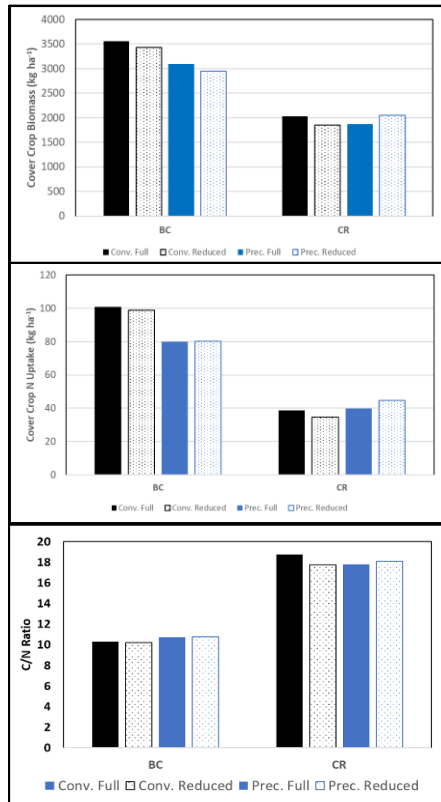
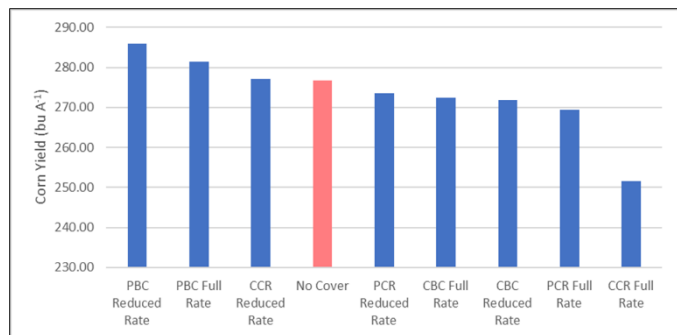


Cover Crop Species x Seeding Method x Seeding Rate (Southern IN, 2022)



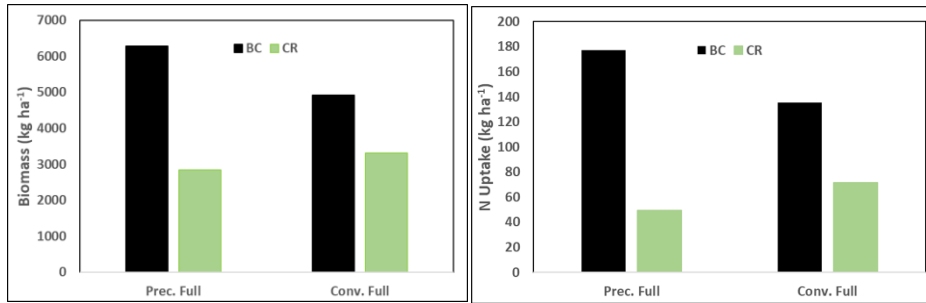
Cover Crop Performance

- In 2022, treatment factors consisted of cover crop species (Balansa Clover (BC) and Cereal Rye (CR)), Planting Method (Conventional and Precision planted), Seeding rate (Full and Reduced recommended rates of BC and CR).
- Within cover crop species seeding method and rate had no impact on cover crop biomass, N uptake or biomass C/N ratio. However, greater cover crop biomass and nitrogen was observed for BC relative to CR. This was attributed to CR being terminated early to control biomass to a level of 2000 kg ha⁻¹ and BC was allowed to grow until corn planting. Balansa clover biomass ranged from 3000-3500 kg ha⁻¹, which equated to a range of 80-100 kg N ha⁻¹ within the biomass. Cereal rye biomass ranged from 1800-2000 kg ha⁻¹ and N uptake ranged from 38-41 kg ha⁻¹.
- Balansa clover biomass C/N ratio was 14. Relative to a C/N ration for CR of approximately 21.
- We observed similar cover crop biomass and N uptake with a 50-75% less seeding rate.
- The red bar represents the no cover crop conventional control. The conventional planted CR at the full seeding rate resulted in significantly less corn yield, relative to the none cover crop control.
- Conventionally planted CR at a 50% less seeding rate resulted in approximately 25 more bu A⁻¹ and 7 more bu A⁻¹ when cereal was precision planted to a 50% less seeding rate.
- Precision planted BC resulted in greater corn yield relative to the none cover crop control with the 50% less seeding rate of BC resulting in greater corn yield.

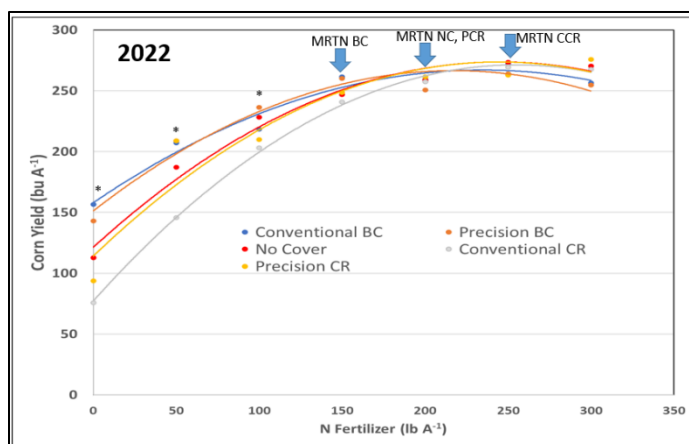


Cover Crop Species x Seeding Method x N Fertilizer Rate (Southern IN, 2022)

Cover Crop Performance



- In 2022, treatment factors consisted of cover crop species (Balansa Clover (BC) and Cereal Rye (CR)), Planting Method (Conventional and Precision planted), Nitrogen Fertilizer Rate (0- 300 lb A-1).
- Within cover crop species seeding method and rate had no impact on cover crop biomass, N uptake or biomass C/N ratio. However, greater cover crop biomass and nitrogen was observed for BC relative to CR. This was attributed to CR being terminated early to control biomass to a level of 2000 kg ha⁻¹ and BC was allowed to grow until corn planting. Balansa clover biomass ranged from 6000-4800 kg ha⁻¹, which equated to a range of 180-140 kg N ha⁻¹ within the biomass. Cereal rye biomass ranged from 3000-2800 kg ha⁻¹ and N uptake ranged from 42-78 kg ha⁻¹.
- Balansa clover biomass C/N ratio was 13. Relative to a C/N ratio for CR of approximately 18.
- Again, we observed similar cover crop biomass and N uptake with 50-75% less seeding rates.

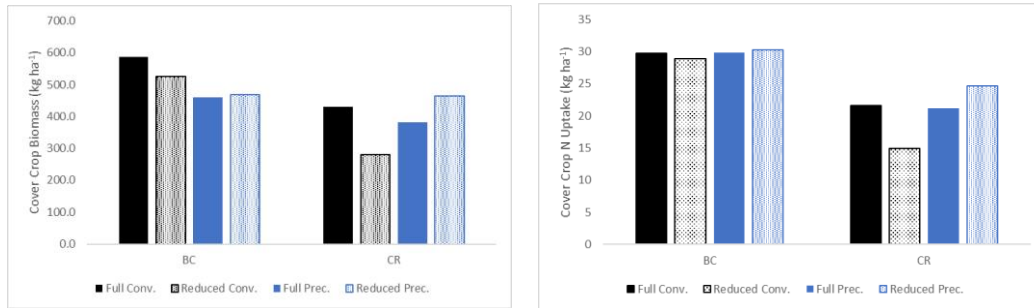


conventional planted CR treatment.

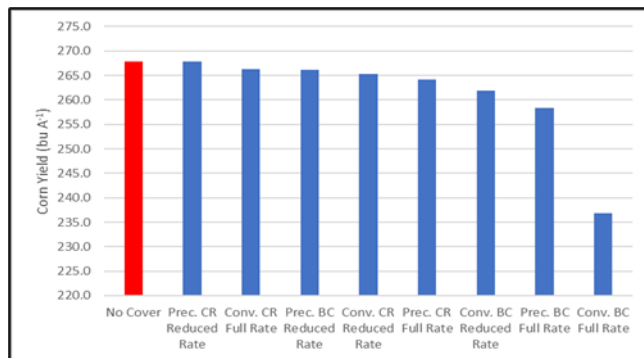
- At lower N fertilizer rates of 0-100 lb A⁻¹, Balansa clover resulted in significantly greater corn yield relative to the none cover crop control and cereal rye plots.
- At zero N added, BC resulted in approximately 150 bu A⁻¹, which was 25 bu A⁻¹ greater than the none cover crop control and the precision planted CR and was 75 bu greater than the

- Maximum return on N fertilizer applied was 50 lb A⁻¹ less relative to the none cover crop control and the precision planted CR treatments and was 100 lb A⁻¹ lower relative to the conventional planted CR treatment.

Cover Crop Species x Seeding Method x N Fertilizer Rate (Southern IN, 2023)



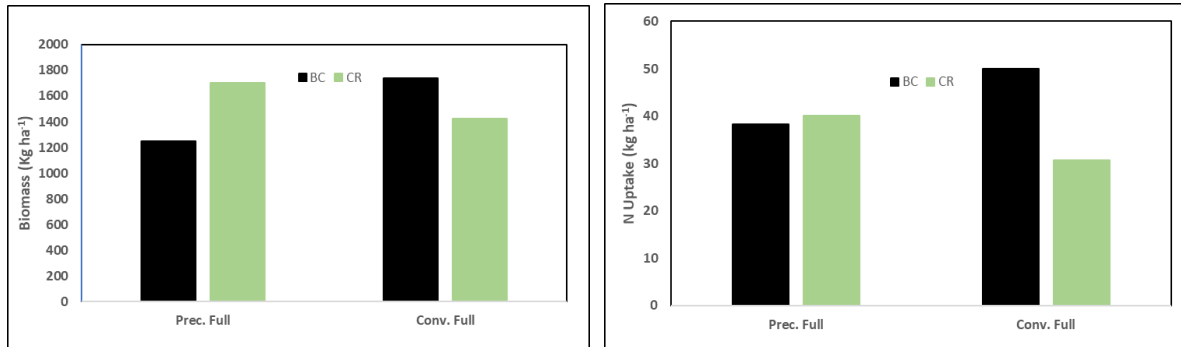
- In 2023, treatment factors consisted of cover crop species (Balansa Clover (BC) and Cereal Rye (CR)), Planting Method (Conventional and Precision planted), Seeding rate (Full and Reduced recommended rates of BC and CR).
- Droughty conditions in 2022 fall significantly impacted cover crop performance.
- Balansa clover biomass ranged from 450-590 kg ha⁻¹, which equated to a range of 28-30 kg N ha⁻¹ within the biomass. Balansa clover biomass and N fixation were significantly lower relative to 2021 and 2022. Cereal rye biomass ranged from 300-450 kg ha⁻¹, which equated to a range of 15-25 kg N ha⁻¹ within the biomass.



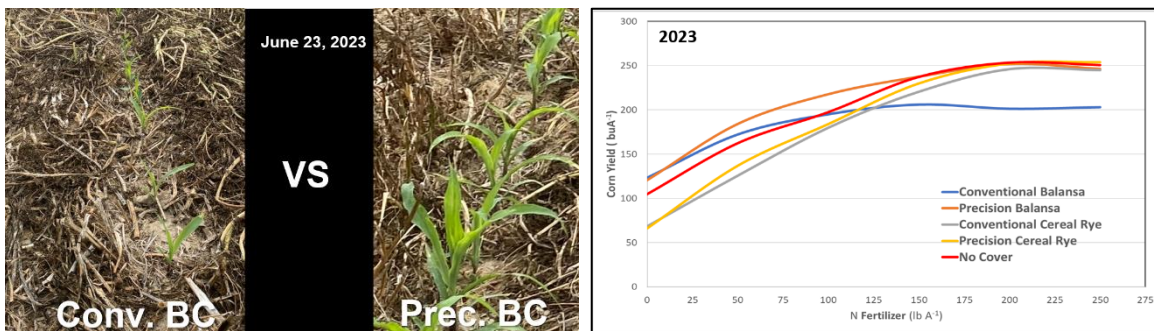
- Reduced CR biomass and early termination resulted in all CR treatments despite planting method or seeding rate to have similar yield relative to the none cover crop control. However, 3 of 4 BC treatments resulted in lower yield relative to the none cover

crop control. This is abnormal and can be attributed to BC late termination that resulted in a depletion of soil water resources for the subsequently planted corn in a drought stricken early spring.

Cover Crop Species x Seeding Method x Seeding Rate (Southern IN, 2023)



- In 2023, treatment factors consisted of cover crop species (Balansa Clover (BC) and Cereal Rye (CR)), Planting Method (Conventional and Precision planted), Nitrogen Fertilizer Rate (0- 300 lb A⁻¹).
- Fall of 2022 was characterized as droughty and significantly impacted the balansa clover growth and performance. For balansa clover, different from previous years, conventionally planted BC resulted in greater biomass, possibly due to quicker canopy establishment and water conservation. However, planting method or seeding rate did not impacted CR growth and performance.
- Balansa clover biomass ranged from 1200-1700 kg ha⁻¹, which equated to a range of 38- 50 kg N ha⁻¹ within the biomass. Balansa clover biomass and N fixation was significantly lower relative to 2021 and 2022. Cereal rye biomass ranged from 1400-1700 kg ha⁻¹, which equated to a range of 30-40 kg N ha⁻¹ within the biomass.



- Corn yield at the lower N fertilizer rates (0-75 lb A⁻¹) was significantly greater for the BC treatments relative to the non-covered crop control and the CR treatments.

- Within the BC treatments, precision planted BC resulted in significantly greater corn yield relative to conventionally planted BC at all fertilizer N rates greater than 50 lb A⁻¹. We also observed that corn planted into conventionally planted BC residue germinated 1.5 weeks after corn planted in precision planted BC. Furthermore, corn planted into the conventionally planted BC were 2 to 3 growth stages behind corn planted into precision planted BC residue. These findings can be attributed to BC planting method. The BC was allowed to grow longer and to be terminated later relative to CR, for the purpose of fixing greater N from the atmosphere. Longer BC growth in a draughty spring led to greater soil water depletion. However, this depletion of soil water was not evident in the precision planted BC plots, where BC did not grow and use water resourced in the corn row. This impact of BC planting method translated in 50 bu A⁻¹ more yield for the precision planted BC plots relative to the conventionally planted treatment. These dynamics were not observed in CR treatments because they were terminated 2 to 3 weeks prior to BC treatments.
- MRTN for all treatments except conventional planted BC was between 150-170 lbs N A⁻¹.