Project Title: Evaluation of Clearfield Winter Wheat Lines for Herbicide Tolerance.

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue, Fernando Guillen, Phil Bruckner, and Jim Berg

Objectives: Evaluate crop tolerance, yield potential and agronomic attributes of experimental herbicide resistant winter wheat lines.

Results:

During the 2004-05 season, fifteen herbicide resistant (Clearfield) winter wheat lines and one susceptible cultivar (Neeley) were evaluated for their agronomic performance when treated with Beyond (imazamox) applied at 2 times the labeled rate (12 oz/a). The herbicide application was made on April 19, 2005 using a tractor –mounted sprayer when seedlings were at the jointing stage. Non-treated controls were included for comparison.

A mild winter helped to maintain good stands. Although snow pack was lower than normal, soil moisture was still adequate for tillering in spring. In addition, exceptional high precipitation (8 in) in June resulted in high yield potential. Unfortunately, the wet conditions also provided ideal conditions for stripe rust to develop. As a result, yield was largely determined by resistance to stripe rust. Yields varied from over 100 bu/ac to as low as 9 bu/ac. Stripe rust significantly reduced test weight which ranged from 64.8 lb/bu (MTCL0461 and MTCL0318) to 40 lb/bu (NWCL042). Julian heading date was later than the previous season and averaged 155. Plant height ranged from 34.8 inches to 45.1 inches and averaged 40 inches. Lodging was minimal and only observed in the nontreated entries.

Herbicide injury was minimal among the entries evaluated, having little effect on test weight and protein. However, herbicide application tended to decreased plant height and reduced lodging. Consequently, yields were greater when treated with the herbicide. This response was especially evident with MTCL0461 and MTCL0318.

Summary:

The 2004-05 season was ideal for evaluating stripe rust resistance. Several Clearfield entries (NWCL013, MTCL0461, MTCL0489 and MTCL0318) showed excellent resistance to stripe rust and had high yields. However, some entries were very susceptible to stripe rust.

Future Plans:

Continue to evaluate herbicide resistant winter wheat materials for herbicide tolerance and agronomic attributes.

Table 1. Agronomic data from the Clearfield winter wheat lines grown at the Northwestern Agricultural Research Center, Kalispell, MT in 2004-2005 season.

Planted: September 27, 2004 Harvested: August 10, 2005

Entry	ID	Yield (bu/ac)		Grain moisture (%)		Test weight (lb/bu)		Heading date (Julian)		Plant height (in)		Protein (%)	
		0X	2X	0X	2X	0X	2X	0X	2X	0X	2X	0X	2X
12	NWCL013	125.5	125.3	11.3	11.6	62.7	63.4	162.7	162.0	44.8	43.8	12.2	11.8
4	MTCL0461	123.7	131.4	10.6	10.6	63.9	64.8	154.0	153.0	40.3	38.6	14.3	13.6
10	MTCL0489	113.9	119.7	10.9	10.0	61.1	59.1	152.7	152.7	36.6	35.8	10.0	10.9
3	MTCL0318	102.7	117.5	11.1	10.5	63.1	64.8	153.7	151.3	43.6	41.9	14.0	12.6
5	MTCL0468	91.2	97.7	10.7	10.3	60.0	58.3	160.0	159.3	48.8	46.2	11.6	11.5
2	MTCL0316	81.6	84.6	9.7	10.3	57.1	56.7	153.3	151.3	45.1	42.8	13.1	13.1
7	MTCL0477	80.6	78.9	9.7	10.0	52.8	57.0	156.0	154.0	40.7	40.2	13.2	12.1
14	MTCL01159	80.3	88.2	10.4	9.8	59.5	59.3	155.3	154.7	39.9	40.2	12.4	12.2
1	MTCL0306	54.9	60.9	8.8	8.1	50.0	51.6	154.3	153.0	42.3	40.4	13.5	13.5
15	Above	45.3	46.4	9.0	8.7	50.2	50.3	150.3	150.0	37.8	34.8	12.4	12.3
8	MTCL0486	37.6	33.9	8.7	7.6	44.4	43.5	156.0	155.3	39.1	39.0	12.4	12.6
9	MTCL0487	35.5	42.2	6.9	7.5	41.2	43.3	155.3	155.3	42.7	41.5	12.7	12.9
13	NWCL034	19.4	24.6	8.2	7.0	48.3	44.8	158.7	156.0	40.0	38.6	13.0	13.2
6	MTCL0474	18.6	15.8	7.0	7.2	45.2	41.1	156.0	156.0	40.2	38.1	13.4	13.7
11	NWCL042	9.0	10.4	6.8	7.2	41.4	40.3	156.7	155.7	38.2	40.0	13.6	13.3
	Mean	**68.0**	**71.8**	**9.3**	**9.1**	**53.4**	**53.2**	**155.7**	**154.6**	**41.3**	**40.1**	**12.8**	**12.6**
16	Neeley	34.3		8.8		45.8		158.7		42.4		13.1	
	LSD (0.05)												
	Entry	**8.67**						**1.57**		**2.12**			
	Rate	**3.02**						**0.55**		**0.74**			

Table 2. Lodging, crop injury and stripe rust infection in Clearfield winter wheat lines grown at the Northwestern Agricultural Research Center, Kalispell, MT in 2004-2005 season.

Planted: September 27, 2004 Harvested: August 10, 2005

Entry	ID	Lodging (%)		Crop injury (14 DAT)		Crop injury (28 DAT)		Stripe rust (6-9-05)		Stripe rust (6-23-05)	
		0X	2X	0X	2X	0X	2X	0X	2X	0X	2X
12	NWCL013	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	4.3	2.3
4	MTCL0461	43.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	MTCL0489	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	6.7
3	MTCL0318	50.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	6.7	6.7
5	MTCL0468	6.7	0.0	1.7	0.0	0.0	0.0	4.0	1.7	18.3	15.0
2	MTCL0316	0.0	0.0	0.0	0.0	0.0	0.0	4.3	1.7	43.3	53.3
7	MTCL0477	3.3	0.0	1.7	0.0	0.0	0.0	6.7	3.3	58.3	73.3
14	MTCL01159	0.0	0.0	0.0	3.3	0.0	0.0	2.3	1.7	8.3	11.7
1	MTCL0306	10.0	0.0	0.0	0.0	0.0	0.0	7.3	8.3	60.0	46.7
15	Above	0.0	0.0	3.3	11.7	0.0	1.7	19.3	8.3	73.3	76.7
8	MTCL0486	0.0	0.0	0.0	1.7	0.0	0.0	30.0	28.3	75.0	80.0
9	MTCL0487	0.0	0.0	0.0	0.0	0.0	0.0	33.3	14.0	86.7	81.7
13	NWCL034	1.7	0.0	1.7	1.7	0.0	0.0	10.0	3.3	66.7	66.7
6	MTCL0474	16.7	0.0	0.0	0.0	0.0	0.0	13.3	16.7	75.0	76.7
11	NWCL042	20.0	0.0	1.7	3.3	0.0	0.0	18.3	10.0	83.3	83.3
	Mean	**10.1**	**0.0**	**0.7**	**2.0**	**0.0**	**0.1**	**9.9**	**6.5**	**44.1**	**45.4**
16	Neeley	0.0		1.7	80.0	0.0	100.0	58.3		95.0	
	LSD (0.05)										
	Entry	**14.84**		**2.84**		**0.59**		**12.15**		**9.18**	
	Rate	**5.18**		**1.00**		**0.21**		**4.24**		**NS**	

DAT: Days after treatment; NS: Not significant at the level of 0.05.