

ABSTRACT

The long cash-crop growing season in the South limits the window for the successful establishment of fall cover crops. Interseeding summer cover crops alongside cash crops could potentially address this challenge. However, sound and comprehensive cultural management for interseeding cover crops must be in place to guarantee adoption by farmers. In addition, the likelihood of competition between the main crop and cover crops which can lead to yield decline must be addressed specifically. In 2023, I participated in a study aimed at evaluating different cover crops (buckwheat, pigeon pea, white clover, and their mixture) interseeded with organic corn at multiple seeding rates and under conventional tillage (two passes of a disc plow) or reduced tillage (one pass of a disc plow) conditions to identify cover crops and their management practices that alleviate soil compaction, suppress weed infestation, and enhance microbial communities that improve nutrient availability and soil health.

BACKGROUND

Interseeding is a practice in which cover crops are incorporated into a cropping system during the cash crop growing period. The interseeded cover crops enhance plant diversity in the operation and can reduce erosion, scavenge nutrients, and improve soil health. However, the successful establishment of cover crops is essential for achieving the above benefits. Multiple factors influence interseeded cover crop establishment. For example, tillage practices influence cover crop establishment by altering the seed-to-soil contact, soil physical and chemical properties, and soil temperatures. Corn plant density and canopy cover could also influence interseeded cover crop establishment through their effect on light penetration onto the ground. Further, soil moisture content is a critical determinant of cover crop success, particularly during germination and early growth stages. Variations in soil moisture due to factors such as precipitation patterns, soil types, tillage, and irrigation can influence cover crop performance. In June and July of 2023, I participated in a study at Clemson University and collected data to quantify the effects of tillage on the establishment of cover crops interseeded into corn in an organic production system.

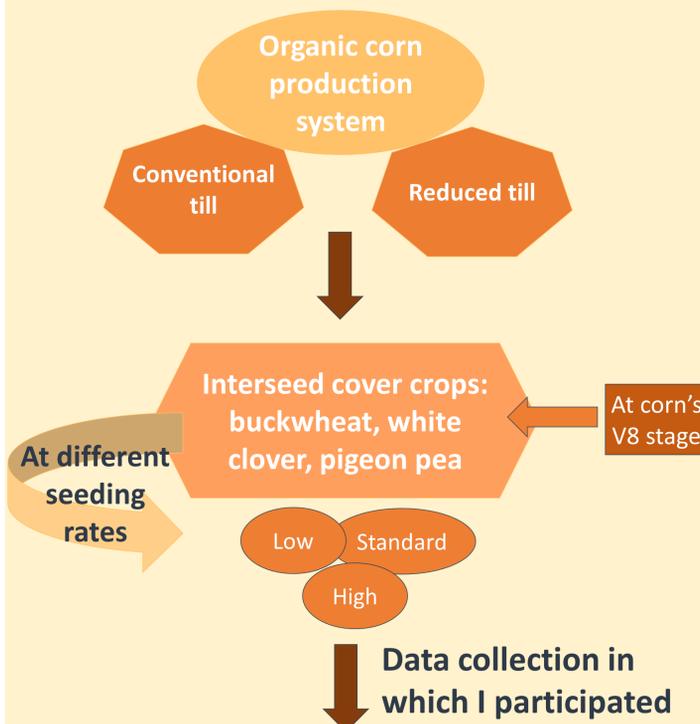


Corn field with interseeded buckwheat, pigeon pea, white clover, and their mixture (from left to right) at 22 days after interseeding (July 28, 2023)



Field plot maintenance

METHODS



Cover crop stand count



Soil moisture content using the Hydrosense II CS658 probe



Soil sample collection for soil health measurement



Light interception using a line quantum sensor



Soil compaction using a Dickey-John Tester



Weed infestation using a 0.25-m² quadrant frame

RESULTS

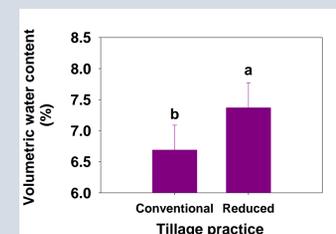


Figure 1. Soil moisture content at the time of cover crop interseeding (59 days after corn planting)

Soil moisture content was greater under reduced tillage conditions than under conventional tillage conditions. No irrigation was applied in the study.

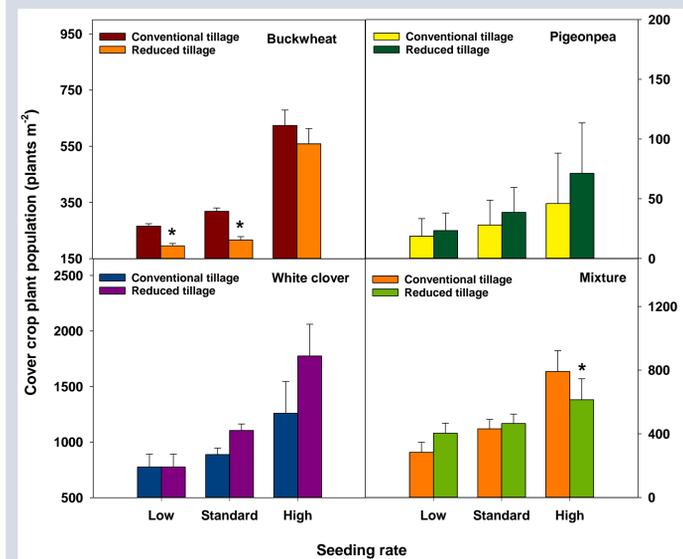


Figure 2. Cover crop stand establishment measured at 14 days after interseeding. An asterisk above the bar indicates whether the plant population was different between the conventional and reduced tillage treatments at the respective seeding rates.

A concern about reduced tillage is that it may result in poor stand establishment primarily due to reduced seed-to-soil contact, especially for crops with small seed sizes. Our data do not support this concern as plant population was not different between conventional and reduced tillage treatments in most cases even though the seed sizes of the cover crops were largely different (seeds/lb was approximately 7500, 334,000, and 776,000 for pigeon pea, buckwheat, and white clover, respectively).

CONCLUSIONS

- Reduced tillage saved more moisture in the soil profile for the establishment of interseeded cover crops.
- Our data did not support a negative impact of reduced tillage on cover crop establishment. Further, reduced tillage resulted in a numerically greater plant population for white clover (small seed size) as well as pigeon pea (large seed size) at low-, standard-, and high- seeding rates.