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Influence of Hybrids on Cold Soil Germination in Grain Sorghum

Josh Lofton
Cropping Systems Specialist

Anna Zander
Graduate Student

Chase Harris
Agricultural Technician

Early season growth is one of the most critical aspects of grain sorghum production. Within 30 days following emergence, total grain numbers are being set and any stress or reduced growth will greatly inhibit yields. To minimize these risks and optimize early growth, sorghum must be planted in a timely manner and into favorable soil conditions. This typically entails good soil moisture with soil temperatures at or above 58 F. However, with potential damages and additional costs associated with sugarcane aphids (an emerging pest in the sorghum industry), growers have become interested in planting sorghum earlier as a tool for managing these pests. Earlier planting would allow the crop more time to mature unhindered by the pest as well as potentially reaching later reproductive stages prior to potential infestation, which will often result in less yield reduction (Table 1).

Table 1. Impact of sugarcane aphids on grain sorghum yield loss based on growth stage of infestation.

Crop stage at 20% infestation	*Percent yield loss with no applied control*
Pre-boot	81 to 100%
Boot	52 to 69%
Panicle emergence	67%
Soft dough	21%
Hard dough	<10%

Adapted from Gore, MSU.

While this may be an effective strategy, planting into cooler soils could result in delayed germination and emergence, as well as reduced early season vigor, lower early season root development and delayed maturity. These issues would negate the benefits of early planting by not allowing the crop to mature quicker. Many growers have looked toward hybrid selection as a way to mitigate the risks of planting into cool soils. Some hybrids have been marketed as having good cold/cool soil emergence; however, this testing is not universal and little direct comparison between hybrids has been conducted.

Cold Germination Tests

To determine the ability for hybrids to be planted into cooler soils, cold germination tests were conducted. Hybrids were germinated at the standard 60 F and 53 F (below the recommended temperature). Seeds were considered germinated if the coleoptile was longer than 1 inch, the typical requirement to emerge at standard planting depths. Counts were conducted at 10 days following placement into the germination chambers. Germination values at cooler conditions were subtracted from germination in standard conditions to determine the percent reduction in germination (Table 2).

Summary

Several hybrids are currently available that will only experience minor reductions in germination/emergence when planted into soils with temperatures below the optimum 58 F. It should be noted that these reductions could still be up to 20 percent. Additionally, soil temperature is only the first factor to consider when deciding whether to plant early. While soil does not typically have major swings in temperatures, similar to air temperatures, prolonged cooler conditions following planting can negatively influence the crop. Hybrid selection does provide growers with options for planting early but critical and optimal soil temperature for planting have been established because it provides better conditions for the crop to germinate and emerge.

Table 2. Percent reduction in germination associated with cooler conditions. Values were the difference of germination at 60 F and 53 F, where seed was considered germinated if coleoptile length exceeded 1 inch.

<20% reduction in germination in cooler conditions		*20 to 35% reduction in germination in cooler conditions*		*>35% reduction in germination*	
Dekalb	DKS 33-07	Dekalb	DKS 47-07	Pioneer	84P72
	DKS 29-07	Pioneer	85Y34	Alta Grain	AG 1201
	DKS 37-07		85P44	Sharp Brothers	SB 4117
Pioneer	84P68	NuTech	GS 725	Gold Source	GS7016
	86P20		GS 636		
	86G32	Advanta	ADV G2106		
NuTech	GS 693	Richardson Seed	RS 124		
	GS 663	Sorghum Partners	SP 73B12		
Advanta	ADV G3247		SP7715		
	ADV G2275	Sharp Brothers	SB 3217		
Alta Grain	AG 1203	Gold Source	GS6717		
Dyna-Gro	M60GB31		GS7117		
	M74GB17				
Richardson Seed	Swift				
Sorghum Partners	SP 68M57				

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