Winter Wheat Cultivar Susceptibility to Preharvest Sprouting at Kalispell in 1998

Favorable environmental conditions make pre-harvest sprouting in small grains an annual concern for District 1 producers. Sprout damaged grain results in substantial economic losses as kernels are no longer agronomically sound and the functional quality of the flour is negatively affected. This study was conducted to evaluate winter wheat class and cultivar susceptibility to pre-harvest sprouting and the effect of sprout damage on seed characteristics and quality.

Included in the study were five hard read (Judith, Rocky, Neeley, Tiber, and Kestrel), five soft white (Lewjain, Cashup, Malcolm, Stevens, and Daws), and one hard white (NuWest) cultivar. In an attempt to initiate some level of sprouting in all cultivars, irrigation was applied daily beginning at physiological maturity to augment natural precipitation. Harvests began one week after the earliest cultivar reached physiological maturity and continued weekly for a total of six. Harvests were made over time to document when and to what degree sprout was occurring in each cultivar. The presence or absence of sprout damage was assessed with visible sprout observations and falling number determinations (FN) conducted by inspectors at the State Grain Lab. Other measured responses included test weight, % germination, protein, lodging, heading date, and physiological maturity.

Harvest maturity was identified on 8-5 for the hard red and white cultivars and 8-12 for the soft whites. Hard red cultivars with the exception of Judith, along with the hard white (NuWest) were much more resistant to sprout damage then the soft whites as illustrated by the percent sprout damage measurements. In general for all cultivars, as percent sprout damage increased, test weight, viable seed, and falling numbers decreased. This was very pronounced in the soft white cultivars. Neeley, Tiber, and NuWest proved to be genetically equipped to resist preharvest sprouting with Lewjain and Stevens the most susceptible.

Site Description

Crop: Winter Wheat
Variety: 5 Hard Reds, 1 Hard White, and 5 Soft Whites
Planting Date: 9-26-97
Planting Method: Disk Drill
Rate, Unit: 70 Lbs/A
Depth, Unit: 1.5"
Row Spacing, Unit: 6"
Soil Moisture: Good
Emergence Date: 10-7-97

Plot Width, Unit: 4.2 FT
Plot Length, Unit: 15 FT
Reps: 3
Site Location: Y-3
Study Design: RCB
Plot Maintenance:

Fertility:	10- 8-97	36 Lbs. N and 45 Lbs. P
	3-26-98	36 Lbs. N
Weed Control:	5- 7-98	Harmony Extra at 0.3 oz + 2,4-D at 0.25 pt
Irrigation:	7-22-98	.12" daily through 9-2-98
Harvest Dates:	7-29-98, 8-5-98, 8-12-98, 8-19-98, 8-26-98, and 9-2-98	

Soil Description

Texture: Silty Loam % OM: 5.6 % Sand: 40 % Silt: 50 % Clay: 10
pH: 7.9 Soil Name: Creston Silt Loam

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Trt No	Treatment Name	WNTR WHT HD DATE JULIAN	WNTR WHT PHYS.MAT JULIAN	WNTR WHT LODGE 0-9 7-29-98	WNTR WHT LODGE 0-9 8-12-98	WNTR WHT LODGE 0-9 8-19-98	WNTR WHT LODGE 0-9 9-2-98
1	JUDITH	153.0	202.7	1.0	1.0	1.7	2.3
2	ROCKY	153.3	202.3	6.3	4.7	4.7	5.3
3	NEELEY	157.0	205.7	4.3	3.0	3.0	3.7
4	KESTREL	157.3	206.3	2.3	2.3	2.7	3.7
5	TIBER	157.0	207.0	4.3	4.0	4.0	4.7
6	NuWEST	157.0	205.7	0.7	0.3	0.3	2.3
7	LEWJAIN	162.7	218.3	0.0	0.7	1.7	4.3
8	STEVENS	160.0	214.3	2.0	3.0	3.7	4.7
9	DAWS	158.7	209.7	0.0	0.0	1.3	3.0
10	CASHUP	159.0	208.3	0.0	1.0	1.3	3.0
11	MALCOLM	157.3	207.0	0.0	0.0	0.3	1.0
	LSD (P=.05)	1.73	1.30	0.91	1.04	1.22	1.64
	Standard Deviation	1.02	0.76	0.53	0.61	0.72	0.96
	CV	0.65	0.37	27.96	33.44	32.01	27.92
	Treatment F	21.702	117.120	51.043	22.246	12.435	5.251
	Treatment Prob(F)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0008

Winter Wheat Cultivar Susceptibility to Preharvest Sprouting at Kalispell in 1998

Trt No	Treatment Name	WNTR WHT TWT GRAMS 7-29-98	WNTR WHT TWT GRAMS 8-5-98	WNTR WHT TWT GRAMS 8-12-98	WNTR WHT TWT GRAMS 8-19-98	WNTR WHT TWT GRAMS 8-26-98	WNTR WHT TWT GRAMS 9-2-98
1	JUDITH	59.2	56.2	55.6	56.1	55.5	55.0
2	ROCKY	61.3	58.6	58.3	58.0	56.8	55.8
3	NEELEY	61.6	58.8	58.3	58.0	57.4	57.1
4	KESTREL	59.6	57.5	57.4	57.5	57.0	56.4
5	TIBER	61.9	60.0	57.9	58.6	57.9	56.2
6	NuWEST	59.9	58.6	57.9	58.2	57.8	57.1
7	LEWJAIN	55.3	52.3	51.7	51.0	51.0	46.8
8	STEVENS	57.7	55.3	54.1	53.8	52.8	50.0
9	DAWS	58.7	56.5	55.6	56.2	54.8	54.4
10	CASHUP	58.5	55.5	55.2	54.9	54.0	53.0
11	MALCOLM	56.1	52.8	53.1	53.0	53.1	52.3
LSD (P=.05)		1.22	1.19	1.00	1.17	0.89	1.63
Standard Deviation		0.72	0.70	0.59	0.69	0.52	0.96
CV		1.22	1.24	1.05	1.23	0.94	1.78
Treatment F		26.484	37.483	44.585	39.414	59.129	34.792
Treatment Prob(F)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Winter Wheat Cultivar Susceptibility to Preharvest Sprouting at Kalispell in 1998

Trt No	Treatment Name	WNTR WHT GERM PERCENT 7-29-98	WNTR WHT GERM PERCENT 8-5-98	WNTR WHT GERM PERCENT 8-12-98	WNTR WHT GERM PERCENT 8-19-98	WNTR WHT GERM PERCENT 8-26-98	WNTR WHT GERM PERCENT 9-2-98
1	JUDITH	93.3	97.3	92.7	94.7	92.7	90.7
2	ROCKY	96.0	98.0	96.0	97.3	96.0	90.0
3	NEELEY	92.7	94.0	95.3	93.3	92.0	95.3
4	KESTREL	97.3	96.7	94.7	98.0	94.7	92.0
5	TIBER	94.0	88.7	86.7	90.0	97.3	94.0
6	NuWEST	92.0	94.0	86.7	86.7	96.0	94.7
7	LEWJAIN	94.0	88.0	82.0	71.3	72.7	50.0
8	STEVENS	89.3	86.7	80.7	80.7	70.0	61.3
9	DAWS	89.3	84.0	76.0	75.3	75.3	56.0
10	CASHUP	91.3	92.0	86.0	86.7	78.7	76.7
11	MALCOLM	90.0	87.3	84.0	78.7	76.7	69.3
	LSD (P=.05)	6.37	5.22	5.91	8.33	7.27	12.72
	Standard Deviation	3.74	3.06	3.47	4.89	4.27	7.47
	CV	4.04	3.35	3.98	5.65	4.99	9.44
	Treatment F	1.468	7.450	10.856	10.353	19.257	15.845
	Treatment Prob(F)	0.2227	0.0001	0.0001	0.0001	0.0001	0.0001

Winter Wheat Cultivar Susceptibility to Preharvest Sprouting at Kalispell in 1998

Trt No	Treatment Name	WNTR WHT SPROUT PERCENT 7-29-98	WNTR WHT SPROUT PERCENT 8-5-98	WNTR WHT SPROUT PERCENT 8-12-98	WNTR WHT SPROUT PERCENT 8-19-98	WNTR WHT SPROUT PERCENT 8-26-98	WNTR WHT SPROUT PERCENT 9-2-98
1	JUDITH	2.87	5.60	6.10	4.67	4.90	6.47
2	ROCKY	0.07	0.27	1.73	1.57	2.57	3.40
3	NEELEY	0.00	0.00	0.00	0.00	0.00	0.13
4	KESTREL	0.50	0.97	1.17	0.87	0.20	2.10
5	TIBER	0.00	0.00	0.00	0.00	0.00	0.07
6	NuWEST	0.13	0.63	0.67	0.37	0.63	0.43
7	LEWJAIN	1.07	14.37	13.97	14.03	19.53	16.10
8	STEVENS	2.33	11.83	13.60	8.93	15.70	16.27
9	DAWS	4.77	12.80	9.93	9.90	12.30	9.07
10	CASHUP	3.67	9.77	10.33	7.20	13.43	14.07
11	MALCOLM	6.80	12.53	13.20	10.47	10.80	11.40
	LSD (P=.05)	1.690	2.699	3.788	3.641	2.584	4.230
	Standard Deviation	0.992	1.585	2.224	2.138	1.517	2.484
	CV	49.17	25.35	34.6	40.55	20.84	34.37
	Treatment F	16.045	43.677	21.064	16.765	68.400	20.292
	Treatment Prob(F)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Winter Wheat Cultivar Susceptibility to Preharvest Sprouting at Kalispell in 1998

Trt No	Treatment Name	WNTR WHT FN 7-29-98	WNTR WHT FN 8-5-98	WNTR WHT FN 8-12-98	WNTR WHT FN 8-19-98	WNTR WHT FN 8-26-98	WNTR WHT FN 9-2-98
1	JUDITH	454.0	255.0	222.0	209.7	166.0	123.7
2	ROCKY	507.3	434.7	423.3	348.0	181.7	183.3
3	NEELEY	531.0	480.7	480.7	544.0	409.0	404.3
4	KESTREL	481.3	372.3	383.0	379.3	301.3	212.7
5	TIBER	527.0	503.3	597.0	559.3	387.3	383.3
6	NuWEST	491.0	424.3	503.3	482.7	348.3	321.0
7	LEWJAIN	350.0	114.0	119.0	113.0	62.3	57.3
8	STEVENS	337.0	144.7	137.0	131.0	61.7	58.7
9	DAWS	375.3	166.7	183.3	172.0	85.3	85.0
10	CASHUP	376.0	180.3	188.7	148.3	66.0	66.3
11	MALCOLM	307.3	143.7	156.7	152.3	101.3	92.3
	LSD (P=.05)	43.81	50.18	56.43	77.53	82.10	75.75
	Standard Deviation	25.72	29.46	33.13	45.52	48.20	44.47
	CV	5.97	10.07	10.74	15.46	24.43	24.61
	Treatment F	31.064	79.309	80.741	43.622	24.711	26.573
	Treatment Prob(F)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001