

Project Title: Effect of Plant Growth Regulators (PGRs) and Fungicides on the Performance of Winter Wheat Varieties – 2014.

Objective: To evaluate the effects of PGRs and fungicides on the agronomic performance of winter wheat varieties.

Lodging and stripe rust are recurring problems in winter wheat. This study was designed to determine which production issue has the most negative effect on winter wheat performance. The study was established as a split plot, randomized complete block design with three replications. The sub plot treatments consisted of seven winter wheat varieties which varied in height and susceptibility to stripe rust. The varieties included Bynum, Curlew, Decade, Jagalene, Promontory, Whetstone, and Yellowstone. The whole plot treatments consisted of foliar applications of Quilt and Palisade applied alone or in combination. A non-treated control was also included for each variety. The treatments were applied on May 30th when the crop was at early boot stage.

Despite a low level of stripe rust pressure, the main effect of fungicide was significant. The application of Quilt reduced stripe rust infection, regardless of variety, and afforded a yield increase of 11 bu/A compared to either the check or Palisade (Table 2). Significant varietal differences in susceptibility to stripe rust were observed. Decade was the most susceptible variety and had an infection level of 24.3%, while Promontory expressed the greatest resistance and had an infection level of 0.2%, regardless of fungicide treatment (Table 3). Decade benefited the most from the fungicide application (Table 4).

Plant height ranged from 35.9 inches for Whetstone to 42.7 inches for Curlew. Not surprisingly, Curlew expressed the greatest degree of lodging at 49.2 percent. The main effect of Palisade was significant, with an average height reduction of 3.0 inches. At the same time, lodging scores decreased from 16.9 % to 3.8 % percent when treated with Palisade (Table 2). However, Palisade applied alone did not improve yields compared to the non-treated check (Table 2).

Summary:

Overall, stripe rust had the greater impact on yield reductions than lodging. Therefore, the application of Quilt had a greater positive impact on grain yield.

Table 1. Materials and Methods - Effect of PGR and Fungicide on Winter Wheat. Kalispell, 2014

Seeding Date:	10/1/2013	Harvest Date:	8/12/2014
Julian Date:	274	Julian Date:	223
Seeding Rate:	80 lbs/A	Soil Type:	Creston SiL
Previous Crop:	Peas	Soil Test:	259-16-172
Tillage:	Conventional	Fertilizer:	9-40-10 / TD 130-0-0
Irrigation:	None	Herbicide:	Rimfire Max 85 g/A, Huskie 11 floz/A and Preference 25%v/v

Table 2. Main effect of fungicide and PGR inputs on agronomic performance of winter wheat. Kalispell, 2014.

Input	SR %	SEP %	HD Julian	HT in	LOD %	YLD BU	PRO %	TWT lb/bu	TKW g	FN sec	MC %
Check	10.5	21.4	157	40.9	16.5	159.3	12.9	61.8	40.5	396.5	10.3
Palisade	10.8	23.8	157	37.9	6.6	160.1	13.0	62.1	40.5	390.2	10.2
Quilt	0.9	12.4	157	40.3	16.9	170.1	13.3	62.2	41.6	380.0	10.3
Palisade & Quilt	1.1	14.9	157	38.6	3.8	165.4	13.4	62.3	41.7	396.8	10.3
LSD	9.2	8.7	0.3	1.4	7.0	4.7	0.2	ns	ns	ns	ns
Pr>F	0.0577	0.0537	0.0148	0.0070	0.0075	0.0040	0.0034	0.3835	0.0654	0.5289	0.7873

Table 3. Main effect of cultivars on agronomic performance of winter wheat. Kalispell, 2014.

Cultivar	SR %	SEP %	HD Julian	HT in	LOD %	YLD BU	PRO %	TWT lb/bu	TKW g	FN sec	MC %
Bynum	3.8	11.7	156	40.9	14.0	146.5	14.5	62.2	39.4	385.9	10.1
Curlew	0.9	7.8	159	42.7	49.2	163.2	13.4	62.0	40.5	377.0	10.6
Decade	24.3	16.2	156	37.7	0.0	151.2	13.4	61.0	37.5	414.1	10.0
Jagalene	8.8	19.3	156	38.6	0.0	175.9	13.0	62.9	43.8	376.6	10.3
Promontory	0.2	13.7	156	39.4	0.4	172.9	11.9	63.0	42.8	348.6	10.3
Whetstone	1.0	25.9	155	35.9	0.0	159.2	13.5	62.1	40.7	424.1	10.2
Yellowstone	1.8	32.4	160	40.9	13.1	177.4	12.3	61.5	42.8	409.9	10.5
LSD	7.6	6.4	0.8	1.6	11.5	6.6	0.2	0.4	1.2	13.5	0.3
Pr>F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0009

SR: stripe rust, SEP: septoria, HD: heading, HT: height, LOD: lodging, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, MC: moisture, ns: nonsignificant.

Table 4. Effect of fungicide and PGR on cultivar agronomic performance of winter wheat. Kalispell, 2014.

Input	SR %	SEP %	HD Julian	HT in	LOD %	YLD BU	PRO %	TWT lb/bu	TKW g	FN sec	MC %
Check											
Bynum	9.0	14.3	156	41.6	26.7	135.3	14.4	61.8	39.3	400.8	10.0
Curlew	0.0	6.3	159	41.9	71.7	163.3	13.4	61.7	39.3	368.1	10.4
Decade	43.3	20.0	155	39.6	0.0	142.2	12.5	59.9	35.3	422.3	10.2
Jagalene	17.0	26.7	156	41.6	0.0	176.5	12.6	63.2	43.7	372.2	10.3
Promontory	0.0	19.3	156	41.7	0.0	165.9	11.8	63.2	42.3	349.5	10.1
Whetstone	1.7	25.0	154	37.9	0.0	159.2	13.3	62.1	41.0	446.5	10.3
Yellowstone	2.3	38.3	159	42.0	17.3	172.8	12.2	61.0	42.3	415.9	10.4
Palisade											
Bynum	5.3	16.7	156	38.8	6.0	148.0	14.2	62.4	38.7	383.2	10.0
Curlew	2.7	10.7	159	42.5	40.0	159.3	13.5	62.0	39.7	369.3	10.7
Decade	48.7	21.7	156	35.8	0.0	139.6	12.9	60.7	36.0	410.8	10.0
Jagalene	16.7	24.0	156	37.1	0.0	172.9	12.6	63.0	43.0	367.6	10.2
Promontory	0.7	21.3	156	37.1	0.0	170.6	11.9	63.2	43.3	354.5	10.4
Whetstone	0.0	31.0	155	34.3	0.0	154.4	13.5	61.9	40.3	432.3	10.0
Yellowstone	1.7	41.3	160	39.8	0.0	175.8	12.3	61.6	42.3	413.9	10.4
Quilt											
Bynum	1.0	5.3	155	42.9	21.7	151.8	14.9	62.2	40.3	386.7	10.0
Curlew	0.7	5.7	158	43.8	65.0	166.5	13.4	62.2	40.7	367.4	10.7
Decade	2.0	11.0	156	39.9	0.0	165.8	14.0	61.7	39.7	401.7	9.7
Jagalene	0.7	13.7	156	38.5	0.0	179.3	13.4	62.0	43.3	357.2	10.4
Promontory	0.0	6.7	156	40.0	1.7	181.6	11.9	63.3	42.7	344.6	10.4
Whetstone	0.7	19.0	155	35.6	0.0	163.2	13.5	62.3	41.3	407.4	10.3
Yellowstone	1.0	25.3	160	41.1	30.0	182.7	12.3	61.6	43.3	395.3	10.5
Palisade & Quilt											
Bynum	0.0	10.3	156	40.2	1.7	151.0	14.6	62.4	39.3	372.7	10.3
Curlew	0.3	8.3	160	42.4	20.0	163.6	13.4	62.3	42.3	403.1	10.5
Decade	3.3	12.0	158	35.4	0.0	157.0	14.1	61.6	39.0	421.6	10.0
Jagalene	0.7	12.7	156	37.1	0.0	174.8	13.4	63.4	45.0	409.5	10.1
Promontory	0.0	7.3	156	38.6	0.0	173.3	12.1	62.5	42.7	345.9	10.4
Whetstone	1.7	28.7	155	36.0	0.0	159.9	13.6	62.1	40.0	410.2	10.0
Yellowstone	2.0	24.7	160	40.7	5.0	178.5	12.5	61.9	43.3	414.4	10.6
LSD	15.3	ns	ns	ns	ns	ns	0.445	0.8701	ns	27.084	ns
Pr>F	0.0011	0.8934	0.6220	0.4162	0.1480	0.5108	0.0001	0.0128	0.2053	0.0272	0.7205

SR: stripe rust, SEP: septoria, HD: heading, HT: height, LOD: lodging, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, MC: moisture, ns: nonsignificant.