

Opportunities for Wheat-Soybean Relay Planting in Arkansas

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INTRODUCTION

A major contributor to the reduction of soybean grain yields in Arkansas is the hot, dry weather experienced in July and August. Normal soybean planting (15 May to 30 June) results in flowering and pod filling during July and August. One attempt to avoid this impact of the hot, dry weather has been the introduction of Group IV soybean planted prior to 25 April. This management approach allows flowering and the majority of the pod-filling period to occur before 1 August.

Another soybean operation in late June occurs where planting of soybean follows wheat harvest (i.e. doublecrop). This popular practice places seedling growth and flowering in the July-August period but does force the pod filling segment into a cooler and usually wetter September. If the plants survive the July-August period in good condition, doublecrop soybean will yield well under subsequent normal weather patterns.

A third option would be relay planting of soybean into standing green wheat. For this option to be accepted by growers, two objectives need to be met 1) the feasibility of Group IV soybean to be incorporated into relay planting and 2) the agronomic advantage of relay planting (i.e. Group N soybean and lower wheat yields) over the normal doublecrop system in which Group V soybean is utilized.

BACKGROUND

Removal of a wheat row increased the grain yield from the adjacent two rows--especially so when removed at an early growth stage (Darwinkle, 1984). Removal at the early growth stages (Zadooks GS 21) allowed for a 82% yield compensation by adjacent rows, whereas removal at the GS 51 resulted in only a 29% yield compensation. Chan et al. (1980) identified the late boot stage for soybean planting to minimize wheat grain losses. Reinbatt et al. (1987) reported that establishment of soybean into wheat progressively reduced wheat yields as growth stages

in wheat increased. However, a skip-row pattern in the wheat minimized the yield loss during the soybean planting operation. Duncan et al. (1990) found that wheat yields were reduced 13% in skip row patterns, whereas the yield reduction was 4% in solid patterned wheat. While not significantly different, the soybean yields in the skip-row pattern were greater than the yields in the solid pattern.

METHOD AND MATERIALS

A single location in 1990 (Colt, Arkansas) and four locations in 1991 (Marianna, Clarkedale, Colt and Fayetteville, Arkansas) comprised the study (Table 1). The wheat cultivar for each location was selected so as to adapt to the location and the soil involved. Wheat was planted in October of the preceding calendar year at recommended rates with plots 13 ft wide and 30 ft long. At the locations in 1991 the wheat was planted solid, and the appropriate rows were removed for each spacing in late winter. At each location a treatment of solid-planted wheat with Group V soybean planted after wheat harvest (doublecrop) was included. Also a fallow plot was planted to Group IV soybeans at the same time the relay planting occurred (Table 2). Four replications were used in 1990 and eight replications in 1991. All locations were dryland.

CONCLUSION

The ability of the relay planting to escape the hot, dry summer period necessitates a normal optimum planting date of 10 April for Group IV soybeans. The late April 1990 planting did not allow the crop to escape the July-August weather during its pod-filling period. The soybean appeared to germinate without stress, and though plant height was observed to be greater than normal at wheat harvest, the plants did not exhibit weak, elongated stems. Also, the soybean were not of sufficient height to interfere with harvesting of wheat.

Row spacing appears to be a major concern in relay planting. In 1989 with the 36-in. rows, the soybean crop never achieved full canopy cover. Also the wheat stubble had a shading effect that appeared to reduce weed pressure. No herbicides were used in either year.

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Table 1. Location and soil series of experimental sites.

Location	Soil series	Suborder
Cotton Branch Station, Marianna	Loring silt loam	Typic Fragiudalfs
Delta Branch Station, Clarkedale	Sharkey silty clay	Vertic Haplaquepts
Pine Tree Branch Station, Colt	Calhoun silt loam	Typic Glossaqualfs
Main Experiment Station, Fayetteville	Captina silt loam	Typic Fraaiudults

Table 2 Row spacing and planting dates for relay planting of soybeans into wheat

Description	Spring crop	Wheat row spacing	Spacing	Planting date
Doublecrop	Wheat	7 in. (normal)	28 in.	10 June
Row Spacing	Wheat	14 in. @ 28-in. center	28 in.	10 April
Trim Une	Wheat	14 in. @ 56-in. center	28 in.	10 April
Soybean	Fallow	—	28 in.	10 April

LITERATURE CITED

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