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

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Abstract

Double-crop soybean yields during the first two years of this study have not been affected by management of previous wheat straw practices by burning or tillage done before planting. However, by the second year of the study, subsequent wheat yields were 41% greater where the wheat residue had been burned the previous year.

Keywords

burning, tillage, wheat straw residue, double-crop soybean

Cover Page Footnote

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Summary

Double-crop soybean yields during the first two years of this study have not been affected by management of previous wheat straw practices by burning or tillage done before planting. However, by the second year of the study, subsequent wheat yields were 41% greater where 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 no 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 was due to the residual from the residue management treatments for the double-crop soybeans.

Results and Discussion

In both 2017 and 2018, burning or not of wheat straw, or tillage prior to planting, did not affect double-crop soybean yields. In 2018, after one year of a continuous wheat-double-crop soybean rotation, subsequent wheat yields were unaffected by the residual of burn or tillage treatments. However, in 2019 wheat yields were 41% greater where the wheat residue had been burned in 2018, even though wheat yields were unaffected by using reduced-, strip-, or no-tillage to plant the previous double-crop soybeans.

Acknowledgment

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

	Double-crop soybean yields		Wheat yields	
Residue management[1]	2017	2018	2018	2019
	bu/a			
Burn				
Yes	36.4	33.5	55.4	48.5
No	38.2	38.0	55.4	34.3
LSD (0.05)	NS	NS	NS	10.1
Tillage				
Reduced-till	38.3	33.5	55.2	42.4
Strip-till	36.1	36.6	56.9	40.6
No-till	37.4	37.2	54.2	41.2
LSD (0.05)	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.