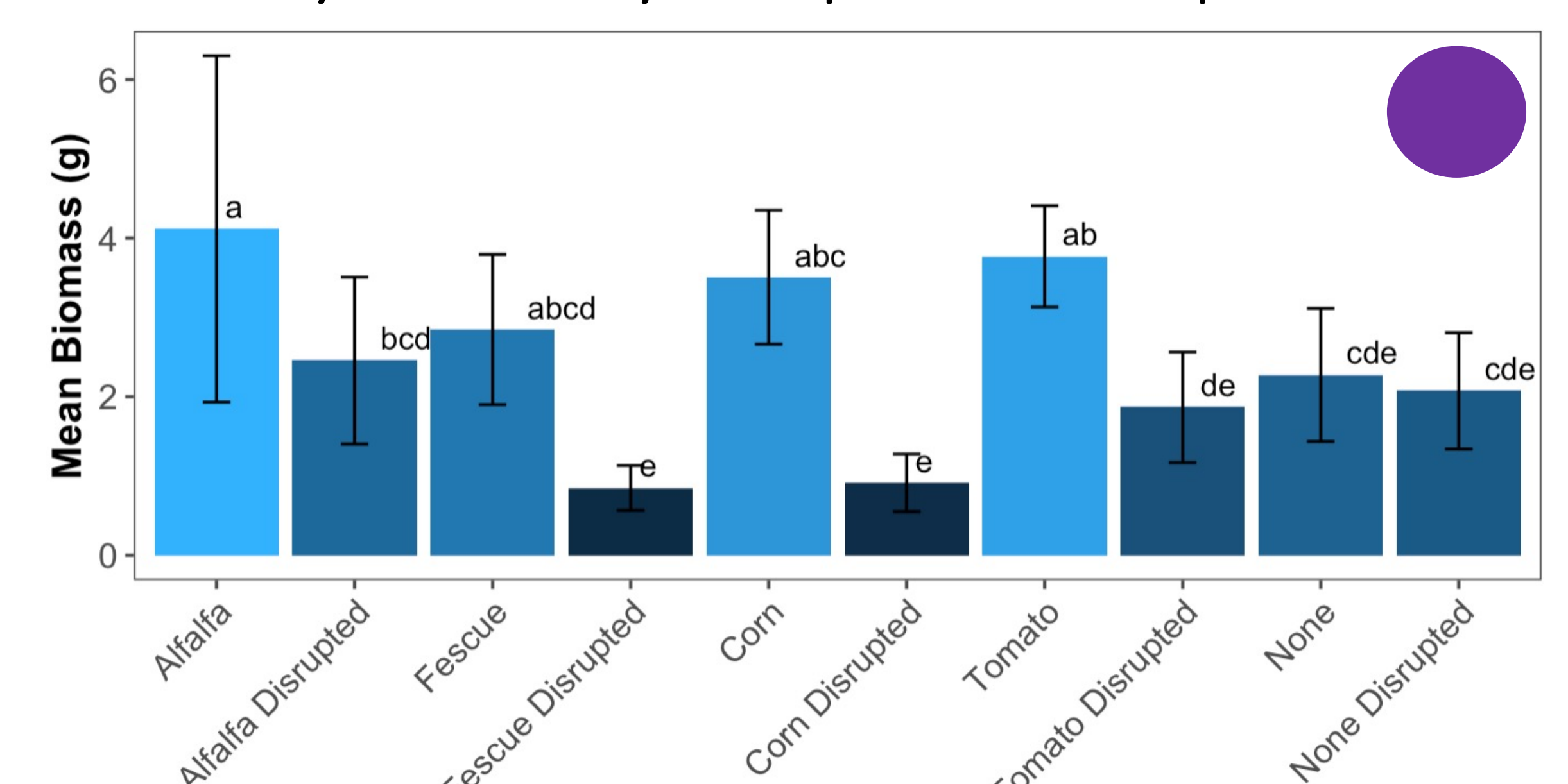
**Results:**

Aboveground Biomass by Disruption and Crop Treatment



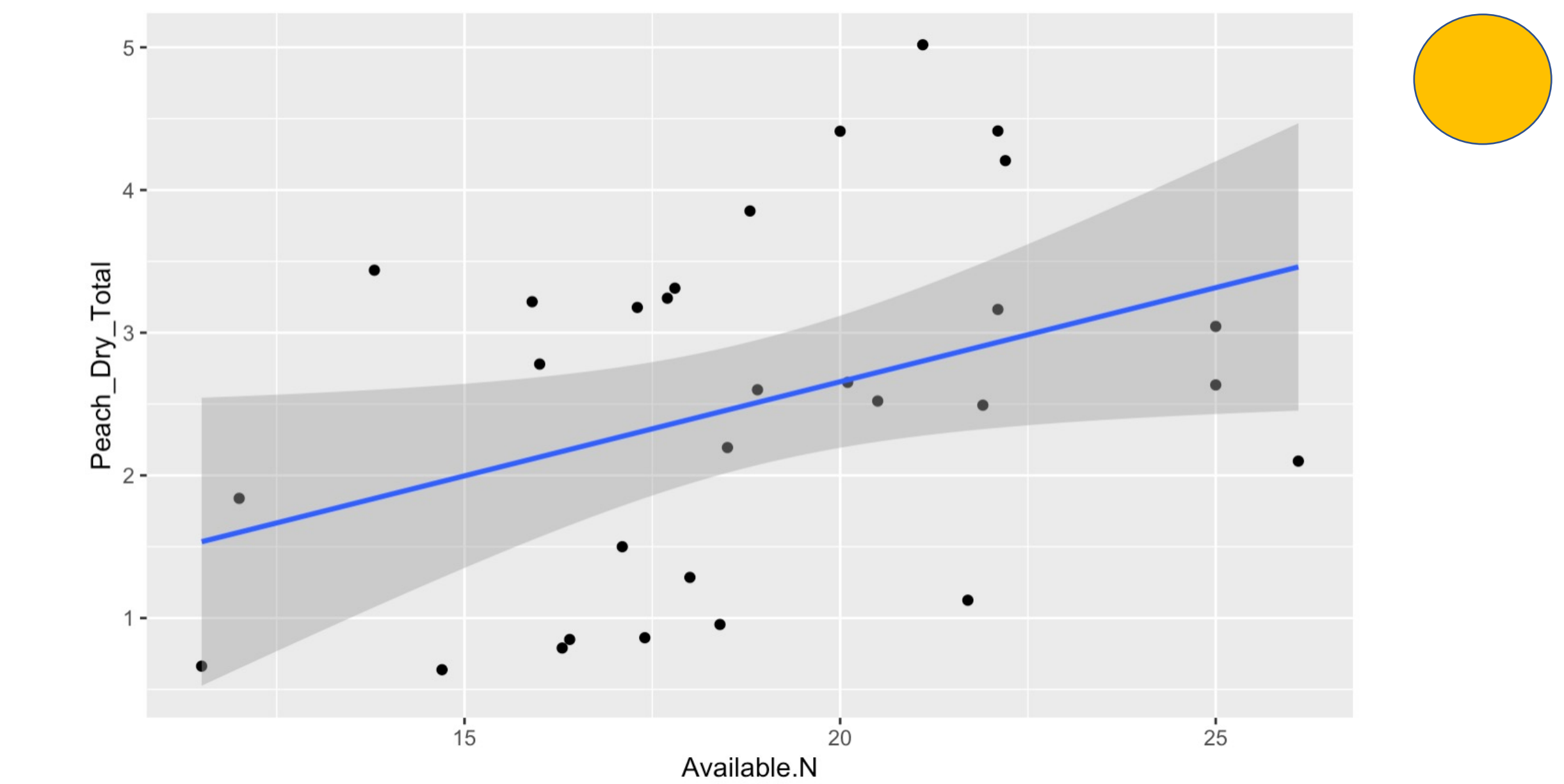
- RD Soil disruption significantly increased cover crop biomass
- Between the two soil treatments, alfalfa's biomass overlapped indicating that replant disease had less of an effect than other crops

Peach Dry Biomass by Disruption and Crop Treatment



- Total dry peach biomass was higher for peach trees grown in soil which had not been disrupted via steam autoclave was observed for every cover crop treatment
- Alfalfa, in untreated soils, performed relatively the best, but was not significantly different than any cover crop treatment.

Available N in correlation with total dry peach biomass



- Positive and significant correlation ( $R^2 = 0.14$ ,  $P\text{-Value} = 0.038$ )
- Of the samples with the highest available nitrogen, the top 8 soils samples previously had either alfalfa or tomato from both soil treatment types (disrupted/ non-disrupted).