Small Grains Variety Update

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Variety responses to intensive fungicide management in the State Variety Trials

New information to use when making variety decisions.

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Objectives

- Evaluate attainable grain yield of HRSW varieties in the State Variety Trials by controlling biotic stresses caused by fungal pathogens and insects with appropriate fungicides and insecticides.

- Determine whether the variety by management interactions are large enough that they result in rank changes of the varieties.

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Materials & Methods

- Locations:
  - Morris
  - Crookston
  - Roseau
- Experimental design:
  - Split-plot design with 3 replications.
  - Split plot treatment: HRSW varieties
  - Whole plot treatment:
    - ‘Intensive’ - with fungicides and/or insecticides
    - ‘Conventional’ - without

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Materials & Methods

- Fungicide treatments:
  - Feekes 5 - 5 fl. oz/A Stratego.
  - Feekes 9 - 4 fl. oz/A Tilt.
  - Feekes 10.51 - 4 fl. oz/A Folicur.

- Insecticide treatment:
  - Penncap at labeled rate if aphids or other insect pests exceeded economic thresholds.

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Data Analysis - 2004

Table 1 P-values of the variety x management interaction term in the analysis of variance of individual locations and the combined across locations.

Trait	*Morris*	*Crookston*	*Roseau*	*Combined*
Grain Yield	0.002	0.001	0.000	0.000
Test Weight	ns*	0.000	0.019	0.000
Grain Protein	ns	0.001	0.097	ns

* Not significant at p=0.1.

Table 2 T-test values of Spearman's rank correlation coefficients.

Trait	*Morris*	*Crookston*	*Roseau*	*Combined*
Grain Yield	-0.862	1.778	1.542	-0.793
Test Weight	1.851	7.032*	6.812*	6.294*
Grain Protein	1.864	4.524*	7.893*	5.289*

* Significant at p=0.05.

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Data Analysis - 2005

Table 3 P-values of the variety x management interaction term in the analysis of variance of individual locations and the combined across locations.

Trait	*Morris*	*Crookston*	*Combined*
Grain Yield	0.025	0.001	0.008
Test Weight	0.002	ns	ns
Grain Protein	ns	0.008	0.013

Table 4 T-test values of Spearman's rank correlation coefficients.

Trait	*Morris*	*Crookston*	*Combined*
Grain Yield	0.307	3.677*	4.248*
Test Weight	9.361*	10.684*	8.110*
Grain Protein	5.948*	4.631*	7.333*

* Significant at p=0.05.

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Variety	Crookston				Morris			
	Conventional		Intensive		Conventional		Intensive	
	Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank
	bu/A		bu/A		bu/A		bu/A	
Alsen	61.3	14	64.4	14	46.2	7	40.8	22
Banton	59.3	19	65.7	10	45.9	8	42.7	19
Briggs	60.4	16	68.1	7	51.5	2	43.4	18
Dapps	59.6	18	57.2	23	38.5	16	39.4	23
Express	51.1	24	55.8	24	39.9	15	21.6	25
Freyr	68.9	5	63.3	16	43.1	11	48.2	12
Glenn	64.1	9	65.3	12	37.8	17	41.6	20
Granger	72.9	2	73.1	4	42.0	13	49.3	9
Granite	67.8	6	68.7	6	35.9	21	48.7	11
Hanna	64.7	8	66.2	9	37.3	19	44.7	15
Knudson	71.9	3	70.2	5	47.9	4	51.2	7
Marshall	56.6	21	74.0	3	21.8	25	46.5	14
Mercury	60.0	17	65.0	13	65.4	1	62.1	1
Norpro	63.0	10	64.3	15	40.9	14	51.4	4
Oklee	67.7	7	62.5	17	37.3	20	48.8	10
Oxen	62.0	11	59.6	20	32.5	24	52.0	3
Parshall	53.5	22	57.9	22	37.7	18	41.3	21
Polaris	76.5	1	84.0	1	33.8	22	51.3	5
Reeder	51.1	25	55.3	25	33.1	23	44.7	16
Saturn	70.0	4	79.9	2	43.5	10	52.7	2
Steele-ND	62.0	12	58.9	21	43.7	9	39.2	24
Trooper	59.0	20	62.4	18	47.9	3	47.3	13
Ulen	60.9	15	65.5	11	42.2	12	44.1	17
Walworth	61.3	13	66.5	8	47.6	5	49.4	8
Mean	62.3		65.4		41.6		46.1	
LSD 0.05	4.0		4.0		9.0		9.0	

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	Grain Yield (Bu/A)			
	2004		2005	
Variety	Con[1]	Int[1]	Con	Int
Alsen	88	90	53	56
Banton	92	92	53	57
Briggs	94	94	56	59
Dapps	91	86	50	51
Express	–	–	48	43
Freyr	87	92	58	58
Glenn	–	–	51	57
Granger	90	89	59	65
Granite	87	100	56	62
Hanna	81	94	53	59
HJ98	87	100	–	–
Ingot	81	88	–	–
Knudson	93	96	61	64
Marshall	71	96	39	64
Mercury	94	108	63	65
Norpro	83	100	53	60
Oklee	88	94	55	58
Oxen	89	94	48	58
P 2375	89	93	–	–
Parshall	80	93	46	52
Polaris	90	96	57	72
Reeder	88	98	43	52
Saturn	88	92	57	70
Steele-ND	88	87	52	52
Trooper	77	105	54	57
Ulen	–	–	52	58
Verde	90	93		
Walworth	80	96	56	61
Mean	86.6	94.6	53.1	58.7
LSD	6.2	6.2	7.1	7.1

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Discussion

- Yield responses to fungicides:
  - 2004 - across locations and varieties 8 bu/A
  - 2005 - across locations and varieties 6 bu/A
- Rank correlation for grain yield:
  - In 4 out 5 environments rank correlation non significant
  - Use of fungicides results in rank changes
- Examples:
  - Trooper — Powdery mildew in Roseau ‘04
  - Trooper — Stripe rust in Morris ‘04
  - Oxen — Leaf rust in Morris ‘05
  - Marshall — Leaf rust in Morris ‘05

Conclusion

- Trials will be continued.
- Results will be included in Minnesota Variety Trials Bulletin.

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Variety Selection for 2006

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Principles Variety Selection

- Hedge – the mix and match principle:
  - To counter GxE interaction:
    - Yield potential
    - Disease risks
  - Two to three varieties depending on your acreage
    - One FHB resistant variety
    - One balanced variety
    - One high yield variety

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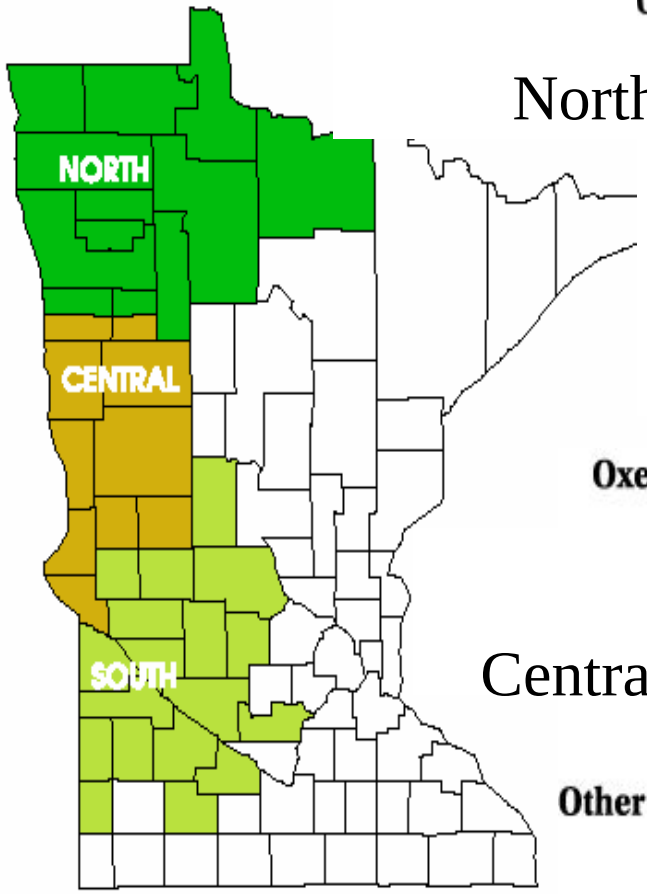
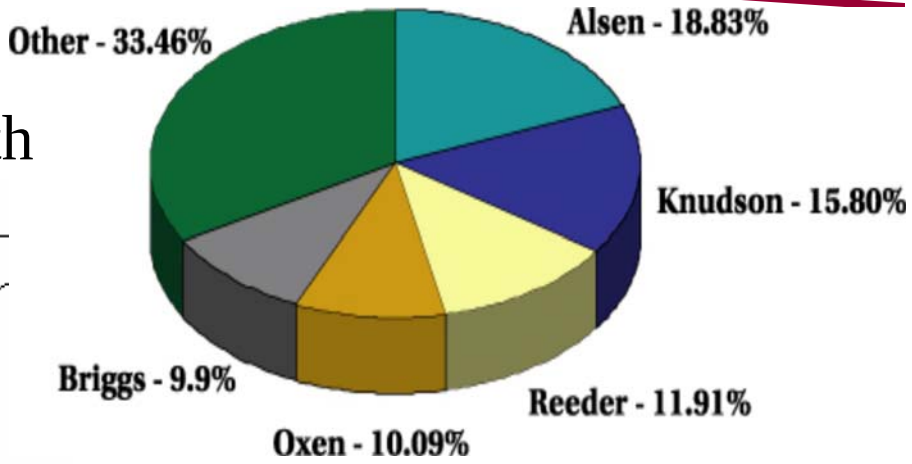
04 Variety Survey - MN



North



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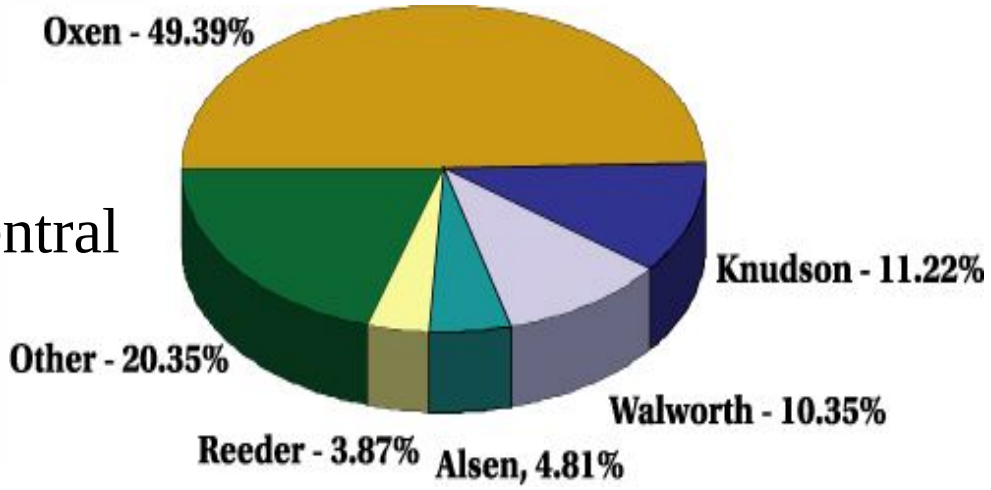

Data Courtesy MN Wheat Growers

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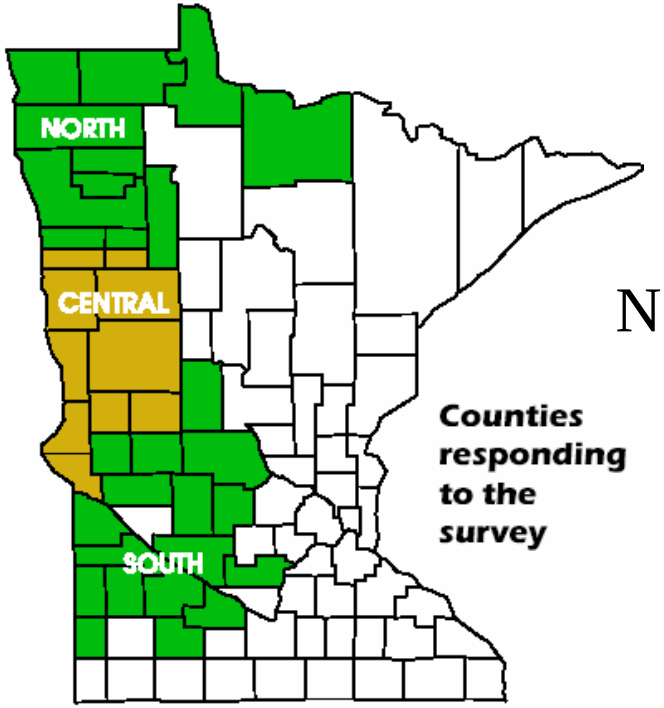
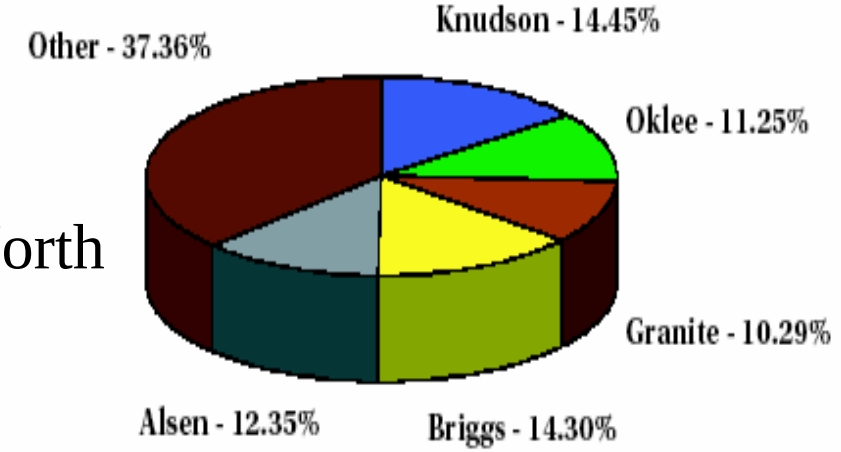
05 Variety Survey



Counties responding to the survey

Minnesota Wheat Research
& Promotion Council
2600 Wheat Drive • Red Lake Falls, MN 5675
800-242-6118 • email: mnwheat@gvtel.com

North



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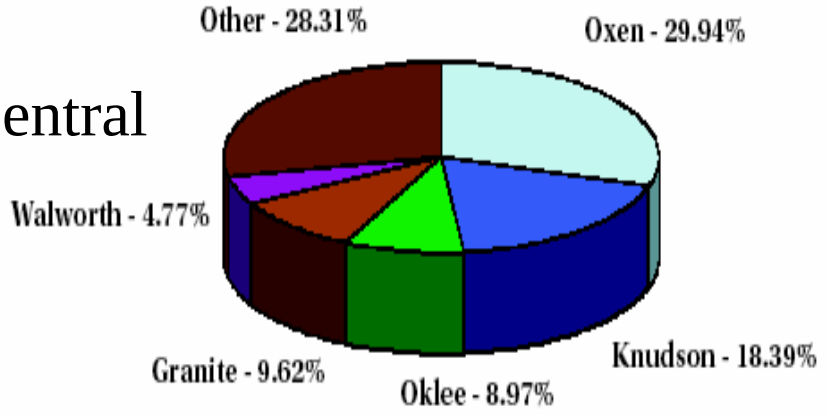

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New Releases in 2004

Name	Pluses	Minuses
Banton (Trigen)	Straw strength Leaf rust, Test weight	
Freyr (AgriPro)	FHB	Straw strength
Granger (SDSU)	Balanced variety	Straw strength
Polaris (North Star Genetics)	Straw strength	Protein, Leaf rust Scab
Saturn (North Star Genetics)	Protein Straw strength	Test weight Scab
Steele-ND (NDSU)	Test weight Protein, Leaf rust	Straw strength
Trooper (Westbred)	Straw strength	Protein, Stripe Rust Powdery mildew

New Releases in 2005

Name	Pluses	Minuses
Glenn (NDSU)	FHB, leaf rust, test weight, maturity, yield	
Ulen (UofM)	Test weight	Straw strength, pre-harvest sprouting

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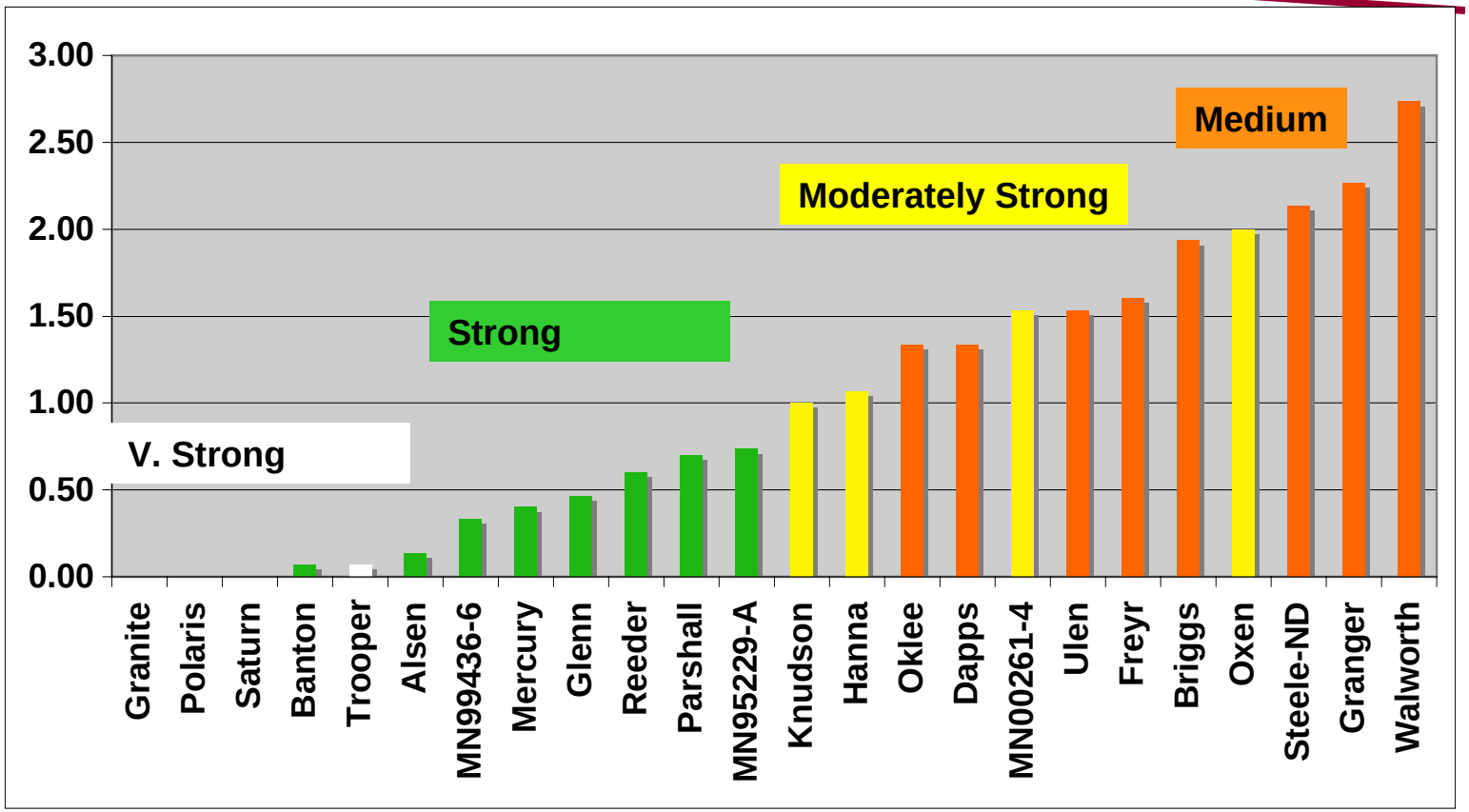
New Releases for 2006

Name	Pluses	Minuses
Kelby (AgriPro)	Balanced variety	
Traverse (SD3847)	FHB and yield	Straw strength
Bigg Red (Bigg Dogg Agg)	FHB	All other diseases
Howard (ND 800)	Balanced variety (replace Parshall, Reeder)	
Norris (MN 95229-A)	Yield and test weight	

Straw Strength



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Leaf Rust Ratings

Briggs	R
Dapps	R
Glenn	R
Knudson	R
Steele-ND	R
Banton	R-MR
Alsen	MR
Express	MR
Granger	MR
Mercury	MR
Trooper	MR
Ulen	MR
Freyr	MR-MS
Norpro	MR-MS
Oklee	MR-MS
Saturn	MR-MS
Granite	MS
Polaris	MS
Walworth	MS
Hanna	MS-S
Oxen	MS-S
Parshall	MS-S
Reeder	MS-S

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FHB Ratings

Variety	Disease Severity	Grain Soundness
Glenn	MR-R	1.5
Alsen	MR	2.0
Freyr	MR	2.0
Hanna	MR	2.0
Parshall	MR-MS	2.0
Banton	MR-MS	2.5
Granger	MR-MS	2.5
Granite	MR-MS	2.5
Knudson	MR-MS	2.5
Oklee	MR-MS	2.5
Trooper	MR-MS	2.5
Walworth	MR-MS	2.5
Briggs	MR-MS	3.0
Steele-ND	MS	2.5
Dapps	MS	3.0
Norpro	MS	3.5
Polaris	MS	3.5
Reeder	MS	3.5
Saturn	MS	3.5
Ulen	MS	3.5
Oxen	MS-S	3.0
Mercury	S	5.0

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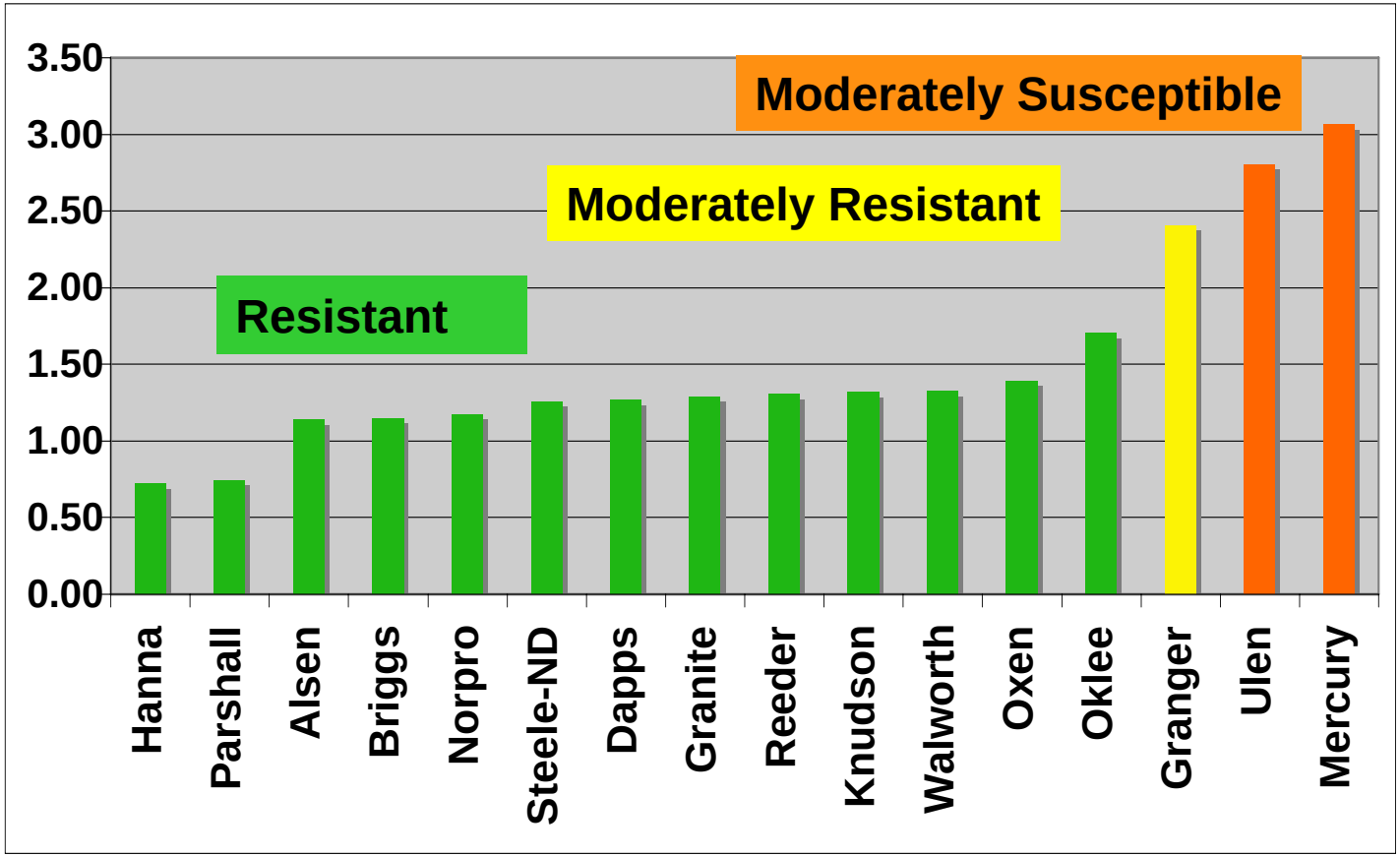
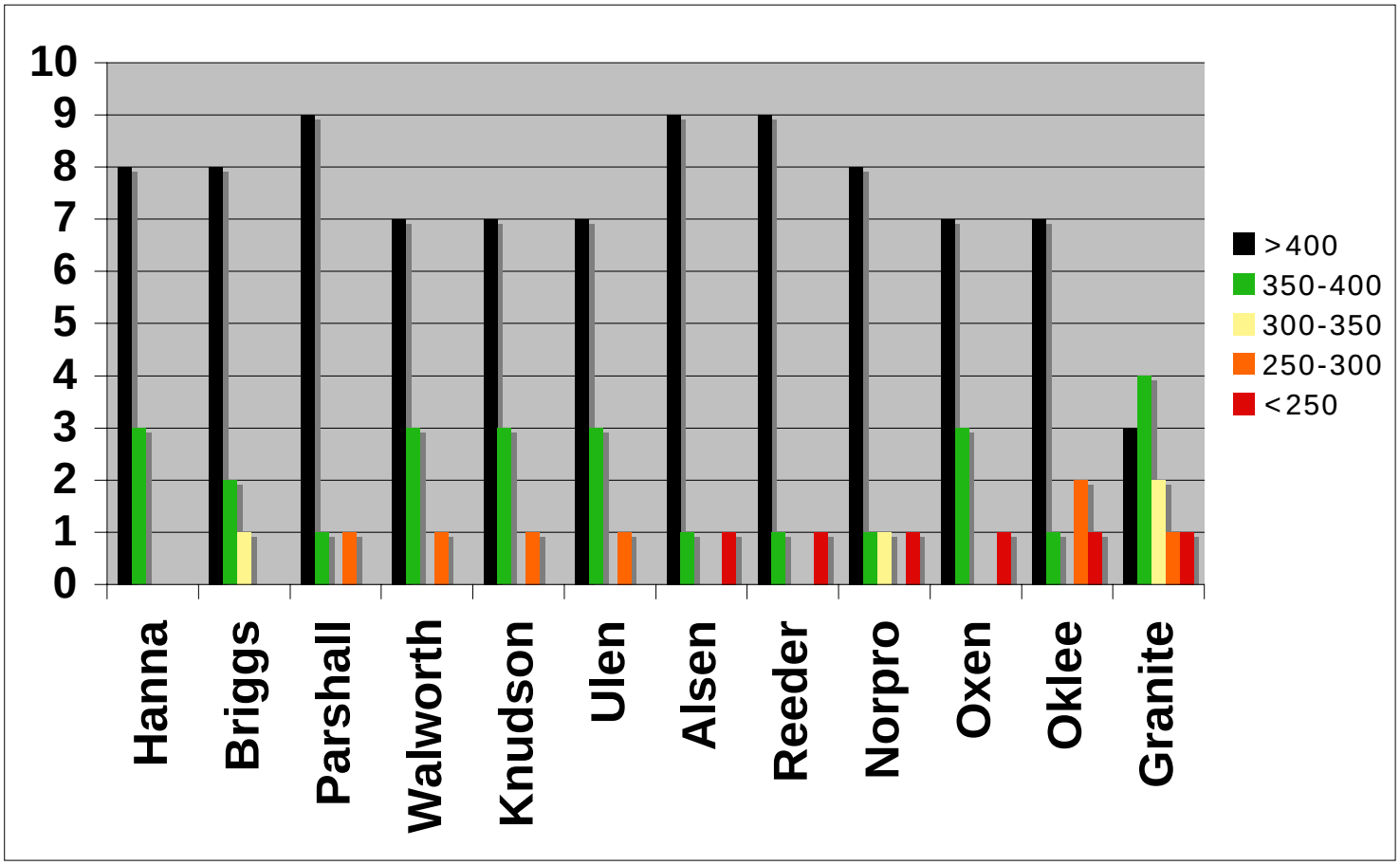
Preharvest Sprouting Rating



Data and graph provided by Jim Anderson.

Risk of Low HFN



Data and graph provided by Jim Anderson. 11 environments, 2002-2004

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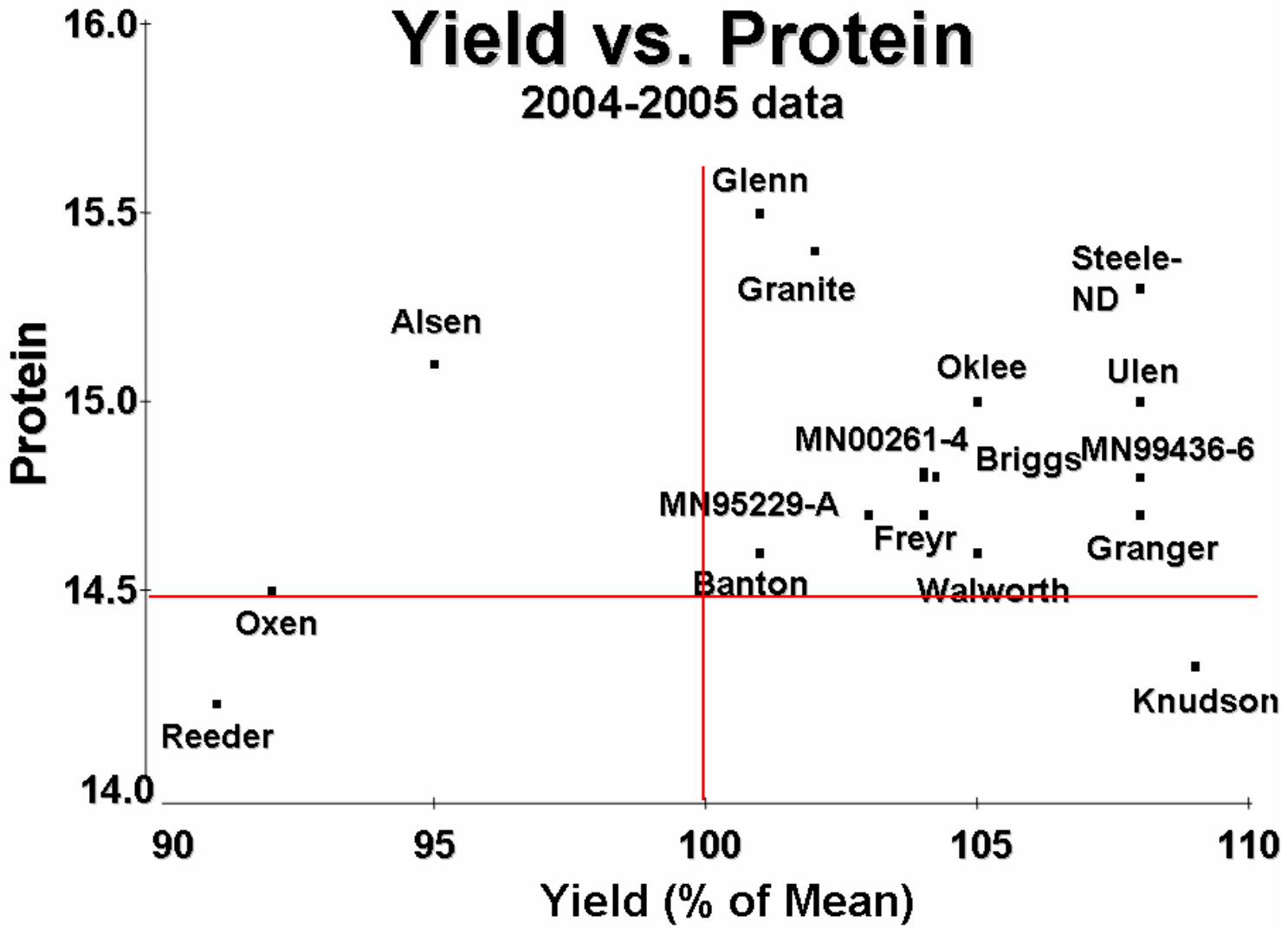
Selection Quadrant



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Slipping…

Name	Minuses
Granite (2002 Westbred)	Hagberg Falling Numbers
Oxen (1995 SDSU)	Leaf rust
Parshall (1999 NDSU)	Leaf rust
Reeder (1999 NDSU)	Leaf rust
Walworth (2001 SDSU)	Stripe rust

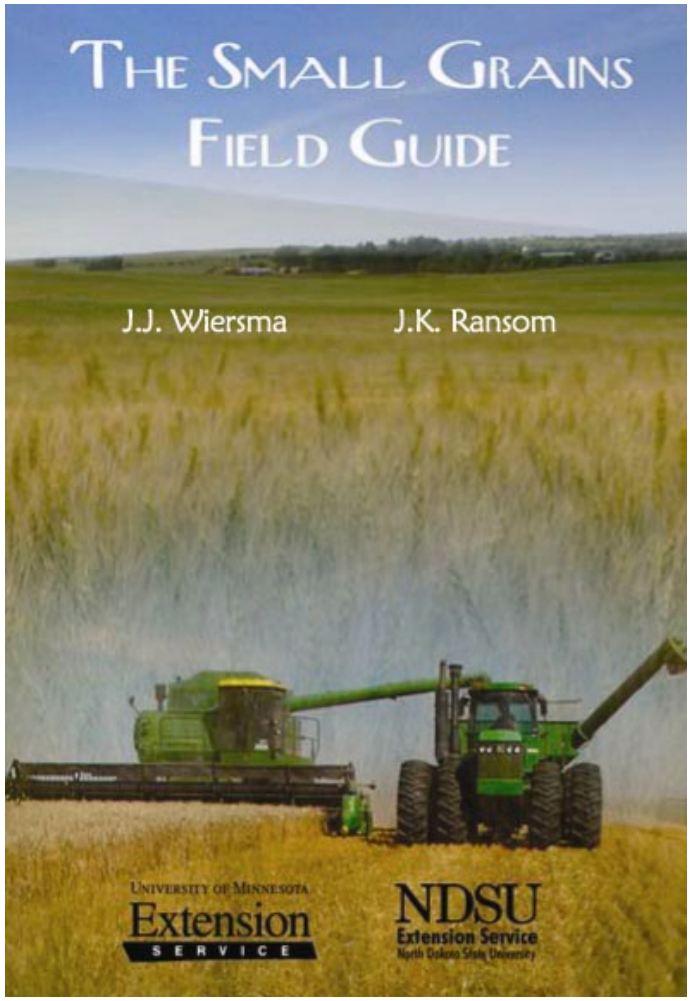
South of Highway 2

Name	Pluses	Minuses
Briggs (2003 SDSU)	Leaf rust	Straw strength
Freyr (2004 AgriPro)	Scab	Straw strength
Granger (2004 SDSU)	Yield	Straw strength
Knudson (2001 AgriPro)	Yield Leaf rust	Protein
Steele-ND (2004 NDSU)	Protein, Test weight	Straw strength
Oklee (2003 U of MN)	Protein, Test weight	Straw strength
Ulen (2005 U of MN)	Yield	Straw strength, FHB

North of Highway 2

Name	Pluses	Minuses
Freyr (2004 AgriPro)	Scab	Straw strength
Glenn (2005 NDSU)	Scab Protein, Test weight	
Granger (2004 SDSU)	Yield	Straw strength
Knudson (2001 AgriPro)	Yield Leaf rust	Protein
Oklee (2003 U of MN)	Protein, Test weight	Straw strength

Small Grains Field Guide



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