

Project Title: Gibberellin (GA) Effect on Spring Wheat Vigor and Yield

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Objective: To evaluate GA effect on seedling vigor, yield and grain quality in spring wheat cultivars differing in height

Results:

Three semi-dwarf (Nick, Explorer, and Jefferson) and three standard height (Fortuna, Scholar and Thatcher) spring wheat cultivars were evaluated for their response to the gibberellin (GA) seed treatment, Release. Each cultivar was treated at a rate of 3 oz of Release/100 lb seeds. The study was planted on April 19, 2006 at a seeding rate of 65 lb/ac, to a depth of 2 inches, using a double disk drill equipped with 6-inch row spacings.

The main effect of GA on the width of the first true leaf was non-significant. However, the leaf length of the first main stem leaf was positively affected. In general, GA resulted in longer, narrower leaves. Explorer and Scholar were more responsive to GA treatment than the other cultivars. The overall effect of GA on the length of leaf-2 was less apparent. Yet, Explorer and Scholar again responded positively to GA.

While the length of leaf-2 did not consistently respond to GA, the width of the second leaf did. The main effect of GA on the width of leaf-2 was significant. In general, GA caused a reduction in leaf width across all cultivars tested.

GA treatment did not affect culms or biomass per square meter. However, GA interacted with cultivar to affect stand density (plants/m²). In general, GA improved stand densities for the semi-dwarf cultivars, especially Explorer. This in turn had an indirect effect on compensatory processes within the plant, which confounded the treatment effects on culms/plant and culms/m². GA had no effect on final plant height, grain yield, or grain end-use quality parameters.

Summary:

GA seed treatments affected leaf length and width in the first two main stem leaves.

Table 1. Effect of GA seed treatment on leaf length and width in leaf 1 and leaf 2, and seedling density, number of tillers and biomass at jointing in six spring wheat cultivars during 2006 season.

Cultivar	HT	Leaf length (mm)				Leaf width (mm)				Plants /m ²		Culms/m ²		Culms/plant		Biomass (g/m ²)	
		Leaf 1		Leaf 2		Leaf 1		Leaf 2		U	T	U	T	U	T	U	T
		U	T	U	T	U	T	U	T	U	T	U	T	U	T	U	T
Nick	SD	97.8	103.3	142.7	139.2	4.1	3.7	4.5	4.0	234.3	290.6	658.4	800.7	2.8	2.8	248.8	250.6
Explorer	SD	89.8	100.5	118.7	131.6	2.9	2.9	3.3	3.1	391.5	519.0	1049.8	1156.6	2.7	2.2	278.2	274.0
Jefferson	SD	87.1	88.6	123.9	121.0	3.4	3.6	3.8	3.7	311.4	397.4	910.4	975.7	3.0	2.5	256.8	244.4
Fortuna	SH	107.3	111.6	142.1	140.2	3.3	3.4	3.6	3.7	305.5	308.4	774.0	889.7	2.6	2.9	215.0	221.3
Scholar	SH	94.6	110.9	127.9	136.1	3.7	3.5	3.8	3.6	296.6	299.5	934.2	925.3	3.1	3.2	270.2	247.3
Thatcher	SH	92.5	96.4	125.4	123.4	2.8	2.7	3.1	2.8	468.6	376.6	1174.4	1201.0	2.5	3.2	236.6	232.8
LSD (0.05)	GA	2.64		NS		0.19		0.16		NS		NS		NS		NS	
	CV	4.57		6.48		0.33		0.29		71.56		176.1		0.38		NS	
	GA*CV	6.47		9.17		0.47		0.41		101.2		249.04		0.53		NS	
ANOVA	GA	***		NS		NS		**		NS		NS		NS		NS	
	CV	***		***		***		***		***		***		*		NS	
	GA*CV	*		*		NS		NS		*		NS		*		NS	

HT: height SD: semidwarf SH: standard height GA: Gibberellin CV: cultivar U: untreated T: GA treated
 NS: Not significant (P>0.05) *, **, ***: Significant (P<0.05, 0.01 and 0.001, respectively)

Table 2. Effect of GA seed treatment on plant height, yield, grain moisture, test weight, 100 kernel weight and lodging in six spring wheat cultivars during 2006 season.

Cultivar	HT	Plant height (cm)		Yield (bu/ac)		Grain moisture (%)		Test weight (lb/bu)		TKW (g)		Lodging (%)	
		U	T	U	T	U	T	U	T	U	T	U	T
Nick	SD	83.0	82.3	96.8	110.0	10.1	10.0	60.5	60.5	34.72	33.64	0	0
Explorer	SD	81.3	81.3	87.9	94.1	10.2	10.1	60.0	60.5	29.50	28.71	0	0
Jefferson	SD	84.7	82.7	110.1	104.1	10.8	10.5	61.0	60.7	35.72	35.18	0	0
Fortuna	SH	102.7	99.3	87.9	83.6	10.6	10.8	62.2	61.8	42.64	42.68	0	0
Scholar	SH	104.7	102.0	101.7	97.4	10.6	10.5	62.6	62.7	39.99	36.34	0	0
Thatcher	SH	105.0	100.0	78.4	69.7	10.9	11.3	60.5	59.8	30.03	28.67	0	0
LSD (0.05)	GA	NS		NS		NS		NS					
	CV	11.81		6.77		0.25		0.39					
	GA*CV	NS		9.58		0.36		0.56					
ANOVA	GA	NS		NS		NS		NS					
	CV	***		***		***		***					
	GA*CV	NS		*		0.09		*					

HT: height; SD: semidwarf; SH: standard height; GA: Gibberellinic acid; CV: cultivar; U: untreated; T: GA treated; TKW: 1000 kernel weight; NS: Not significant ($P > 0.05$); *, **, ***: Significant ($P < 0.05$, 0.01 and 0.001, respectively).