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Effect of Burning and Tillage Options on Yields in a Continuous Wheat-Double-Crop Soybean Rotation

D. W. Sweeney
Kansas State University, dsweeney@ksu.edu

D. R. Presley
Kansas State University, deann@ksu.edu

D. A. Ruiz Diaz
Kansas State University, ruizdiaz@ksu.edu

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Abstract

Double-cropping soybeans after wheat is common in southeastern Kansas and yields of double-crop soybean during the three years of this study were not affected by management of previous wheat straw practices such as burning or tillage done before planting. However, in the second and third year of the study, subsequent wheat yields were increased by 30% or more when the wheat residue had been burned the previous year.

Keywords

Double-crop, soybean, wheat residue, burn, tillage

Cover Page Footnote

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Effect of Burning and Tillage Options on Yields in a Continuous Wheat-Double-Crop Soybean Rotation

D.W. Sweeney, D.R. Presley,[1] and D.A. Ruiz Diaz[1]

Summary

Double-cropping soybeans after wheat is common in southeastern Kansas and yields of double-crop soybean during the three years of this study were not affected by management of previous wheat straw practices such as burning or tillage done before planting. However, in the second and third year of the study, subsequent wheat yields were increased by 30% or more when the wheat residue had been burned the previous year.

Introduction

Double-cropping of soybeans after wheat is practiced by many producers in southeastern Kansas. Several options exist for dealing with wheat straw residue from the previous crop before planting soybeans. However, the method of managing the residue may affect not only the double-crop soybeans but also the following wheat crop. The objective of this study was to determine the effect of burning or not burning with three tillage options (reduced-till, strip-till, and no-till) on double-crop soybean and subsequent wheat yields.

Experimental Procedures

Six wheat residue management systems for double-crop soybean and the subsequent wheat crop were established in spring 2017. The experiment was a split-plot arrangement of a randomized complete block with three replications. The whole plots were burn and no-burn and the subplots were tillage options of reduced-till, strip-till, and no-till prior to planting the double-crop soybeans. In each year after the soybean harvest, the entire area was disked, field cultivated, fertilized, and planted to wheat. Thus, treatment effects on wheat yield were due to the residual from the residue management treatments for the double-crop soybeans.

Results and Discussion

In 2017, 2018, and 2019, burning versus not burning the wheat straw or tillage options prior to planting had no significant effect on double-crop soybean yields. In 2018, after one year of a continuous wheat-double-crop soybean rotation, subsequent wheat yields

[1] Department of Agronomy, College of Agriculture, Kansas State University, Manhattan, KS.

were unaffected by the residual of burn or tillage treatments. However, in both 2019 and 2020 wheat yields were increased by 30% or more where the wheat residue had been burned in the previous year, even though wheat yields were unaffected by using reduced-, strip-, or no-tillage to plant the previous double-crop soybeans.

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Table 1. Effect of residue management on double-crop soybean and subsequent wheat yields

Residue management[1]	Double-crop soybean yields			Wheat yields		
	2017	2018	2019	2018	2019	2020
	---------- bu/a ----------					
Burn						
Yes	36.4	33.5	40.7	55.4	48.5	32.1
No	38.2	38.0	44.7	55.4	34.3	24.7
LSD (0.10)	NS	NS	NS	NS	6.9	7.4
Tillage						
Reduced-till	38.3	33.5	42.4	55.2	42.4	28.3
Strip-till	36.1	36.6	42.2	56.9	40.6	28.3
No-till	37.4	37.2	43.6	54.2	41.2	28.6
LSD (0.10)	NS	NS	NS	NS	NS	NS

[1]Residue management effects on wheat yields are the residual following those treatments for the double-crop soybeans in the previous year.