

DIRECT SEEDING COTTON INTO ALFALFA: CHALLENGES AND BENEFITS

Robert Flynn
New Mexico State University
Artesia, NM

Abstract

Rotations that include alfalfa and cotton leave the soil bare between crops and would disqualify growers from the USDA Conservation Security Program. Direct seeding cotton into alfalfa may be one way to keep sufficient soil cover and reduce erosion due to wind and qualify for government programs. Alfalfa was either traditionally tilled, ripped once, sprayed with non-selective herbicide or simply swathed with no herbicide prior to planting cotton. Half the plots were established in 2007 while the rest came out in 2008. Although there was a significant year effect on cotton yield there were no statistical differences among treatments. This implies that rotations are possible without traditional tillage following alfalfa and there could be a significant reduction in fuel used in traditional tillage operations by switching to direct seeding.

Introduction

Alfalfa is a leading cash crop in New Mexico. Most growers rotate out of alfalfa every 3 to 4 years. Cotton is a good rotation crop but traditional tillage practices leave no cover to help protect the soil from wind and water erosion. Direct seeding cotton into alfalfa may keep sufficient ground cover for farmers to qualify for the Conservation Security Program and potentially reduce expensive field work. Other potential benefits include improved soil quality. The objective of this project was to evaluate cotton yield and selected soil physical properties for any negative or positive effects for cotton production.

Materials and Methods

Cotton, variety DP448RR, was planted into a 7 year old stand of alfalfa using the following treatments with 3 replicates:

- 1) Harvest alfalfa, rip, plow, disc, bed, plant.
- 2) Spray standing alfalfa, rip, direct seed.
- 3) Spray alfalfa, direct seed.
- 4) Harvest alfalfa, direct seed.

Treatments 1 and 4 did not involve the use of herbicide to kill alfalfa until the cotton was established. Treatments 2 and 3 involved spraying the alfalfa when it was 4 to 6-inches tall before planting. The idea being to leave more ground cover. A vertical disc blade was used ahead of the planter to open a slot in which to plant the seed. Target seeding population was 70,000 seeds/acre.

Soils were tested for evaluated for soil organic matter, infiltration rate (2 locations/rep), bulk density (2 location / rep), hard pan (3 locations / rep), and aggregate stability (2 location/rep). All parameters subjected to Analysis of Variance using SAS.

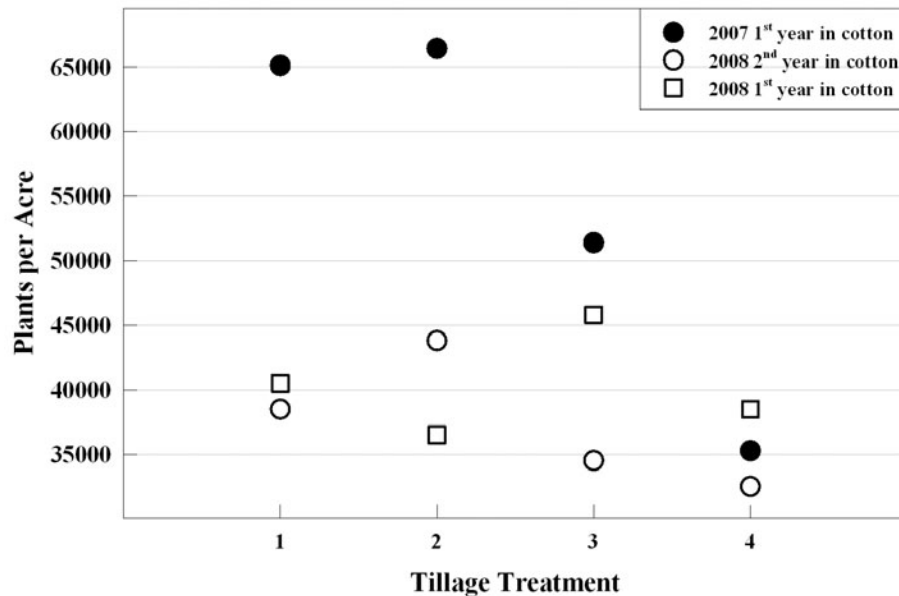
Results and Discussion

Plant population was negatively affected by planting directly into recently harvested alfalfa (Figure 1). A ripping operation was needed to establish the same population as conventional tillage techniques. There was no statistical difference in harvest population between spraying alfalfa and then direct seeding when compared with conventional tillage and one ripping operation before planting. Observations at establishment suggested that direct seeding into harvested alfalfa dried the seed bed out quicker than the other treatments. This was true again in 2008. Cotton growing conditions were better in 2007 than in 2008 when it came to yield. Within each year there were no differences in yield among treatments (Figure 2). Lint yield appeared most stable over both years when cotton was direct seeded after alfalfa had been sprayed.

The lack of any negative effects on lint yield from the different treatments suggests the following:

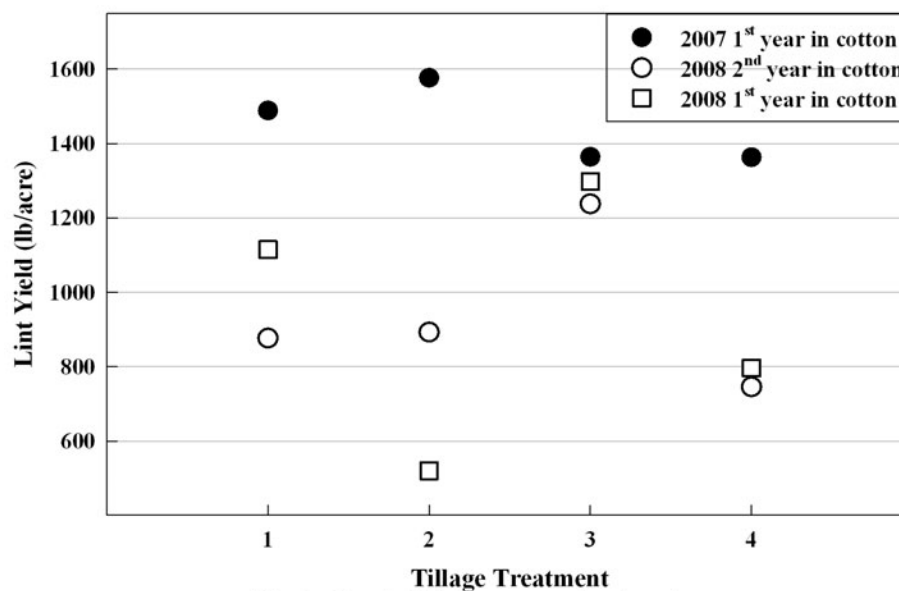
- 1) Up to four field operations (rip, plow, disc, bed) were avoided by direct seeding into alfalfa.
- 2) Alfalfa does not need to be sprayed prior to planting cotton.

Harvest Population*



* In 2007, treatment 1 and 2 were significantly greater than treatment 4.

1Figure 1. Harvest population as affected by tillage treatment. Conventional tillage (treatment 1) and spraying and then ripping before seeding (treatment 2) had more plants at harvest than harvesting alfalfa then direct seeding. All other treatments were the same within each year.



2Figure 2. Lint yield as affected by tillage. There are no significant differences among treatments within years. Treatments were 1) conventional (rip, plow, disk, bed); 2) spray, rip, then direct seed; 3) spray alfalfa then direct seed; 4) harvest alfalfa then direct seed..

There were no statistically significant effects on the measured soil properties and are not presented in this paper. However, wind erosion would not have been a factor in the direct seed plots and sufficient plant material was on the soil surface to provide protection from wind erosion.

Summary

The conclusions that can be drawn from this evaluation are:

- 1) Direct seeding cotton into alfalfa did not negatively impact yield.
- 2) Herbicides can be used after planting cotton to control weeds and alfalfa growth.
- 3) No definitive measure of improved soil quality was observed.

The final year of cotton production in this rotation will be in 2009. The plots that were planted first in 2007 will be returned to alfalfa. Direct seeding the alfalfa seed will be the challenge to see if we can keep enough residues on the soil surface to qualify for the Conservation Reserve Program with NRCS.

References

Blevins, R.L., W.W. Frye. 1993. Conservation tillage: An ecological approach to soil management. Adv. Agron. 51:33-78.

Miller, P. R., D.E. Buschena, C.A. Jones, and J.A. Holmes. 2008. Transition from Intensive Tillage to No-Tillage and Organic Diversified Annual Cropping Systems. Agron. J. 100(3):591-599.