

YIELD RESPONSE OF SOYBEAN CULTIVARS TO SUBSURFACE DRAINAGE AND SUBIRRIGATION IN NORTHEAST MISSOURI

Kelly Nelson

Research Agronomist

Clinton Meinhardt

Research Specialist

Randall Smoot

Superintendent

Excessive springtime precipitation can be followed by periods of low rainfall during summer that can lower soybean grain yields. Combining water management and subirrigation during summer months could help farmers reduce year-to-year production variability of soybean on claypan soils. Drainage plus subirrigation (DSI) uses subsurface drainage to remove excess water in spring and fall for critical field operations, regulate water flow during winter (controlled drainage), and add water to the field. Claypan soil research has evaluated the effects of drainage systems on corn (Nelson et al., 2009; Sipp et al., 1984; Walker et al., 1982), soybean (Sipp et al., 1984; Walker et al., 1982), and alfalfa (Rausch et al., 1990) response, but not the effects of DSI as part of an integrated water management system on high yielding soybean cultivar response in a claypan soil. Limited DSI research has evaluated its effects on response for different soybean cultivars (Cooper et al., 1992) and grain quality (Wiersma et al., 2010). Hence, a need existed to evaluate soybean cultivar responses to different drain tile spacings. The objective of this research was to evaluate the effects of cultivar selection and drainage water management system at 20 and 40 ft spacings on soybean response in a claypan soil.

Field research in 2007 and 2008 evaluated effect of cultivar (Kruger 382, Morsoy 3636, Asgrow 3602, Pioneer 93M96 and NKS37-N4) and DO or DSI at 20 and 40 ft drain tile spacings on soybean response. Yields were similar for DO and DSI at 20 and 40 ft spacings when yield potential for cultivars in the non-drained control was 37 to 40 bu/acre (Table 1). Kruger 382 yield increased 7 bu/acre with DSI on a 20 ft spacing compared to DO, but yields were similar between DO and DSI systems for other cultivars. Using DSI and DO, Kruger 382, Morsoy 3636, and Asgrow 3602 increased yields 15 to 46% (7 to 17 bu/acre) compared to the non-drained control. However, Pioneer 93M96 or NKS37-N4 yields were not affected by DO or DSI. Oil concentration of Morsoy 3636 and Asgrow 3602 decreased up to 0.3% with DO at a 20 ft spacing, but drainage had no effect on oil concentration of Kruger 382, Pioneer 93M96, or NKS37-N4 (data not presented). It was important to match high yielding cultivars with appropriate drainage water management systems.

Table 1. The interaction of cultivar and water management systems on yield. Water management systems were drainage only (DO) and drainage plus subirrigation (DSI). Data were combined over years (2007 and 2008) in the absence of a significant interaction.

Cultivar	Yield				
	Non-drained	DO		DSI	
		20 ft	40 ft	20 ft	40 ft
	----- Bu/acre -----				
Kruger 382	37	47	47	54	53
Morsoy 3636	40	49	47	51	49
Asgrow 3602	37	47	46	51	46
Pioneer 93M96	38	46	46	42	44
NKS37-N4	40	45	45	44	43
LSD ($P = 0.05$)	----- 7 -----				

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