Fertility update

January 23-25, 2023

Bruce Linquist

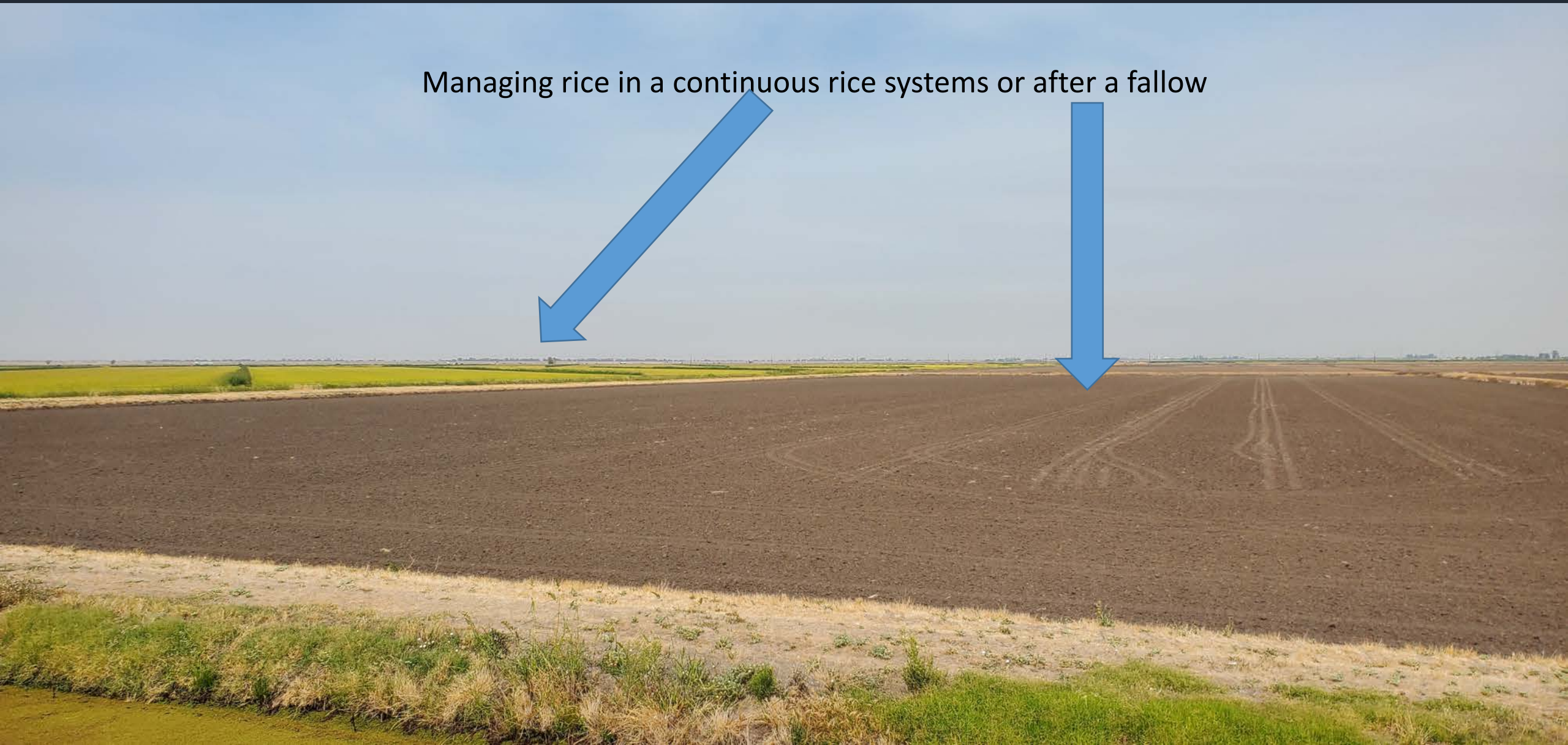
California Rice Research Board

UC DAVIS DEPARTMENT OF PLANT SCIENCES

Topics covered

- Managing a fallowed field
- No-till planting

Impacts of fallow on N fertility management

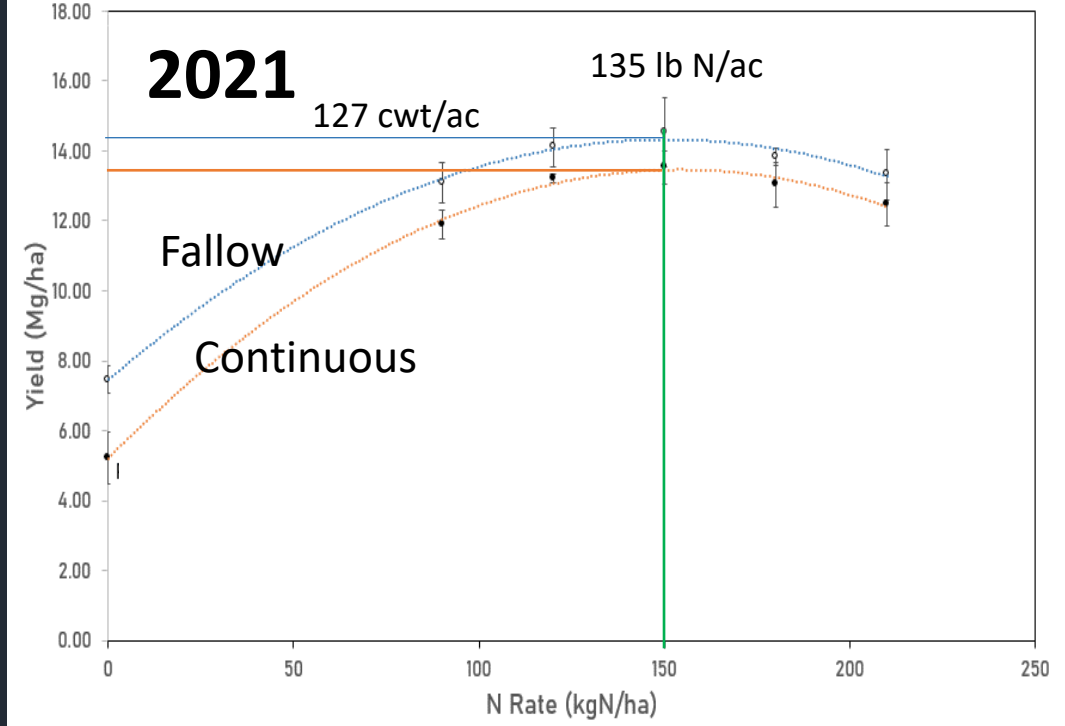


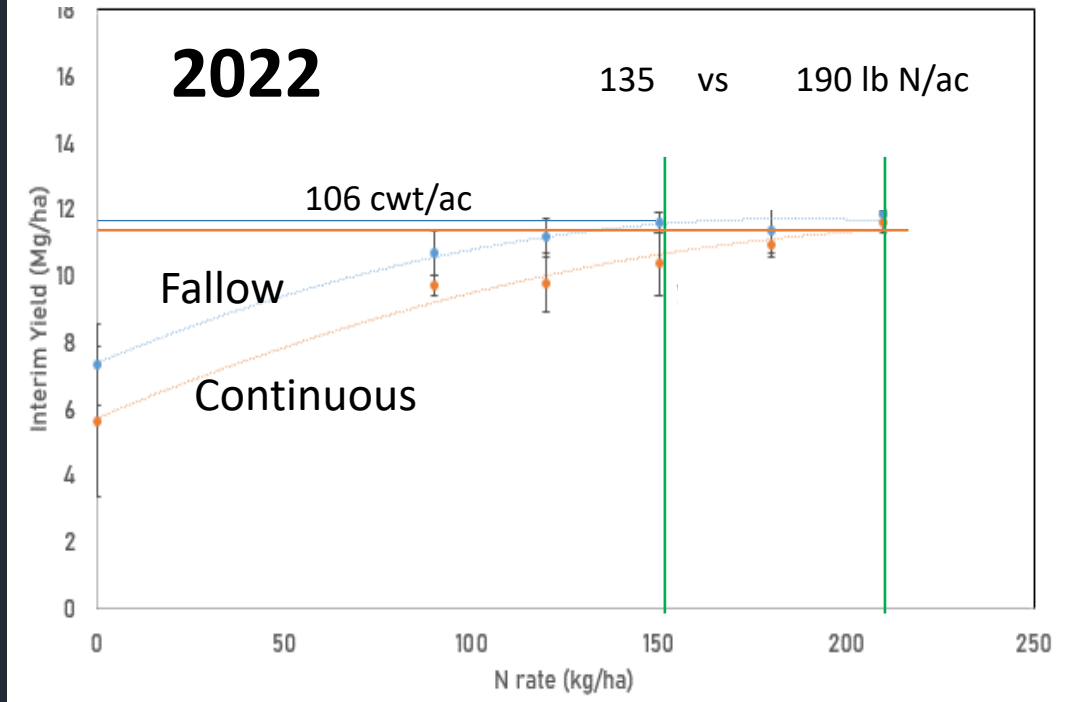
Experimental design (2021, 2022)

- Treatments (3 replications):
  - Fallow/non-fallow
    - Fallowed treatments were fallowed in 2020
  - 6 N rates
    - 0, 80 -190 lb N/ac
- Measurements
  - Biomass yield at PI and heading
  - Grain yield
  - Stem rot severity
  - N uptake
  - Labeled N uptake (find out where N is coming from)
  - GHG emissions

Rice yields in fallowed vs continuous rice fields

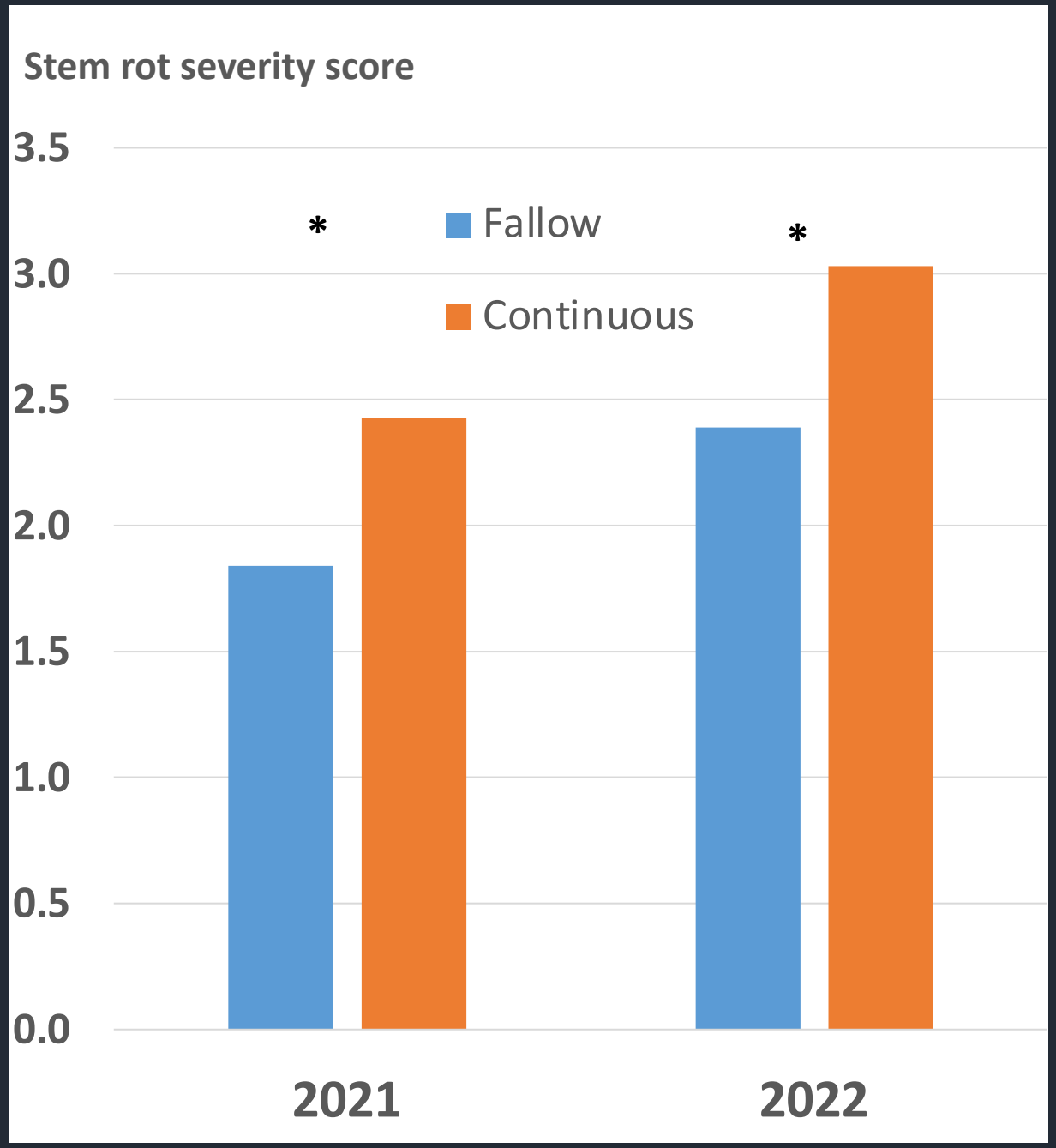
- Yields were higher in fallowed fields by 2-5 cwt/ac.
- 2021:
  - Yield potential was lower in continuous rice
  - Optimal N rates to achieve maximum yields were similar (about 135 lb N/ac)
- 2022:
  - Yield potential was closer between the systems, but fallow still higher.
  - Continuous rice systems required more N to achieve the higher yields





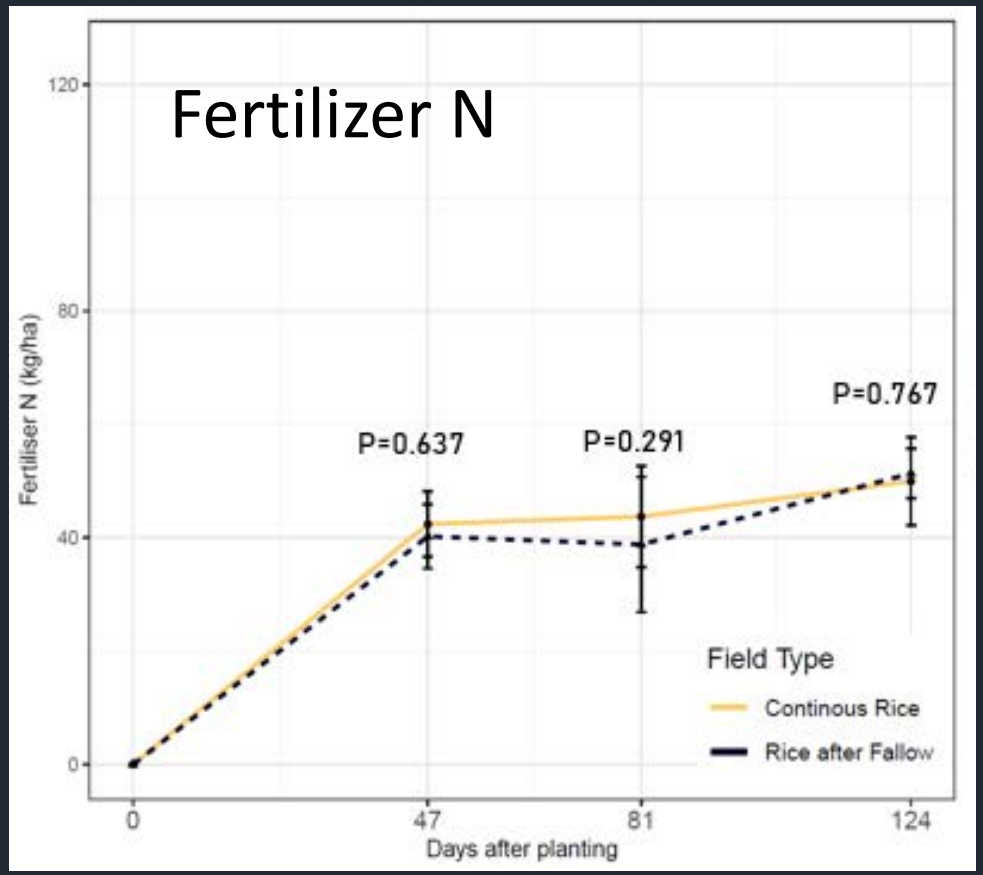
Stem rot severity

- Stem rot incidence was higher in continuous rice system in both years.
- Quadris was applied in both years to help control disease



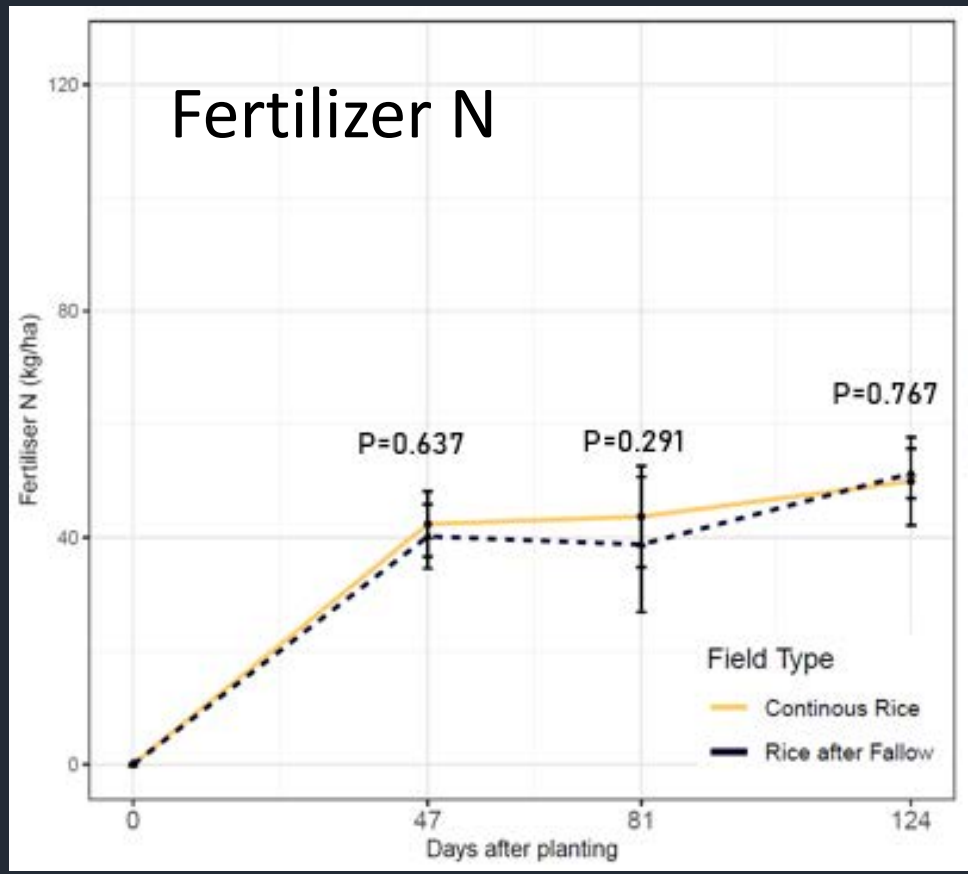
Where is nitrogen coming from: fertilizer or soil?
We used labeled fertilizer N to determine

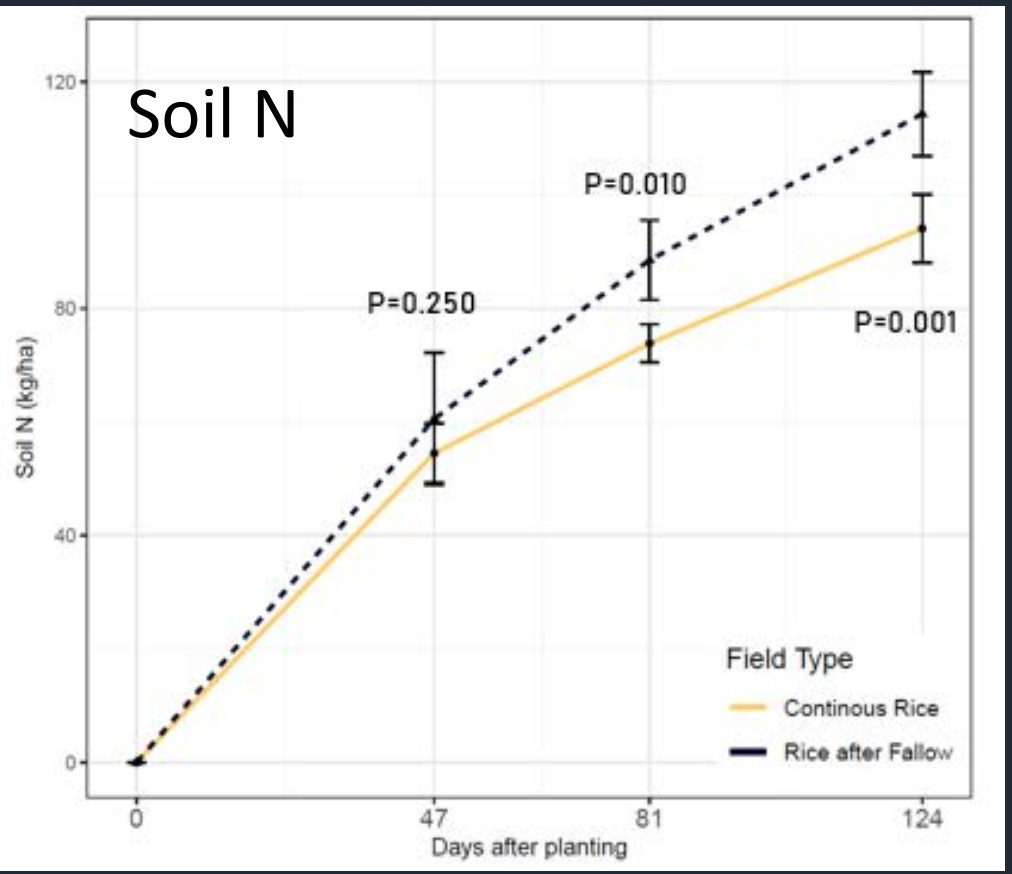
- Fertilizer N: Similar amounts of coming from both systems



Where is nitrogen coming from: fertilizer or soil?

- Fertilizer N: Similar amounts of coming from both systems
- Soil N: More from fallow. Especially later in season
  - Fallowed fields may need less top-dress N?



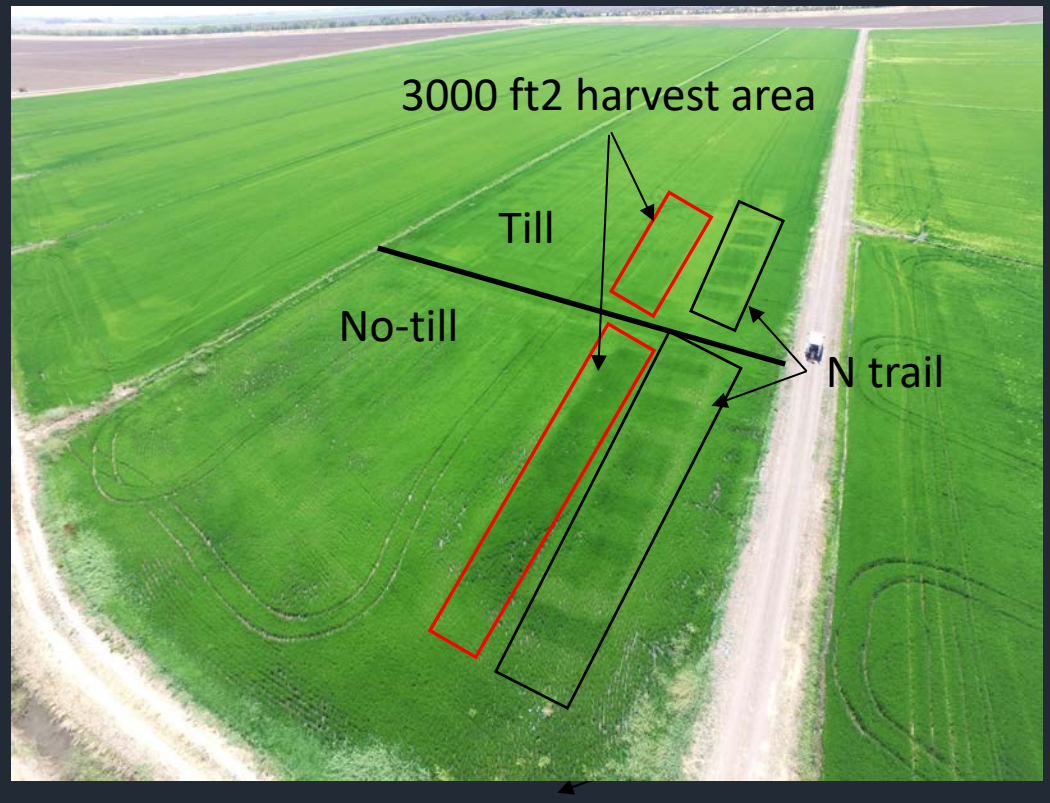


“No-till” planting

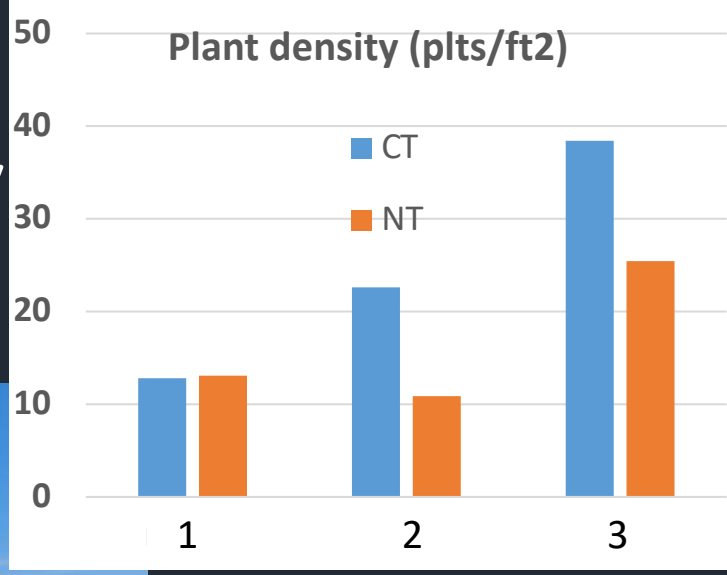
- Evaluate feasibility of planting directly (no-tillage) onto a field that was previously fallowed and had the ground worked during the fallow period.

Design

- 3 on-farm locations
- N rate trial
- Evaluated weeds and pests
- Large area to examine variability and yields



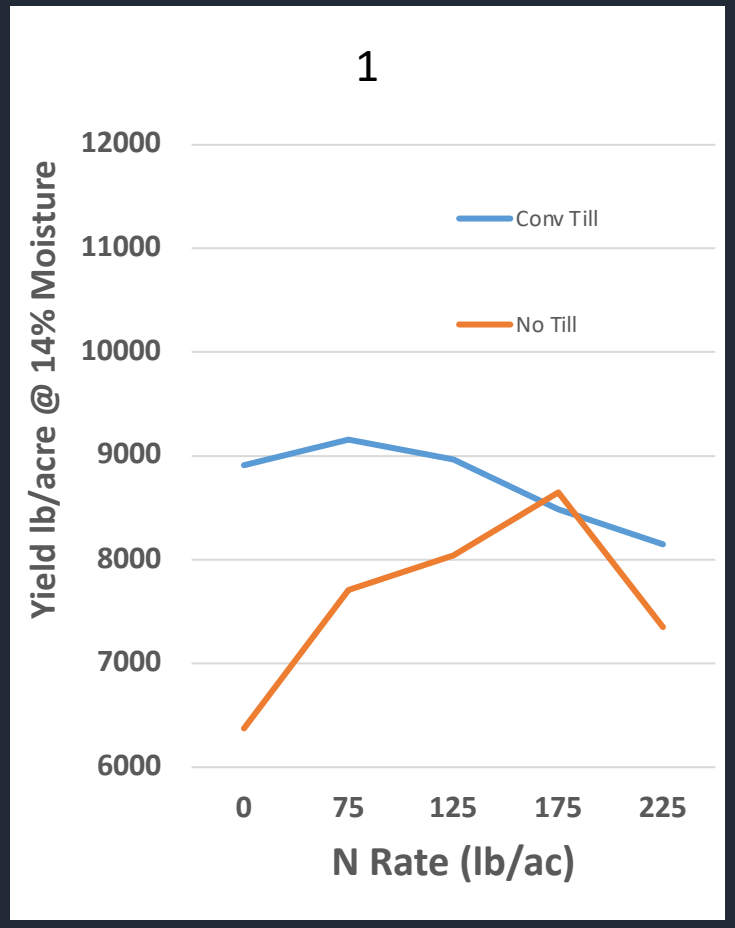
Preflood soil conditions/planting density

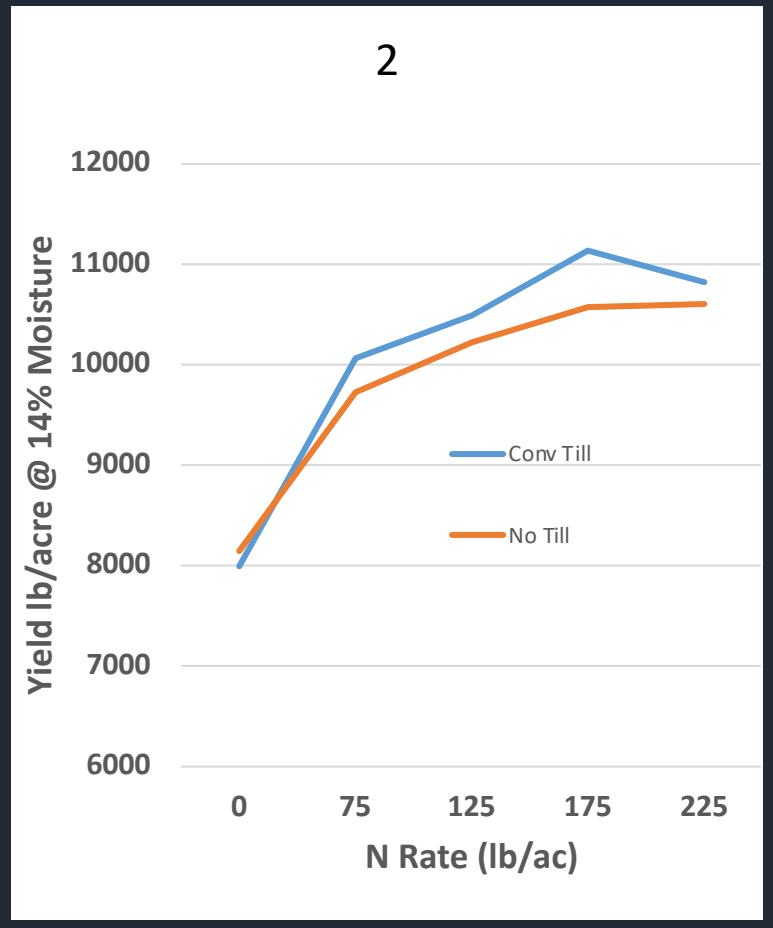


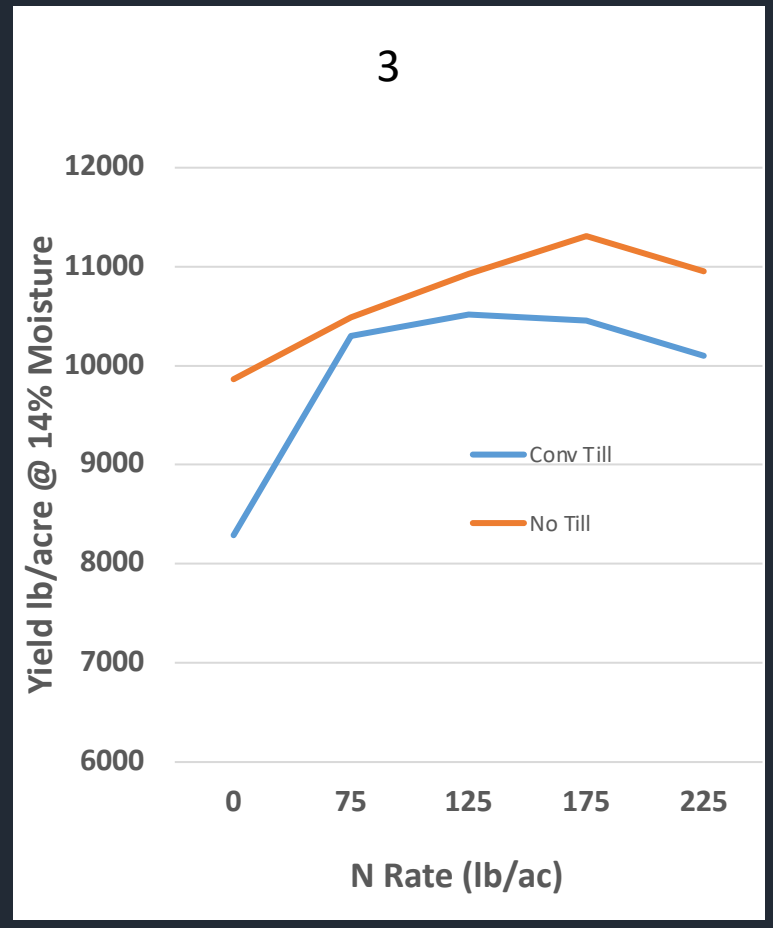
- Very windy conditions in late April/early May
- Suggest:
  - Rolling year before
  - Leather's

1 inch more water in NT compared to CT

Yield vs N rate

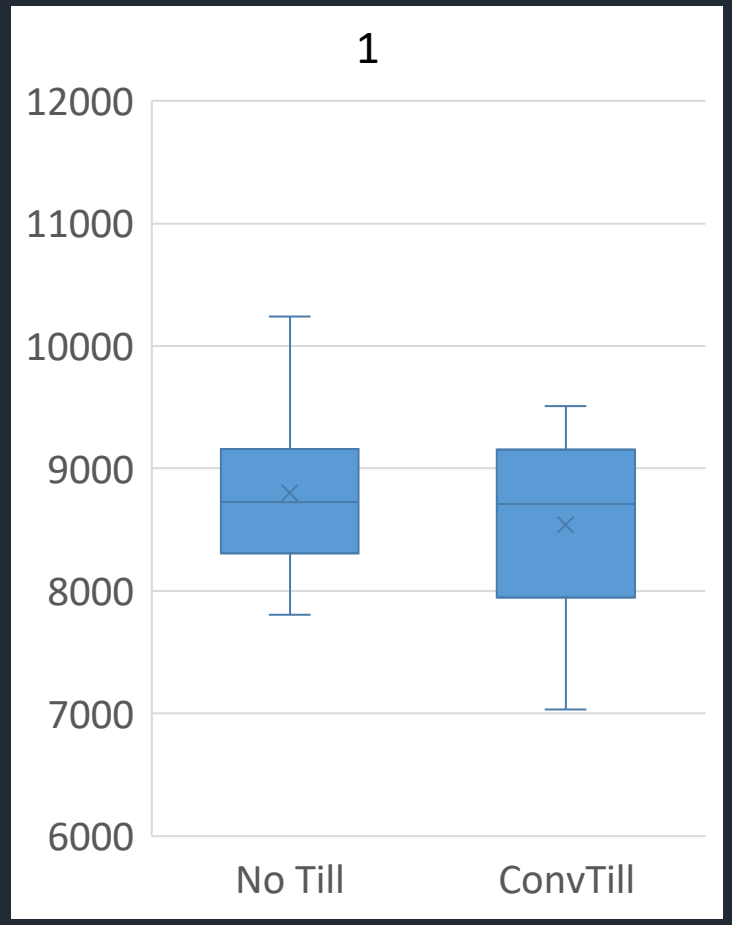


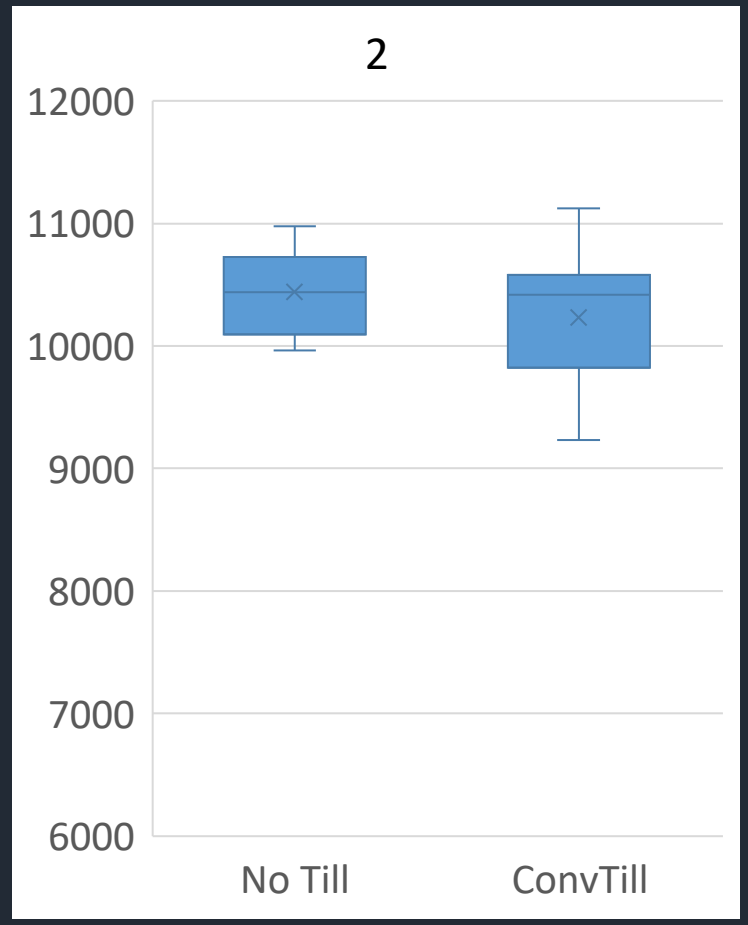


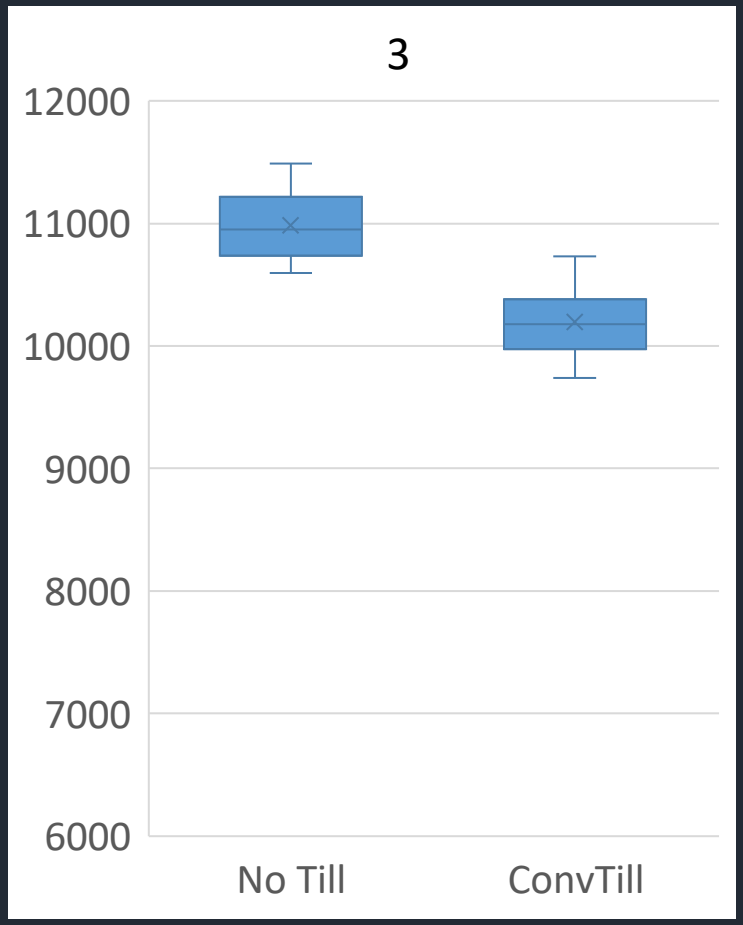


Large plot yields (lb/ac) and variability

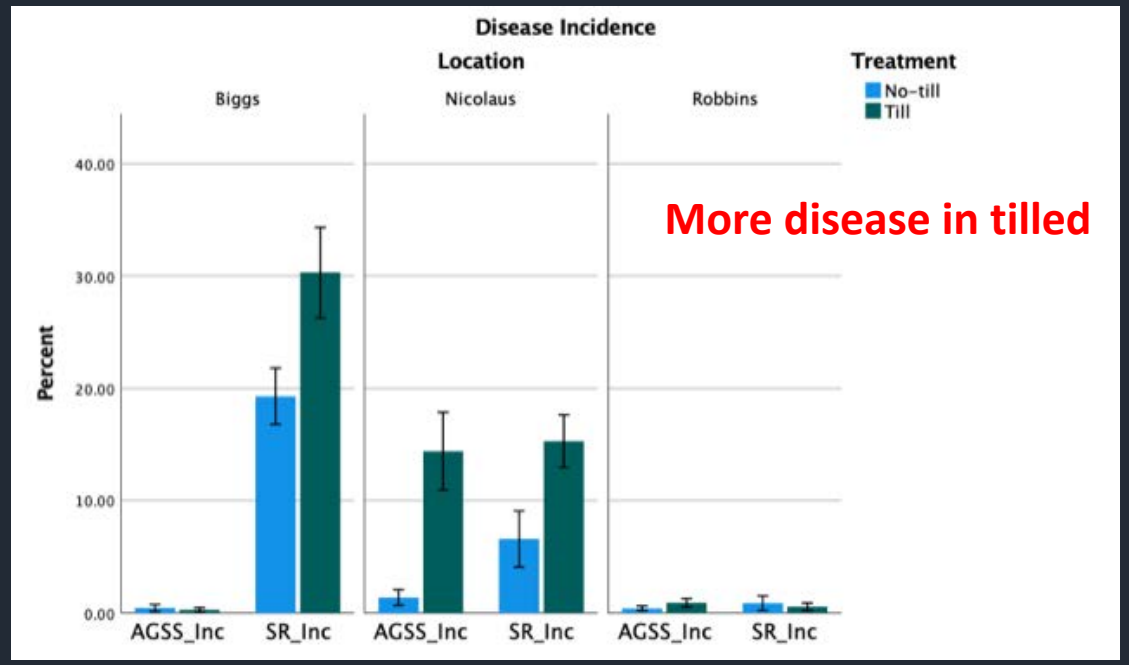
represent 14 individual small plot combine harvests



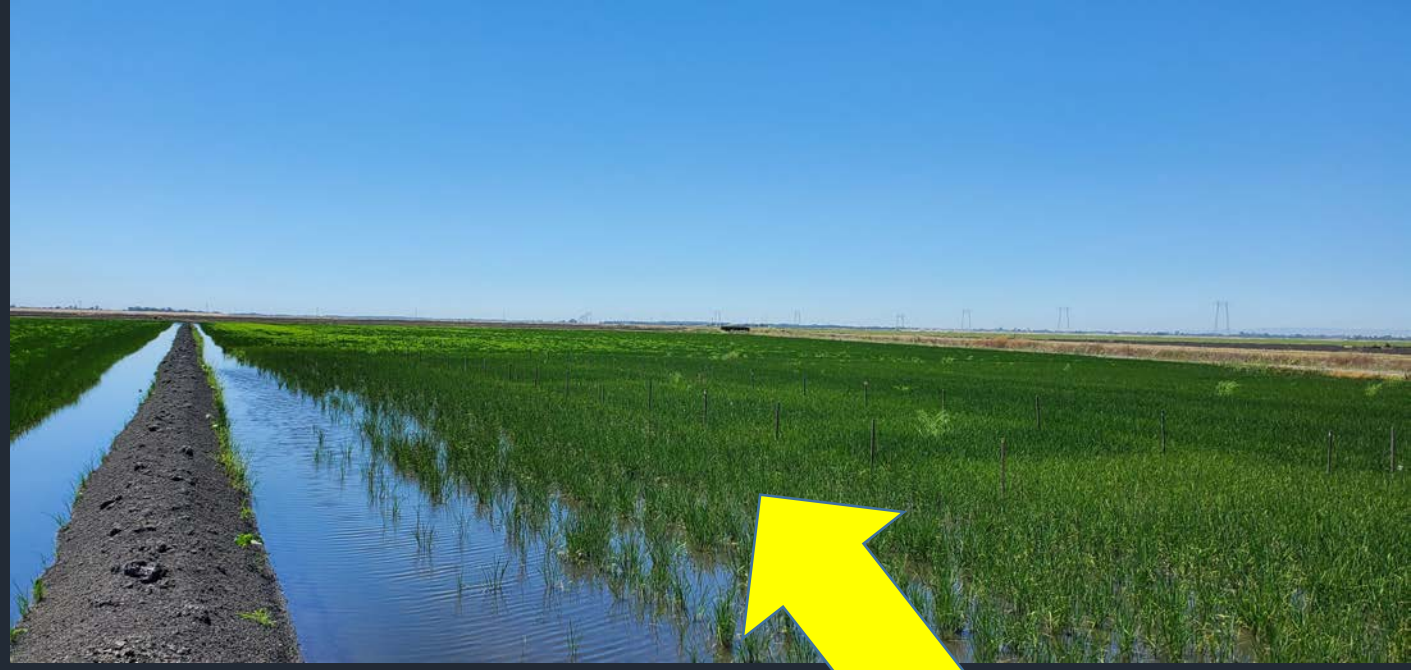




Weeds/Pests/Disease

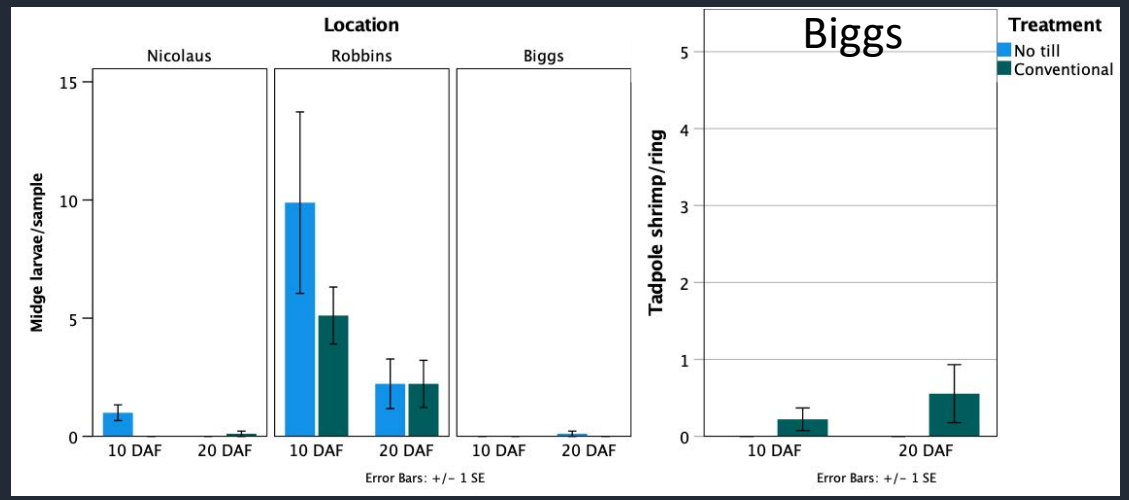


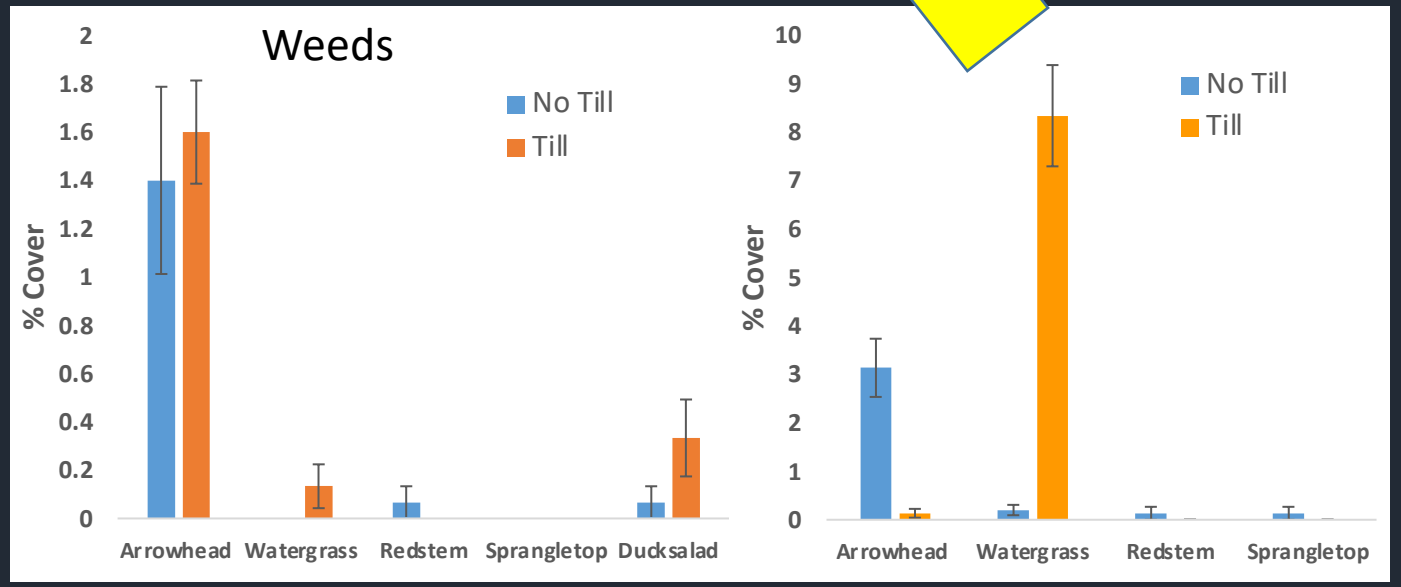
More disease in tilled



Midge

Tadpole shrimp





Lessons

- Need to use urea as opposed to aqua-NH_3
- Wind can be problematic for stand establishment.
  - During fallow year, end with a roller
  - Use a Leather's drain to improve establishment
- Yield potential appears to be similar
  - These results confirm previous findings
- Potential to get in early
- Small water savings (1")
- Potential for less weeds, diseases, pests
  - Easier to incorporate a stale seed bed if necessary (needs more study).
- Savings on tillage costs

System could be part of a Stale-Seed Bed

- Stale seed bed
  - Flood field to germinate and establish weeds
  - Drain
  - Spray weeds
  - Flood and plant
- A major disadvantage with this is the need to till before flooding the first time. Really delays planting.
- Using a stale-seed bed in a no-till system, you can avoid the tillage and go straight to flooding.

Thank you

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Why less soil N?

- Higher soil phenols seen in continuous rice at both RES and on-farm sites (4 pairs)
- Continuous rice systems are flooded for long periods (winter and growing season)
- Decomposition of rice straw under flooded conditions lead to build up of phenols
- Phenols bind nitrogen.