

Title: Foliar application of abscisic acid in winter wheat – 2015

Objective: To evaluate winter wheat height response to foliar applied abscisic acid.

Results:

Plant height is directly related to lodging, which reduces grain quality and yield. This study was designed to determine the effect of abscisic acid (ABA) on reducing plant height.

The study was established as a randomized complete block with three replications. Yellowstone winter wheat was planted at 80 lb/A in 7 inch rows on September 29, 2014. The factorial treatment arrangement consisted of abscisic acid applied at three different rates and at two different growth stages. The treatment was applied at 0.078 lb ai/A, 0.156 lb ai/A, and 0.624 lb ai/A on May 7th and May 20th, 2015 when the wheat crop was at the two node or flag leaf stage of growth, respectively.

No significant effect was observed for plant height or lodging. However, the application of abscisic acid did have an effect on heading date and test weight (Table 2). Abscisic acid treatments had no effect on heading date when applied at the two node stage of growth. However, when abscisic acid was applied at the flag leaf stage, heading occurred earlier as the application rate increased. As a result, the earliest heading date was observed when the highest rate was applied at flag leaf. At the same time, the highest test weight was associated with this same treatment.

Summary:

It may be possible that the early heading allowed the plant to initiate grain filling before drought conditions became severe, which in turn improved test weight. However, abscisic acid is known to impact plant water use under stressful conditions by regulating stomatal apertures. In either case, these results indicate that foliar applications of ABA may provide benefits with respect to grain quality.

Table 1. Materials and Methods - Winter Wheat Abscisic Acid - 2015

Seeding Date:	9/29/2014	Harvest Date:	7/30/2015
Julian Date:	272	Julian Date:	211
Seeding Rate:	80 lbs/A	Soil Type:	Creston SiL
Previous Crop:	Spring Wheat	Soil Test:	29-10-158
Tillage:	Conventional	Fertilizer:	9-40-10, 0-0-62,130-0-0 TD
Irrigation:	None	Herbicide:	Huskie Complete 13.7 oz/A

Table 2. Agronomic effect of foliar applied abscisic acid on winter wheat

Rate of ConTego lb ai/A	HD Julian	HT in	YLD ¹ bu/A	PRO ² %	TWT ¹ lb/bu	TKW ¹ g	FN sec
Non-treated check	152.7	43.0	149.1	11.4	61.2	39.6	417.8
Two nodes							
0.078	152.7	41.7	151.5	11.1	61.6	41.0	413.2
0.156	152.7	42.0	149.1	11.4	61.5	40.0	426.2
0.624	152.0	41.3	147.2	11.6	60.6	39.7	435.4
Flagleaf							
0.078	153.0	42.0	150.2	11.3	61.4	40.7	417.1
0.156	152.3	41.0	134.3	11.6	60.5	38.5	432.2
0.624	151.7	41.7	148.3	11.3	61.9	41.1	421.5
Mean	152.4	41.8	149.2	11.4	51.4	40.1	423.3
CV	0.3	1.8	5.2	5.2	0.5	3.8	4.8
LSD P=.05	0.8	ns	ns	ns	0.4	ns	ns
Pr>F	0.0314	0.1360	0.9872	0.9230	0.0203	0.4205	0.7957

HD: heading, HT: height, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, ns: nonsignificant

¹ adjusted to 13% moisture, ² adjusted to 12% moisture

Table 3. Main effect of application timing

Timing	HD Julian	HT in	YLD ¹ bu/A	PRO ² %	TWT ¹ lb/bu	TKW ¹ g	FN sec
two node	153	42.0	149.2	11.4	61.2	40.1	423.2
flag leaf	152	41.9	145.5	11.4	61.2	40.0	422.2
LSD	ns	ns	ns	ns	ns	ns	ns
Pr>0.05	0.4226	0.8075	0.3067	0.9715	0.9415	0.7759	0.9068

Table 4. Main effect of treatment rate

Rate of ConTego lb ai/A	HD Julian	HT in	YLD ¹ bu/A	PRO ² %	TWT ¹ lb/bu	TKW ¹ g	FN sec
Non-treated check	153	43.0	149.1	11.4	61.2	39.6	417.8
0.078	153	41.8	150.9	11.2	61.5	40.9	415.2
0.156	153	41.5	141.7	11.5	61.0	39.2	429.2
0.624	152	41.5	147.7	11.4	61.2	40.4	428.5
LSD	ns	ns	ns	ns	ns	ns	ns
Pr>0.05	0.0848	0.1063	0.5344	0.7843	0.2392	0.4618	0.4335

HD: heading date, HT: height, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, ns: nonsignificant

¹ adjusted to 13% moisture, ² adjusted to 12% moisture

Table 5. Effect of application timing and treatment rate

Timing	HD Julian	HT in	YLD ¹ bu/A	PRO ² %	TWT ¹ lb/bu	TKW ¹ g	FN sec
Non-treated check							
two node	153	43.0	149.1	11.4	61.2	39.6	417.8
flag leaf	153	43.0	149.1	11.4	61.2	39.6	417.8
0.078 lb ai/A							
two node	153	41.7	151.5	11.1	61.6	41.0	413.2
flag leaf	153	42.0	150.2	11.3	61.4	40.7	417.1
0.156 lb ai/A							
two node	153	42.0	149.1	11.4	61.5	40.0	426.2
flag leaf	152	41.0	134.3	11.6	60.5	38.5	432.2
0.624 lb ai/A							
two node	152	41.3	147.2	11.6	60.6	39.7	435.4
flag leaf	152	41.7	148.3	11.3	61.9	41.1	421.5
LSD	ns	0.6	ns	ns	1.1	ns	ns
Pr>0.05	0.4547	0.0293	0.4486	0.8263	0.0452	0.4392	0.8542

HD: heading date, HT: height, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, ns: nonsignificant

¹ adjusted to 13% moisture, ² adjusted to 12% moisture