PROGRESS REPORT ON GRASS SEED PRODUCTION RESEARCH

prepared by
N. Ehlke, D. Vellekson, and D.Grafstrom
Department of Agronomy and Plant Genetics
University of Minnesota
St. Paul, Minnesota 55108

Grass-Legume Seed Institute Presentation

Roseau, MN - February 18, 2015

This summary and previous annual summaries are on the Web at:

http://www.mnturfseed.org/html/progress_reports.html

Standard Management Practices for University of Minnesota
Perennial Ryegrass Seed Production Research Plots

General management regime of perennial ryegrass plots on the Magnusson Research Farm:

Spring seeded ryegrass with wheat

Ryegrass seeded at 5#/acre with spring wheat
Banvel+ 2,4-D amine (0.75 + 0.75 pint) applied in mid-September
Fertilize 30-30-30 mid-October
Fertilize 100-0-0 applied early to mid-May, 300 - 600 GDD
Banvel+ 2,4-D amine (0.75+0.75 pint) applied late May, 700 - 900 GDD
Tecoma or Assure (8-10 oz) applied early June, 800 - 1,000 GDD
Apogee (6-8 oz) applied early heading, 1,100 - 1,300 GDD
Quilt Excel (10 oz) applied full heading, 1,700 - 1,900 GDD

Fall seeded ryegrass in wheat stubble

Ryegrass seeded at 5#/acre after wheat harvest into existing stubble
Pre-harvest glyphosate application to wheat , or
glyphosate applied to wheat stubble prior to seeding ryegrass.
No broadleaf application in fall but other management for fall seeded ryegrass the same as spring seeded.

On-farm small plot research trials

All crop planting and general management are done by the grower/cooperator.
Application of treatment variables, agronomic notes and harvest by University of Minnesota personnel.
Cooperators will avoid applications of treatments involved in the study to the research plot area.

General ryegrass seed harvest procedure for small research plot

Measured areas are hand cut and bagged for each individual plot.
These samples are then brought to the U of M St.Paul campus where they are dried, threshed, cleaned and weighed.
Seed yields and other data are statistically analyzed and results summarized.

On-farm large plot trial research protocol

These experiments are conducted in fields with growers using standard best management practices.
University personnel design experiments with the goal of having a limited number (2 or 3) of treatment variables.
University agronomists work closely with the grower to initiate field trials and apply or monitor treatment applications.
Plant samples, crop development observations and other applicable notes
are recorded as needed throughout the growing season.
At harvest, University or local agronomists will assist the growers in collecting quality samples and recording data.

Highlights and new items to consider in ryegrass seed production management

Fertility- Higher application rates and possibly a split spring application of phoshorous maybe beneficial is soil level is low.
Sulfur(AMS) applications may have benefit some years even in the Roseau area.
Applying a mix of 10-15%ESN nitrogen with standard spring urea applications may have benefit.
Harrowing of spring planted ryegrass stands under small grain is generally beneficial.
Baling off small grain straw after harvest in spring planted ryegrass would reduce the need for harrowing and
also slightly reduce the nitrogen fertilizer rate needed for the following crop. Organic matter will be reduced,however,
and the need for the long term for nitrogen fertilization may increase.
Growth regulators- Apogee over 7-8oz./acre have diminished effects and may not be cost effective.
Adding 3 gallons of 28% UAN to Apogee and fungicide applications may have yield benefits.
Adding 2,4-D amine or MCPE late may have a yield effect but more study is needed to recommend proper application timing
Delaying swathing until seed moisture is 35% will produce the highest yields
but shattering losses potentially can increase quickly below this threshold.
Nortron applications can reduce impact of some problem weed and volunteer grain but may work unreliably under
certain climate conditions or lack of rainfall.

Table 1. Monthly and Year End Precipitation Totals*
Roseau ,Mn 1967-2014.

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Yearly Total(in.)	DEVIATION FROM MEAN	Park' blg. mean yield lbs/A
1967	1.13	0.39	0.59	2.89	0.89	2.23	4.95	1.69	0.83	1.11	0.70	1.76	19.16	-2.74	
1968	0.62	T	1.25	0.63	1.46	6.47	6.13	8.49	2.35	1.26	1.06	0.21	29.93	8.03	650
1969	3.07	0.11	0.05	1.27	3.31	2.29	3.70	4.28	3.29	1.91	0.30	0.73	24.31	2.41	488
1970	0.71	0.41	1.38	2.56	5.93	4.07	3.55	0.83	2.77	1.49	1.21	0.37	25.28	3.38	673
1971	0.54	0.13	0.26	1.50	2.24	2.29	3.58	0.69	3.33	2.97	0.29	0.50	18.32	-3.58	492
1972	0.68	0.76	0.50	0.70	1.66	5.03	1.92	1.53	4.22	1.40	0.38	0.32	19.10	-2.80	405
1973	0.09	0.17	1.18	0.90	2.46	2.21	4.04	2.09	5.67	1.19	0.67	0.75	21.42	-0.48	422
1974	0.88	0.87	0.16	2.72	4.12	1.56	2.56	11.00	0.42	0.66	0.15	1.40	26.47	4.57	642
1975	1.10	0.29	0.64	1.40	1.52	4.96	2.26	1.75	1.79	1.49	0.20	0.65	18.05	-3.85	504
1976	1.13	0.50	1.05	0.77	0.54	5.82	1.52	3.72	0.34	0.07	T	0.37	15.83	-6.07	146
1977	0.14	0.62	1.02	0.27	2.43	3.71	2.28	1.74	3.83	0.87	2.27	0.26	19.44	-2.46	140
1978	0.36	0.26	0.17	1.00	1.97	1.92	6.25	3.25	3.44	0.23	0.98	0.79	20.62	-1.28	507
1979	0.50	1.01	1.06	2.77	1.89	1.91	3.70	1.59	0.45	1.40	1.02	0.16	17.46	-4.44	415
1980	0.55	0.82	0.35	0.00	0.24	1.75	3.35	5.19	4.12	1.66	0.94	0.18	19.15	-2.75	62
1981	0.27	0.16	0.66	0.56	2.79	6.85	2.63	2.41	3.63	1.75	0.90	0.99	23.60	1.70	625
1982	1.30	0.45	0.74	0.24	1.38	2.00	5.53	2.71	1.92	2.91	0.46	0.57	20.21	-1.69	595
1983	1.31	1.26	1.17	0.53	2.76	4.03	1.62	3.34	2.91	2.26	0.66	0.10	21.95	0.05	605
1984	T	0.95	T	0.72	0.72	4.46	3.78	0.99	0.37	4.32	0.10	1.02	17.43	-4.47	613
1985	0.12	0.33	0.06	1.07	4.35	4.62	1.08	8.72	1.60	1.04	1.68	0.38	25.05	3.15	525
1986	0.30	0.90	0.26	2.96	1.40	2.43	3.59	2.04	2.52	0.65	1.97	0.36	19.38	-2.52	488
1987	0.47	0.30	0.10	0.59	4.37	2.25	4.80	2.22	0.82	0.92	0.73	0.35	17.92	-3.98	288
1988	0.60	0.09	1.75	0.00	1.74	1.34	5.53	1.70	2.24	0.12	0.77	1.05	16.93	-4.97	152
1989	3.27	0.32	2.86	0.10	2.82	5.46	1.60	2.56	1.24	0.41	0.62	0.45	21.71	-0.19	320
1990	0.55	0.20	1.12	1.09	0.46	3.19	2.48	0.62	0.91	0.16	0.18	0.72	11.68	-10.22	160
1991	0.56	0.64	0.58	2.87	3.19	5.94	3.40	1.99	7.42	1.64	1.36	0.70	30.29	8.39	210
1992	0.61	0.68	0.45	2.27	1.99	2.36	2.72	4.51	2.76	0.12	1.27	0.88	20.62	-1.28	630
1993	0.68	0.05	0.27	1.01	1.63	5.06	5.87	4.69	0.72	0.71	0.45	0.65	21.79	-0.11	490
1994	0.21	0.33	0.47	0.02	0.16	2.54	3.03	3.48	3.94	1.38	2.72	0.32	18.60	-3.30	230
1995	0.57	0.59	1.23	0.61	2.50	2.13	4.59	3.59	1.81	1.33	1.54	1.46	21.95	0.05	300
1996	0.94	0.48	0.22	1.65	4.62	1.64	7.34	1.78	1.77	1.75	2.73	1.07	25.99	4.09	250
1997	1.06	0.14	1.02	0.84	2.02	3.36	4.02	1.31	4.01	2.45	0.19	0.25	20.67	-1.23	350
1998	0.69	1.05	0.21	0.77	4.55	5.39	3.01	2.20	0.31	4.42	1.39	0.95	24.94	3.04	275
1999	0.15	0.77	0.23	1.31	4.09	6.97	3.46	1.38	3.16	0.43	0.38	0.56	22.89	0.99	400
2000	0.45	0.14	0.79	0.38	1.83	7.38	1.63	6.45	2.14	2.89	3.41	0.74	28.23	6.33	550
2001	0.21	0.52	0.46	1.89	3.27	1.76	4.74	1.40	0.72	1.76	1.50	0.56	18.79	-3.11	575
2002	0.19	0.10	0.45	1.44	2.79	9.94	2.96	4.47	1.62	1.02	0.30	0.54	25.82	3.92	300
2003	0.80	0.77	1.60	1.75	2.95	3.56	1.92	1.78	4.55	1.32	1.52	1.95	24.47	2.57	550
2004	2.85	0.70	2.14	2.61	8.19	2.98	2.42	5.50	2.97	2.36	0.08	1.33	34.13	12.23	650
2005	2.33	0.67	0.82	0.73	3.62	7.55	3.37	3.24	1.77	3.48	2.06	1.65	31.29	9.39	400
2006	2.52	0.95	1.01	1.23	1.97	1.00	0.94	2.18	2.42	1.54	0.17	0.56	16.49	-5.41	300
2007	0.44	0.56	1.25	0.95	2.75	7.75	2.92	1.37	0.92	5.14	0.39	0.86	25.30	3.40	200
2008	0.25	1.29	0.46	2.17	1.56	3.93	4.33	3.63	3.06	2.37	2.00	1.47	26.52	4.62	275
2009	1.25	1.75	4.45	1.37	3.59	3.72	1.28	3.92	2.67	1.06	0.28	1.22	26.56	4.66	375
2010	0.80	0.43	0.55	1.23	6.47	2.88	3.79	1.50	6.09	2.42	1.14	0.61	27.91	6.01	350
2011	1.15	0.20	0.23	3.14	2.63	3.87	2.38	1.63	0.89	1.34	0.19	0.07	17.72	-4.18	375
2012	0.59	1.06	2.06	1.39	1.48	3.32	2.74	1.42	0.18	3.64	1.22	0.24	19.10	-2.80	275
2013	1.34	1.21	1.05	1.40	4.69	1.70	2.14	3.77	2.65	0.84	1.43	1.85	24.07	2.17	375
2014	2.32	0.54	3.31	1.71	3.74	4.23	2.21	1.62	2.68	1.14	0.75	1.49	25.74	3.84	400
48 year average annual precipitation													**21.90**		

*Precipitation amounts used are from the Magnusson Research Farm-near Roseau May-October and Minnesota Climatology Working Group the remainder of the year.

Table 2.

2011 Kentucky Bluegrass Variety Trial
Magnusson Research Farm-2013-14

		Seed Yield						Harvest-2014			% Heading-2014						
	Seed	#/ac.			**% of Mean**												
Variety	lot	2014	2013	2013-14	2014	2013	**2013-14**	Ht.(In.)	Date	Lodging[1]	5/31	6/3	6/7	6/10	6/15	6/18	6/22
39140-06	1	343	343	343	75	86	**80**	24	7/12	4.3	0	0	3	24	45	80	100
39141-06	2	67	165	116	25	41	**27**	24	7/14	1.0	0	1	0	0	2	15	70
39130-06	3	325	38	181	40	10	**42**	19	7/14	4.3	0	0	1	9	24	63	96
39138-06	4	200	62	131	29	16	**31**	21	7/10	3.8	0	0	5	18	31	58	98
39098-06	5	681	630	655	143	158	**153**	28	7/9	4.3	0	8	14	45	69	91	100
39142-06	6	289	162	226	49	41	**53**	21	7/13	3.3	0	0	0	4	12	45	91
39087-06	7	336	469	403	88	118	**94**	29	7/10	3.0	0	0	0	9	31	63	99
39149-06	8	154	20	87	19	5	**20**	24	7/11	3.0	0	1	0	5	19	48	94
39157-06	9	612	768	690	151	192	**161**	27	7/11	5.8	0	0	11	35	61	89	100
39117-06	10	421	412	416	91	103	**97**	25	7/12	2.8	0	0	1	14	40	79	100
ORBM-11.0380	3958	721	641	681	149	161	**159**	33	7/9	3.0	0	3	29	50	80	96	100
ORBM-11.0373	3957	291	200	246	54	50	**57**	28	7/12	5.8	0	0	8	25	55	80	100
ORBM-11.0383	3959	414	340	377	82	85	**88**	31	7/11	5.0	0	1	14	35	60	81	100
KBG-10.0537	3954	643	814	729	159	204	**170**	28	7/9	3.8	0	15	26	55	81	99	100
Park	3888	481	668	574	125	167	**134**	33	7/9	4.8	8	20	68	75	98	100	100
Dragon	3671	863	574	719	157	144	**168**	27	7/9	3.0	0	2	28	48	85	100	100
A99-3124	3897	668	547	607	133	137	**141**	24	7/16	1.8	0	0	0	3	13	48	90
Abbey	3608	730	336	533	116	84	**124**	26	7/10	1.8	0	0	4	13	34	76	100
LSD @ 5% level		91	97	61	20	24	**14**	2	3	2.2	1	10	5	9	12	10	9
CV(%)		14	17	10	14	17	10	6	17	44	163	256	33	24	18	10	6

Experimental Design: RCB w/4 reps
Mean seed yield 2013= 399 #/ac.
Mean seed yield 2014= 458 #/ac.
[1]-Lodging-1=no lodging; 9=flat

Management:
All plots burned 8/16/2013
120-40-40-8s applied 10/18/13
.75pt. 2,4-D+.75pt Clarity applied 9/25/13
3 oz. Tilt applied 6/8/14

Table 3.

2012 Fine Fescue Variety Trial

Magnusson Research Farm- 2013-14

					Seed Yield(#/ac.)		Harvest			% Heading					
	Cultivar	Fescue Species	Company	Lot	**2013**	**2014**	Date	Ht.(in.)	Lodging[1]	5/31	6/3	6/7	6/10	6/15	6/18
1	Bridgeport II	Chewings	Barenbrug	M20-11-DF229	**194**	**545**	7/14	35	6.8	0	7	43	50	79	100
2	Culumbra II	Chewings	ProSeeds Marketing	Z2-10-10	**198**	**830**	7/14	35	7.3	0	16	49	65	88	100
3	Enchantment	Chewings	Pure Seed	M65-9-4CH6-F-1	**105**	**583**	7/14	34	7.3	0	8	38	55	84	100
4	J-5	Chewings	Jacklin Seed by Simplot	B09-10	**220**	**632**	7/14	33	6.3	1	13	48	55	81	100
5	Longfellow III	Chewings	DLF International		**85**	**1072**	7/14	34	8.0	1	14	45	58	85	100
6	PSG 50C3	Chewings	Seed Research of Oregon	BLK-L5-08N-09	**180**	**1137**	7/14	34	8.0	0	11	33	63	89	100
7	PSG SPRS	Chewings	Seed Research of Oregon	BLK-26-14-09EABC-09	**227**	**890**	7/14	35	7.8	0	14	38	58	86	100
8	Radar	Chewings	Peak Plant Genetics		**247**	**854**	7/14	33	7.5	1	15	40	58	86	100
9	Windward	Chewings	Seed Research of Oregon		**154**	**1001**	7/14	34	7.8	0	15	43	68	91	100
10	Wrigley 2	Chewings	DLF International		**138**	**837**	7/14	34	7.3	0	13	40	60	84	100
11	Azay Blue	Blue hard	Seed Research of Oregon	BLK-1-06E-08	**56**	**959**	7/11	29	3.0	48	71	79	88	100	100
12	Barok	Sheep	Barenbrug	H4-11-00812	**4**	**679**	7/11	25	7.0	23	45	60	78	91	100
13	Barpreza	Sheep	Barenbrug	6911	**5**	**392**	7/11	26	2.0	8	30	50	78	90	100
14	Bighorn GT	Hard	Pure Seed	M65-11-4BU3-R	**26**	**725**	7/11	29	3.5	28	58	68	75	90	100
15	Blueray	Hard	Peak Plant Genetics		**16**	**785**	7/11	26	2.8	26	50	61	78	90	100
16	Hardtop	Hard	Barenbrug	H4-11-00911-A	**24**	**685**	7/11	32	2.8	35	63	78	83	95	100
17	MNHD	Hard	University of Minnesota		**69**	**1213**	7/11	28	4.5	35	60	71	83	94	100
18	PSG 3TH3	Hard	Seed Research of Oregon		**49**	**774**	7/11	28	4.3	43	63	73	78	94	100
19	Soil Guard	Hard	Pure Seed	M65-10-4CU3-R	**38**	**877**	7/11	29	2.5	28	55	73	78	91	100
20	SR 3210	Blue hard	Seed Research of Oregon		**111**	**1046**	7/11	31	6.3	60	80	90	95	100	100
21	07-1 FF	Creeping red	Seed Research of Oregon	BLK-SO-08E-10	**256**	**340**	7/14	30	6.3	0	1	8	20	53	100
22	BRJDT	Strong creeping red	Seed Research of Oregon	BLK-54-11E-11-CTBT	**360**	**289**	7/14	32	5.0	1	3	13	25	55	100
23	Cindy Lou	Strong creeping red	DLF International		**196**	**409**	7/14	30	5.5	0	3	14	25	58	85
24	Contender	Strong creeping red	Barenbrug	L187-9-1CRF	**234**	**327**	7/14	30	4.8	0	6	23	31	58	85
25	Epic	Strong creeping red	ProSeeds Marketing	M85-11-15	**127**	**247**	7/14	31	4.8	0	1	9	23	55	83
26	OR C126	Strong creeping red	Seed Research of Oregon	2011-CTBT	**425**	**347**	7/14	30	3.5	0	2	11	30	53	80
27	PPG-FRR 103	Strong creeping red	Peak Plant Genetics		**156**	**243**	7/14	28	3.5	0	2	10	25	53	75
28	PSG 5J5115 L	Strong creeping red	Seed Research of Oregon		**174**	**320**	7/14	28	3.3	0	1	5	25	55	78
29	PSG 5J5115E	Strong creeping red	Seed Research of Oregon		**176**	**312**	7/14	27	2.8	0	3	8	25	55	83
30	Shademaster III	Strong creeping red	Pure Seed	M65-10-48Y7-F	**80**	**289**	7/14	28	3.5	2	3	10	30	63	80
				LSD @5% level	**70**	**151**	0	2	1.6	6	8	12	9	7	5
				CV(%)	34	16	0	4	22	39	22	21	12	7	4

Seeding date- 5/1/2012 @5#/acre

[1]-lodging- 1=upright;9=flat

Management: Residue baled off after harvest

2pt Curtail M+.5pt Clarity 9/29/2013

Fertilizer applied 10/18/2013:90-30-30-5s

Table 4

2011-12 Tall Fescue Variety Trial- 2012-14 Data

Crookston- NWROC University of Minnesota

Roseau- Magnusson Research farm-Roseau,Mn

				Seed Yield-- Lbs/Ac.								Crookston Harvest-2014		
					Crookston[2]			Roseau						
Variety	Lot#	Seed Yield % of Mean[1]	2 yr. Mean[1]	2014	2013	2013-14	2014	2013	2012	2012-14	2012-13	Lodging[3]	Ht.(in.)	maturity[4]
1 PSG 85 P1	3952	**97**	**1097**	**1296**	1350	1323	274	902	840	672	871	1.8	34	17
2 Speedway	3950	**108**	**1216**	**1310**	1437	1373	185	1094	1022	767	1058	1.5	32	18
3 Brockton	3944	**97**	**1096**	**1236**	1261	1249	283	920	967	723	943	1.5	35	18
4 Kentucky 31	3947	**91**	**1024**	**913**	1198	1056	461	1212	771	815	991	4.0	42	15
5 Crossfire 3	3948	**94**	**1058**	**1120**	1386	1253	296	876	851	674	863	1.3	32	18
6 Mustang 4	3949	**97**	**1095**	**1330**	1341	1335	332	773	936	680	854	3.3	32	18
7 D3- WH*	3943	----	----	----	----	----	278	1007	1005	764	1006	NA	NA	NA
8 Greystone	3946	**94**	**1060**	**1076**	1352	1214	183	900	913	665	907	3.3	33	19
9 Durana	3945	**114**	**1281**	**1265**	1553	1409	241	1210	1098	849	1154	2.0	35	19
10 SR 8650	3951	**107**	**1205**	**1274**	1606	1440	212	936	1002	717	969	1.5	35	17
11 Hidden Valley*		----	----	528	570	549	----	----	----	----	----	7.3	37	13
LSD @5% level		**12.5**	**141**	**282**	326	237	111	166	144	90	139	1.9	3	1
CV		8.9	8.9	17	17	13.4	27	11.7	10.5	8.4	10	47	6.1	3.8

Experimental Design: RCB w/4 reps

2 Year average-all varieties-1126#/acre

Tall fescue at 6#/ac. with spring wheat

Roseau - 5/22/2011 ; Crookston 4/20/2012

Plot size= 5' x 20'

Management- residue burned within 10 days after harvest

Fertility:

2014 harvest--30-30-30 in September + 120-0-0 in early May

2013 harvest--30-30-30 in September + 100-0-0 in late April

2012 harvest-- 10/22/2011 -110-34-40-8s

3/4pt. 2,4-D + 3/4pt. Banvel in late September

*Hidden Valley Crookston location only;D3-WH (U of M experimental) Roseau location only

[1]Roseau/Crookston- Mean of 2012-2013 seed yield at Roseau + 2013-14 seed yields from Crookston--Mean=1126#/acre

[2]Crookston had a visually estimated 20% seed shatter prior to harvest in 2013

[3]Lodging-1=no lodging;9=flat

[4]-maturity date 2014-(July) Crookston. Actual harvested 7/18/2013, 7/19/2014

Table 5.

2013 Perennial Ryegrass Seed Production Variety Trial
Magnusson Research Farm-Roseau,Mn

			Seed yield		% Heading					RCI[1]		Ht.	Color[2]
Source	Variety	Seed lot	**% mean**	#/ac	6/12	6/15	6/18	6/22	6/27	6/17	8/11	Harvest	8/11
McCarthy	DN-08	3889	**115.5**	1586	1	4	20	50	88	610	130	20	5
McCarthy	Stardust	3995	**115.2**	1582	4	10	34	64	91	632	127	19	5
U of M	MSPxA.Green/Ragnar	3973	**114.2**	1568	2	3	23	63	94	668	155	22	6
McCarthy	C-35	3988	**109.3**	1501	2	5	20	49	85	653	172	20	6
U of M	Green Emperor	3976	**108.5**	1490	2	4	16	45	85	629	156	20	5
U of M	Arctic Green	3985	**104.3**	1432	3	8	23	55	93	595	125	22	4
McCarthy	Seductive	3993	**104.2**	1430	3	8	25	51	83	625	139	19	4
McCarthy	Excellence	3990	**100.4**	1379	5	10	25	59	89	649	132	19	5
McCarthy	Vintage	3996	**99.3**	1363	4	9	26	55	86	597	171	20	6
McCarthy	GPR	3991	**99.1**	1361	0	3	13	35	79	609	137	20	5
U of M	Ragnar II	3987	**95.8**	1316	3	13	45	88	100	620	129	27	4
McCarthy	ST-12	3994	**94.1**	1292	10	20	41	79	95	580	141	21	5
U of M	Royal Green	3982	**92.9**	1276	1	4	21	61	92	533	150	24	5
McCarthy	Provocative	3992	**91.7**	1259	2	2	9	35	79	601	152	20	6
check	Brightstar SLT	3977	**88.4**	1214	3	6	19	48	85	568	152	21	6
U of M	Spreader III	3791	**86.2**	1183	1	2	13	24	76	584	201	21	8
check	NK-200	3917	**80.8**	1109	1	4	8	28	68	548	146	25	6
	LSD @5% level		**10.6**	145	3	4	14	16	8	74	28	1	2
	CV(%)		7.4	7.4	72	45	44	22	6	9	13	4	23

Experimental Design:RCB with 4 Reps

Ryegrass planted 5/24/2013 with YB Soren wheat

[1]RCI(relative chlorophyll index)-higher number means more chlorophyll.

[2]Color- Visual score of greenness- 1=brown;9=dark green

Trial mean seed yield= 1373#/acre

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 6.

2013 Perennial Ryegrass Winter Hardiness Variety Trial
Roseau,Mn-Seeded 9/4/2013,St.Paul-Seeded 9/17/2013

			Vigor*	Winter Injury**		
Source	Variety	Seed lot	Roseau	Roseau	St.Paul-4/22	**Mean**
U of M	Arctic Green	3997	2.8	4.0	1.5	**2.7**
check	Brightstar SLT	3977	3.0	5.8	2.3	**4.0**
U of M	Forageur	3942	3.0	4.0	1.3	**2.6**
Pickseed	PRWH2-12	4002	1.3	5.3	1.8	**3.5**
Pickseed	PRWH4-12	4003	0.5	4.5	1.8	**3.1**
U of M	Green Emperor(MSP)	3976	2.0	3.8	1.3	**2.5**
U of M	MSPxA.Green/Ragnar	3999	1.0	4.8	1.0	**2.9**
check	NK-200	3917	3.0	3.3	1.5	**2.4**
Pickseed	PRWH11-3	4004	3.3	3.8	1.5	**2.6**
check-pic	Quebec	4006	2.8	4.8	1.3	**3.0**
check	Gulf(annual)	3983	5.0	9.0	7.8	**8.4**
U of M	Spreader III	3791	2.8	5.5	1.5	**3.5**
U of M	Royal Green	3982	3.5	4.5	1.3	**2.9**
U of M	Spreader x A.Green	4000	1.0	6.0	1.3	**3.6**
Pickseed	08-20LpAB	4005	1.8	5.8	1.3	**3.5**
U of M	Green Emperor x A.Green	4001	0.8	5.5	1.3	**3.4**
	LSD @ 5% level		1.0	1.7	0.6	**0.9**

Experimental Design:RCB with 4 Reps

Seeding Rate= 8#/acre

*Vigor/ Emergence 9/11/2013 ,0= none emerged; 5= all emerged(all emerged 10/1/2013)

** Winter Injury; 1=none; 9=dead-;St.Paul 4/22/2014 ; Roseau 5/16/2014

Table 7.

2013-2014 AGROTAIN® Ultra Application to Perennial Ryegrass

2014-Roseau area and 2013-Lake of the Woods area

Large plot trial- 70' x 2600' --Harvested area-48' x 500'

Treatments=

Spring nitrogen applications of standard rate urea vs.standard rate urea + AGROTAIN® vs. standard urea rate+30#N.

Fertilizer	Seed Yield- #/acre[1]		**Seed yield % of mean**	Lodging[2]			Tissue samples
Treatment	2014	2013	**2013-14**	2014	2013	RCI[3]	%Nitrogen[4]
Standard-N-urea	1423	1200	**98.5**	6.3	3.6	501	1.7
Standard + Agrotain®	1411	1266	**100.5**	7.3	4.3	559	1.8
Standard + 30# N-urea	1467	1225	**101.0**	7.7	4.3	508	2.0
LSD @20% level	47	NS	NS	0.7	0.7	35	0.19

Experimental design- RCB with 3 reps

[1]Clean seed yield

[2]Lodging;1=erect, 9=flat

[3]RCI=Relative chlorophyll index 7/23/2014

[4]Whole plant tissue samples taken at flowering- 7/21/2014

All applications,general crop management and harvest done by growers

Roseau location-2014

Dahlgren Farm-south of Roseau- variety-Sun

Grower application-5/24/2014- vegetative stage-3" ht.(.5" rain on 5/24 +.5" rain on 5/25).

Standard fertility rate=125-30-0

Soil test- 5/19/2014--- NO3-N 0-24" = 28#/ac.

Lake of the Woods location-2013

Tveit Farm-north of Roosevelt-variety-Accent II

Grower application- 5/28/2014-vegetative stage -4" ht.

Standard fertility rate=120-0-0

Soil test- 5/9/2013--- NO3-N 0-24" = 66#/ac.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 8.

2013- 2x Phosphorous and Potassium applied to Ryegrass in the Fall

Byron Tveit Farm- North of Roosevelt,Mn

Treatments applied 11/12/2013 with commercial equipment-Williams Elevator

Compare standard fall Phosphorous and Potash(8-40-40) fertilizer application to a 2X rate.

2X rate will just be an additional pass by the applicator at full rate on the 3 reps.

Fertilizer	Seed Yield- #/acre[1]		Tissue samples[3]		
Treatment	2014	RCI[2]	%N	% P	%K
8-40-40	945	335	1.7	0.29	1.2
16-80-80	1103	313	1.6	0.29	1.1
LSD @20% level	NS	NS	NS	NS	NS

Experimental design- RCB with 3 reps(poor area in middle -only used 2 reps)

[1]Clean seed yield

[2]RCI=Relative chlorophyll index 7/23/2014

[3]Whole plant tissue samples taken at flowering- 7/23/2014

Standard fertilizer = (8-40-40) or 77#- 11-52-0(MAP)+ 67#- 0-0-60

Fertilizer treatments applied by 70' air flow(Terragator type) applicator

8-40-40 applied to entire area 11/12/2013

Plot applications= 70'x2000'. Harvest yields taken on 48'x1720' area. (24' swathed down and back)

All other field operations done uniformly to entire field by grower using best management practices.

Table 9.

2013-14 Perennial Ryegrass Fertility Trial

F2B Magnusson Research Farm

	Total	Nitrogen	2014 Seed Yield		Yield as % of mean			Harvest			RCI[1]				
Trt. #	Nitrogen	Application timing	#/acre	%mean	2013	2012	2011	Ht.(in.)	Lodging[3]	Date	6/17	6/27	7/3	7/7	8/11[2]
1	100+0+0	Split*	1232	**91.7**	96	112	108	21	3.0	7/5	491	596	387	405	124
2	140+0+0	Split*	1399	**104.1**	104	118	118	21	3.3	7/7	470	596	423	457	145
3	140+0+0+20s	Split**	1479	**110.0**	99	----	----	21	6.3	7/6	437	588	504	461	125
4	180+0+0	Split*	1639	**121.9**	111	----	----	21	6.3	7/7	552	662	447	462	159
5	100+0+0	spring	1276	**94.9**	93	96	108	20	1.8	7/5	402	510	422	463	156
6	140+0+0	spring	1285	**95.6**	104	119	115	21	2.3	7/5	399	584	418	451	144
7	100+0+0	Fall	907	**67.5**	93	83	110	19	1.0	7/5	388	450	276	335	112
8	140+0+0	Fall	1290	**96.0**	100		119	20	2.3	7/6	475	581	392	439	130
9	140+0+0	(8-80-40)Split*	1439	**107.1**	----	----	----	21	5.0	7/5	588	587	473	512	141
10	140+0+0	8-40-40(9/25/13) split*	1354	**100.7**	----	----	----	21	3.3	7/5	359	516	424	449	155
11	140+0+0	30-40-40(9/25/13) split*	1361	**101.3**	----	----	----	21	3.0	7/6	352	498	416	459	171
12	140+0+0	(8-40-40)+(0-40-0spring)Split*	1613	**120.0**	----	----	----	21	4.5	7/5	479	632	508	447	149
13	140+0+0	(spring 8-80-40)Split*	1461	**108.7**	----	----	----	21	5.3	7/6	546	655	489	462	147
14	140+0+0	(spring 8-40-40)Split*	1463	**108.9**	----	----	----	22	5.8	7/6	534	668	417	470	143
15	100+0+0	Split*+(50spring+20liq)	1098	**81.7**	----	----	----	20	1.8	7/5	374	510	387	420	141
16	140+0+0	Split*+(90spring+20liq)	1421	**105.7**	109	----	----	20	3.3	7/5	451	612	439	463	142
17	100+0+0	Spring residue removal/split*	1294	**96.3**	----	----	----	20	2.3	7/6	437	535	405	402	135
18	140+0+0	Spring residue removal/split*	1439	**107.1**	----	----	----	21	4.8	7/6	480	629	497	470	145
19	140+0+0	*NO added P OR K(splitN)*	1094	**81.4**	----	----	----	19	1.8	7/5	267	492	368	417	184
20	0	0	361	**26.9**	28	21	36	14	1.0	7/5	166	280	146	179	132
		LSD @5% level	152	**11.3**	16	11	12	1	1.8	1	130	113	66	56	27
		CV(%)	8.3	**8.3**				4	39	12	21	14	11	9	13

Experimental design=RCB with 4 reps

Variety=Arctic Green

2014 Trial mean(excluding 0-N fertilizer)=1344 #/ac.

*Split-30# N applied 10/22/2014 Spring applications=5/19/2014

**Split-30#N-20#N ammonium sulfate+10#N urea applied 10/22/2013

[1]RCI-Relative Chlorophyll Index; higher number = more chlorophyll

[2]All readings are from crop canopy except the 'cut area' on 8/2 which has readings

[3]-Lodging-1=Erect,9=flat

Soil test results- 10/17/2013		
0-6"	P-Olsen	4ppm
0-6"	K	100ppm
0-6"	PH	8.3
0-6"	NO3-N	3.4ppm
6-24"	NO3-N	2.7ppm

Soil test results- 10/22/2014		
TRT#2	P-Olsen--5ppm	NH_4OAc-K--114ppm
TRT#9	P-Olsen--7ppm	NH_4OAc-K--104ppm
Trt#19	P-Olsen--2.5ppm	NH_4OAc-K--106ppm

Trt. #	Explanation of fertility treatments October 2013;May-June 2014
1	30-40-40 applied 10-22 / 70-0-0 applied 5-19
2	30-40-40 applied 10-22 / 110-0-0 applied 5-19(Standard)
3	30-40-40-20s applied 10-22 / 110-0-0 applied 5-19
4	30-40-40 applied 10-22 / 150-0-0 applied 5-19
5	8-40-40 applied 10-22 / 92-0-0 applied 5-19
6	8-40-40 applied 10-22 / 132-0-0 applied 5-19
7	100-40-40 applied 10-22
8	140-40-40 applied 10-22
9	30-80-40 applied 10-22 / 110-0-0 applied 5-19
10	8-40-40 applied 9-25 / 132-0-0 applied 5-19
11	30-40-40 applied 9-25 / 110-0-0 applied 5-19
12	30-40-40 applied 10-22 / 110-40-0 applied 5-19
13	30-0-0 applied 10-22 / 110-80-40 applied 5-19
14	30-0-0 applied 10-22 / 110-40-40 applied 5-19
15	30-40-40 applied 10-22 / 50-0-0 applied 5-19 / 6 gal. 28%UAN applied 6-20
16	30-40-40 applied 10-22 / 90-0-0 applied 5-19 / 6 gal. 28%UAN applied 6-20
17	30-40-40 applied 10-22 / 1 ton/ac. residue removed 5-17 / 70-0-0 applied 5-19
18	30-40-40 applied 10-22 / 1 ton/ac. residue removed 5-17 / 110-0-0 applied 5-19
19	30-0-0 applied 10-22 / 110-0-0 applied 5-19
20	No fertilizer

Table 10.

2013-14 Date of Swath- Perennial Ryegrass

Roseau,Mn

		2014							2013 Data		
	Cut	Seed Yield- % of mean			Moisture[1]		Test weight-#/bu.[2]		Cut		Seed Yield
Trt#	Date	Mag	Rice	mean	Mag	Rice	Mag	Rice	Date	Moisture[1]	% of Mean
1	7/30	100.7	93.0	96.9	44	47	28.2	28.7	7/22	44	86.1
2	8/1	91.2	93.8	92.5	41	45	29.0	29.3	7/24	43	93.1
3	8/3	107.5	107.5	107.5	39	41	29.2	29.5	7/26	44	105.8
4	8/5	104.7	110.2	107.5	36	39	29.5	30.2	7/28	38	108.4
5	8/7	120.2	123.1	121.7	31	37	29.9	30.6	7/31	36	113.2
6	8/9	89.3	98.5	93.9	23	33	30.3	31.7	8/7	28	93.6
7	8/12	86.6	91.0	88.8	19	22	30.6	31.2	----	----	----
8	8/15	----	82.9	----	----	14	----	30.9	----	----	----
LSD @ 5%		8.8	14.8	6.2							14.6
CV(%)		4.9	8.5	3.4							9.7

Experimental Design- RCB with 3 reps

[1]Moisture-Seed moisture determined by sub sample microwave drying.

[2]Test weight-#/bushel- -Clean seed test weights corrected to 12.5% moisture

Mean seed yield(#/acre)=2013 - 931 ; 2014 MagPlots - 1368 ;Rice Farm -1348

<u>Trial Locations-</u>

2013-Mag=Magnusson Farms 2 mi. west and 2 mi. north of Roseau- var. Arctic Green

2014-Rice= Rice Farms- var. Royal Green; Magnusson Research farm-var. Arctic Green

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 11.

2014 Fungicide Trial- 'Integra' Perennial Ryegrass
Magnusson Research Farm- F4

			Seed Yield	test wt	Crown rust[1]	RCI[2]	Color[3]
Trt.#	Fungicide treatment	Rate	**#/acre**	#/bu	at harvest	12-Aug	12-Aug
1	No treatment		**1372**	27.1	3.8	134	3.0
2	No treatment+3gal28%N		**1357**	27.0	4.0	144	3.5
3	Quilt Excel+3gal 28%N	10.5 oz.	**1515**	29.2	1.0	156	5.5
4	Priaxor+3gal 28%N	6 oz.	**1493**	28.6	1.3	170	7.0
5	Stratego YLD+Folicur+3gal 28%N	5.4oz.+5.4oz.	**1493**	28.1	1.0	181	7.0
6	Folicur+3gal 28%N	5.4oz.	**1446**	27.6	1.5	174	6.0
	LSD @5% level		**116**	1.5	1.3	20	2
	CV(%)		5	4	42	8	25

Experimental design=RCB w/4 reps Harvest date 8/7/2014

[1]Crown rust-visual rating at harvest-incidence/severity ;1=no rust, 9=severe rust

[2]RCI-Relative chlorophyll index- higher number =more chlorophyll

[3]Color-visual rating post harvest- 1=brown; 9=green

Applications made- 7/5/2014 83F PTLY CLDY 72%RH, wind wsw 5-10mph 2:15pm

22" height fully headed

Table 12.

2014 Liquid N Treatments applied to Arctic Green Per.Ryegrass
Magnusson Research Farm

Trt#	Application*	Seed yield #/acre	Lodging[1] at harvest	RCI[2] 6/17	RCI[2] 8/12	Color[3] 8/12
1	No treament	**1441**	3.0	567	188	4.5
2	12gallons 28%N --6/10	**1570**	4.8	483	229	7.5
3	24gallons 28%N --6/10	**1686**	7.3	488	256	8.0
4	12gallons 28%N +12gpa water-6/13	**1488**	5.0	434	235	7.0
5	12gallons 28%N +12gpa water-6/20	**1437**	6.0	596	210	7.5
	LSD @5% level	**170**	2	95	50	2
	CV(%)	7	25	12	14	19

Experimental design=RCB w/4 reps

Fertility=30-30-30-5s in fall + 100-0-0 in spring and best management practices on all plots.

*Treatment applications made with bicycle sprayer with flat fan 11002 nozzels @ 28PSI.

Treatments 2,3 were straight, undiluted 28%UAN

Treatments 4,5 were 28%UAN + 12GPA water

6/10= ryegrass at 4 node stage(vegetative) wind ssw 10-15 64F

6/13= ryegrass trace heading-70F

6/20= ryegrass 60% headed wind SSW 8-10 60F

[1]Lodging-1=no lodging;9=Flat

[2]RCI-Relative chlorophyll index- higher number =more chlorophyll

[3]Color-visual rating post harvest- 1=brown; 9=green

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 13.

2013-14 Nortron Applications to Integra Perennial Ryegrass
Magnusson Research farm

Trt#	Treatment	Rate	Seed yield #/ac.	Harvest Lodging[1]	Harvest Ht.(in.)	Ryegrass stand	volunteer wheat control[2]
1	Nortron	2 pt.	**1667**	4	21	91	92
2	Nortron only	2 pt.	**1629**	4	20	96	96
3	Nortron	4 pt.	**1694**	3	21	100	96
4	2,4-D+Clarity only	.75pt+.75pt	**1715**	4.7	20	96	30
5	Nortron late	2 pt.	**1561**	3.7	20	100	100
6	Spring	2pt	**1650**	4.7	21	100	100
7	No Treatment		**1463**	3	22	96	0
	LSD @5% level		**216**	NS	1	NS	33
	CV(%)		7	34	3	12	26

Experimental design=RCB w/3 reps

Harvested-8/7/2014

[1]Lodging-1=Erect;9=Flat

[2]volunteer wheat control- visual rating-0=no control;100= complete control

9/25/2013 all plots treated with 3/4pt. 2,4-D+3/4 Pt. Clarity- 55F S5mph

EXCEPT #2 &#7 received no 2,4-D+Clarity

10/16/2013 sunny 50F good soil moisture NW10mph

spring plant ryegrass well tillered with good growth

5/7/2014 12:00 ptly cldy 52F wind 5-10 ENE

Ryegrass just starting to green up

Table 14.

2014 '1500# by 2015'--Added Fertility to Standard Management Practices
Arctic Green Per.Ryegrass-Magnusson Plots-northwest of Roseau,Mn

Trt#	Broadleaf[6] 6/3/13	Grass[7] 6/10/13	Apogee[8] 6/17/13	Quilt Xcel[9] 7/9/13	Seed Yield #/acre	Seed Yield % mean	Harvest Ht.	Harvest lodging[1]	Color[5] 11-Aug	RCI 8-Jul	RCI 11-Aug	Additional Dry Fertilizer
1	Yes	Yes	Yes	Yes+N	**1539**	**100**	21	5.5	5.0	467	153	None
2	Yes	Yes	Yes+N	Yes+N	**1604**	**104**	17	5.0	7.0	489	166	None
3	Yes	Yes+N	Yes	Yes+N	**1461**	**95**	21	4.8	7.5	486	190	None
4	Yes+N	Yes+N	Yes+N	Yes+N	**1408**	**91**	21	4.5	6.5	493	173	None
5	Yes	Yes+N	Yes+N	Yes+N	**1526**	**99**	21	3.8	7.0	489	186	None
6	Yes	Yes	Yes	Yes	**1517**	**98**	21	5.5	5.0	461	148	None
7	Yes	Fusilade[4]	Yes	Yes+N	**1417**	**92**	21	3.0	7.5	484	196	None
8	No	No	No	No	**1434**	**93**	25	8.3	3.0	397	132	None
9	Yes	Yes+N	Yes+N	Yes+N	**1761**	**114**	22	7.0	7.5	531	175	add 30-40-30-10s (20# ESN)[2]
10	Yes	Yes+N	Yes+N	Yes+N	**1744**	**113**	21	7.0	6.5	544	172	add 30-40-30 (20# ESN)[2]
11	Yes	Yes+N	Yes+N	Yes+N	**1539**	**100**	21	5.8	8.8	461	203	spray on 40#N UAN 6-20-2014[2]
			LSD @5% level		**188**	**12**	4	1.5	1.7	57	30	
			CV(%)		8	8	13	19	18	8	12	

Experimental design=RCB w/4reps
Seed Yield mean=1541#/acre
Harvest date-8/8/2014

Soil test results: 10/22/2013

Olsen P (ppm)	NH_4OAc-K (ppm)	LOI OM (%)	Water pH
4	100	2.8	8.3

[1]-Lodging-1=no lodging;9=flat
[2]-Fertilizer applied 5/21/2014
[3]-RCI -Relative Chlorophyl Index- Higher number= more chlorophyl
[4]-Fusilade - Fusilade in not a labeled treatment on ryegrass
[5]-Color- 1=brown-9=dark green- Post harvest

Pesticide application rate and timing:

[6]-Broadleaf-2,4-D .75pt +Clarity .75pt. 6/3/13--ht.= 3-6" 1 node 53F wind e10-15mph
[7]-Grass-Assure II(except Fusilade trt#11) 6/10/14 wind ssw 10-15mph ryegrass jointed
[8]-Growth Regulator-Apogee 6/18/2014 wind SSW 8-12mph 9am- 5% headed
[9]-Fungicide-Quilt Excel 7/10/2014 wind s 5-10 10:30am 72F
fertilizer applied 5/21/2014
Assure/Fusilade 6/10/14 wind ssw 10-15mph ryegrass jointed
2,4-D+Clarity 6/14/14 wind n5 mph ryegrass late joint-
Apogee 6/18/2014 wind SSW 8-12mph 9am- 5% headed
4oz./ac. Folicur added with all Apogee trts.
Quilt Excel 7/10/2014

Trade name	Rate per acre + adjuvunt	common name	#AI/Gal.
2,4-D	.75pt.	2,4-D amine	4
Clarity	.75pt.	dicamba	4
Assure II	10oz.+.25%NIS	quizalofop	0.88
Apogee	8oz.+.25%NIS+2.5% UAN	prohexadione	27.5%DF
Quilt Excel 2.2se	10.5oz.	propiconazole+azoxystrobin	1.02+1.18
Fusilade DX	12oz.+1%COC	fluazifop	2
N-PAK 28	2.5% solution or 3 gal.(+N)	UAN nitrogen(L)	3.3#

Table 15.

2012-14 Summary of the Seed Yield Effect of Liquid N added to Standard Ryegrass Pesticide Applications at 5 Roseau Area Locations* Over 2 years

					2012-14	**2014**	2013		2012	
					Overall	MagPlots	Magnusson	Dahlgren	Erickson	MagPlots
Trt.#	Broadleaf[1]	Grass[2]	Apogee[3]	Fungicide[4]	---------- Seed Yield as % treatment means----------					
1	Yes	Yes	Yes	Yes	**95.4**	101	96	95	94	91
2	Yes	Yes	Yes	Yes+N	**99.0**	103	94	105	100	93
3	Yes	Yes	Yes+N	Yes+N	**106.4**	107	95	105	110	115
4	Yes+N	Yes	Yes+N	Yes+N	**99.2**	----	97	96	103	101
5	Yes+N	Yes	Yes	Yes+N	**99.5**	----	98	100	100	100
6	Yes	Yes+N	Yes	Yes+N	**104.6**	98	112	103	104	106
7	Yes+N	Yes+N	Yes+N	Yes+N	**96.8**	94	91	96	99	104
8	Yes	Yes+N	Yes+N	Yes+N	**100.7**	102	95	105	----	----
9	NO	NO	NO	NO	**93.8**	96	106	94	87	86
		LSD @5% level			**10**	11.5	19.7	NS	17.0	13.4
		#/acre Seed Yield mean of each trial =				1498	950	1121	970	1358

Experimental Design-Randomized complete block with 4 replications

*Locations/variety- 2012 Erickson farm -NW of Roseau- variety- Cutter II

2012 Magnusson research farm NW of Roseau-variety- Arctic Green

2013 Dahlgren farm south of Roseau-variety-Sun

2013 Magnusson farms west of Roseau-variety-Arctic Green

2014 Magnusson research farm NW of Roseau-variety-Arctic Green

[1]-Broadleaf application- 3/4pt. 2,4-D+3/4pt. Clarity with(+3 gal.28% UAN) and without added UAN

[2]- Assure II or Tecoma (Puma)with(+3 gal.28% UAN) and without added UAN

[3]-Apogee 5-8 oz. + .25%NIS+2.5%UAN with(+3 gal.28% UAN) and without added UAN

[4]-Quilt Excel 10.5 oz. with(+3 gal.28% UAN) and without added UAN

Trade name	Rate + adjuvunt	Common name	#AI/Gal.
2,4-D	.75pt.	2,4-D amine	4
Clarity	.75pt.	dicamba	4
Assure II	10oz.+.25%NIS	quizalofop	0.88
Tecoma	10oz.	fenoxaprop	1
Apogee	8oz.+.25%NIS+2.5% UAN	prohexadione	27.5%DF
Quilt Excel 2.2se	10.5oz.	propiconazole+azoxystrobin	1.02+1.18
N-PAK 28	3 gal. -28% urea ammonium nitrate(UAN)-3#N/gal		3.3#N

Table 16a.

2014 Herbicide Applications on Spring Wheat with Underseeded Ryegrass
Magnusson Research Farm

Trt#	Treatments/Rates/Adjuvunts:	%Stand* 10/23/2014
1	Affinity tank mix .9oz+.5ptmcpe+1pt NIS	88
2	Affinity tank mix .9oz+.5ptmcpe+.75oz.Everest+.1pt NIS+3pt 28%N	75
3	Bison Advance 3/4pt+Everest2.0 .9oz.+1pt NIS	83
4	Bison Advance 3/4pt+1.5pt Assert+1pt NIS	92
5	Wolverine 1.7pt	100
6	Express .25oz.+.5ot MCPE+1pt NIS	80
7	Express .25oz.+.5ot MCPE+.75oz. Everest+1pt NIS+3pt 28%	75
8	No Treatment-Bison Advance 3/4pt. only	92
	LSD @5% level	9
	CV(%)	7

Experimental design=RCB w/4reps
Ryegrass variety=Arctic Green
*%Stand- visual rating of ryegrass stand
Applications made 7/10/2014 w/Bike sprayer 12GPA @28psi
wind s5 mostly sunny temp 72F RH74%

Growth Stages 7/10/2014

ryegrass .5-1" pigweed 3-5"
wheat 7-9" lambsquarter 4-6"
mustards 3-6"

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 16b.

2013 Herbicide Applications on Spring Wheat with Underseeded Ryegrass
Magnusson Research Farm

Trt#	Treatments/Rates/Adjuvunts:	Seed yield #/ac.	5/8/2014 %Stand
1	Affinity tank mix .6oz+.5ptmcpe+1pt NIS	1667	91
2	Everest2.0 .9oz.+1pt NIS	1742	90
3	Assert 1.5pt.+1pt NIS	1633	91
4	Avenge 3pt.+1pt NIS	1622	90
5	Tecoma 10oz.	1693	94
6	No treatment	1653	91
	LSD @5% level	NS	NS
	CV(%)	7	3

Ryegrass variety=Integra
Sprayed 6/14/2013 9' backpack sprayer @13GPA
ryegrass just emerging to 2leaf--wheat 3leaf stage

Herbicide formulation	Product use rate
Affinity Tank Mix(SG)= 40% thifensulfuron+10%thibenuron	.9oz
Express with total Sol(SG)=50% thibenuron	.25oz.
Everest 2.0= flucarbazone3.5#/gal	.75oz.
Assert= imaxamethabenz 2.5#/gal	1.5pt
Wolverine=.17# fenoxyprop ,.42# pyrasulfole,.41# bromoxinil	1.7pt
Tecoma= .08# fenoxaprop	10oz.
MCPE=3.75#MCPE	.5pt
Bison Advance=2.5#MCPA + 2.5#bromoxinil	.75pt
28%n UAN= 28% urea ammonium nitrate-3#N/gal	3pt
.25%NIS= 1pt. /100 gal. non-ionic surfactant(Preference)	0.25%

Table 17.

2014 Late Herbicide Applications to 'Integra' Perennial Ryegrass*

Magnusson Farms- Northwest of Roseau,Mn

			Seed Yield							
		Rate/acre	% of no treatment			(#/Ac.)			2014	2014
Trt#	Treatment	Adjuvunt	**2012**	**2013**	**2014**	2012	2013	2014	test wt	lodging[1]
1	MCPE	1pt	**107.8**	**112.4**	**80.9**	1433	1023	1316	26.0	7.3
2	2,4-Da	1pt	**108.3**	**107.5**	**96.4**	1439	978	1570	28.8	7.0
3	2,4-DE	3/4pt	**97.7**	----	----	1299	----	----	----	----
4	2,4-Da+Clarity	1pt+1pt	**99.3**	**112.7**	**83.0**	1320	1026	1350	26.7	7.0
5	Stinger	6oz.	**97.5**	----	----	1296	----	----	----	----
6	Clarity	1pt.	**94.2**	----	----	1252	----	----	----	----
7	Aim	1oz.+.25%NIS	**101.6**	----	----	1350	----	----	----	----
8	Basagran	1.5pt+1%MSO	**98.0**	----	----	1302	----	----	----	----
9	No Treatment		**100.0**	**100.0**	**100.0**	1329	910	1626	29.3	7.0
10	Avenge	3pt.+.25%NIS	**98.6**	----	----	1311	----	----	----	----
11	Assure II	10oz.+.25%NIS	**91.3**	**122.5**	----	1213	1115	----	----	----
12	Fusilade	12oz+.5%HCCOC	**99.3**	**110.8**	----	1320	1008	----	----	----
	LSD @ 5% level		**10.3**	**14.5**	**12.6**	137	132	206	2.1	NS
	LSD @ 10% level		9	12	10	114	108	167	1.7	NS

Growth regulator applied to rep 1 only.

*-Arctic Green used in 2012-13.

[1]Lodging-1=Erect;9=Flat

Herbicides applications made 6/21/2012 at 60% heading stage and 7/10/2013 at late pollen shedding.

Wind WSW at 4-8mph in 2012. Wind NW 5-10 and 75F in 2013.

treatments applied 7/5/2 1:30pm 82F 71%RH WSW 5-10

fully headed- early pollen shedding 18-24" ht

Harvested 7/21/2012, 7/26/2013, and 8/7/2014

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 18.

2014-Arctic Green Perennial Ryegrass Spring Burn

F2B Magnusson Research farm

Treatment	Seed yield #/acre	Test wt. #/BU.
Check-No burn	**1720**	29.1
Burn- May 7	**1483**	28.5

Methods

A 40' x 60' block of ryegrass was isolated and burned on May 7.
Soil conditions were wet but the desired burn was achieved.
Most straw and residue burned off but live plant crowns
did not appear to be burned or damaged.
No replication was done and 2 yield samples were cut and
threshed. Clean seed yield from the 2 blocks is reported above.
General management was done using best management practices.

Table 19a.

2014 Apogee Rate +Nitrogen - Arctic Green Perennial Ryegrass
Magnusson Research Farm-Roseau,Mn

			nitrogen	Seed Yield	Test			Color[2]		RCI[3]
Trt#	Treatment	Rate	Additive?	#/acre	wt.	Ht.(in.)	Lodging[1]	8/7	8/11	8/11
1	Apogee	4oz.	NO	**1648**	27.6	23	5.3	4.3	5.5	175
2	Apogee	6oz.	NO	**1686**	27.8	23	5.8	4.8	6.5	188
3	Apogee	8oz.	NO	**1784**	27.8	22	5.3	4.3	6	175
4	Apogee*	8oz.	add 3 gal.28%N	**1726**	27.9	22	5.8	5.3	5.5	184
5	Apogee	10oz	NO	**1756**	27.8	22	4.5	3.8	5.5	164
6	Apogee*	10oz.	add 3 gal.28%N	**1715**	28.2	22	4.8	4.3	5	163
7	No treatment		NO	**1537**	27.1	26	8.3	4.5	5	174
8	No treatment*		add 3 gal.28%N	**1724**	27.9	27	8.0	4.5	5.5	154
			LSD @5% level	**NS**	NS	4	1.4	NS	NS	NS
			CV(%)	11	5	19	16	31	27	18

Experimental design=RCB w/4reps

Harvest date=8/8/2014

*Add 3 gal. 28%UAN/acre to spray mix instead of normal rate of 1 Qt. 28%UAN/acre(2.5gal/100 gal water)

6/20/2014 wind SSW 8-12mph 10am 5% headed

[1]-Lodging-1=erect;9=flat

[2]-Color at harvest(8/7) and post harvest-1=brown;9=green

[3]-RCI -Relative Chlorophyl Index- Higher number= more chlorophyl

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 19b.

2014 Apogee Rate Trial - Royal Green Perennial Ryegrass
Rice Farms- 1/2 west of Magnusson Research farm

			Seed Yield	Dry wt.	Harvest[1]	Ht.(in.)		Lodging[2]		
Trt#	Treatment*	Rate	#/acre	tons/ac.	Index	7/31	Harvest	7/1	7/23	Harvest
1	Apogee	0	**1239**	3.9	16	26	27	9	6.7	8.3
2	Apogee	6oz.	**1637**	3.9	22	24	24	6.3	4.3	6.7
3	Apogee	9oz	**1604**	4.3	19	23	24	6.7	3.7	6.3
4	Apogee*	12oz.	**1470**	3.7	20	23	24	5.3	3.7	5.7
5	Apogee	15oz.	**1512**	3.9	19	23	24	4	2.3	5.3
	LSD @5% level		**369**	NS	NS	1	2	2.4	1	1
		CV(%)	13	11	20	2	4	20	13	8

Experimental design=RCB w/3reps

Harvest date=8/6/2014

*Apogee treatments applied 6/20/2014 65F- wind SSW 8-12mph 12pm--10% headed

[1]Harvest index=seed yield/total dry matter (%seed relative to total biomass)

[2]Lodging=1-Erect;9-flat

Table 20.

2014 Wheat Fertility Trial-Variety -Samson Wheat

Magnusson Research farm Planted 6/4/2014

140# total nitrogen added to all plots

			Yield**			RCI		Vigor		Heading	Tissue samples- 7/22			
TRT#	Treatment	App*	Bu./acre	**% of mean**	% Protein	3-Jul	8-Jul	3-Jul	8-Jul	Date	N	P	K	S
1	0-0-0	NONE	96	**86**	14.1	256	336	7.0	6.0	7/21	4.1	0.29	1.68	0.38
2	9-30-30	B	111	**101**	13.3	374	451	8.0	7.8	7/21	4.1	0.29	1.83	0.35
3	9-30-30	I	108	**97**	13.0	370	456	8.3	8.3	7/21	3.9	0.3	1.73	0.33
4	18-60-60	B	109	**98**	12.9	404	448	8.3	8.3	7/21	3.9	0.3	1.73	0.33
5	18-60-60	I	115	**104**	12.9	375	473	8.5	9.0	7/22	4.0	0.3	1.91	0.3
6	18-60-30	B	112	**101**	12.9	390	454	8.8	8.3	7/21	4.0	0.3	1.8	0.33
7	18-60-30	I	112	**101**	12.8	385	456	8.3	9.0	7/22	4.0	0.3	1.72	0.34
8	13-45-30	I	108	**97**	13.1	389	461	8.3	8.5	7/21	4.0	0.3	1.74	0.33
9	9-30-30-7s	B	104	**94**	12.6	387	466	8.5	8.3	7/21	4.0	0.29	1.76	0.31
10	18-60-30-14s	I	120	**108**	12.8	427	488	8.5	9.0	7/23	4.1	0.32	2.1	0.35
11	9-30-30-7s	I	113	**102**	13.0	412	472	8.0	8.5	7/22	3.9	0.3	1.9	0.31
12	39-30-30[1]	I	108	**98**	13.8	341	401	7.5	7.5	7/21	4.0	0.31	1.72	0.35
13	69-30-30[2]	I	115	**103**	14.4	369	426	8.0	7.8	7/21	4.1	0.31	1.71	0.36
14	39-60-30[1]	I	119	**107**	13.4	422	467	8.8	8.8	7/21	4.1	0.32	1.89	0.31
	LSD @5% level		9	**7**	0.8	61	44	1	1	1	0.2	0.02	0.35	0.05
		CV(%)	5.5	5.5	4.2	11.4	7	9	8.1	2.1	4	5.7	13.5	11.1

Experimental design=RCB w/4reps

App*= Fertilizer application method

I= in-furrow at seeding; B=Broadcast prior to final seed bed prep

[1]ESN applied in furrow 30#N/acre

[2]ESN applied in furrow 60#N/acre

Yield**-corrected to 12% moisture- Bushel wt.=62# -- Mean yield =111bu/ac.

Soil test pre-plant- 5/25/2014					
soil depth	NO_3-N (ppm)	Olsen P (ppm)	K (ppm)	OM (%)	pH
0-6"	9	4	77	3.2	7.9
6-24"	4				

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Table 21.

2014-15 2X Broadcast Phosphorous Application to Spring Wheat

Location 1=Rice Farm-3 mi. North and 5 mi. west of Roseau-variety-Linkert

Location 2=Magnusson Farms-1mi.west and 1 mile north of Roseau-variety-Samson

			Soil test ppm-P2O5						Flag leaf Tissue tests-7/22			
	Yield- Bu./acre*		Early Spring		post harvest		RCI**		phosphorus		potassium	
Treatment	**Rice**	**Mag**	Rice	Mag	Rice	Mag	Rice	Mag	Rice	Mag	Rice	Mag
1)Standard In Furrow (7-30-30)	**66.7**	**74.1**	9.5	4	7	2.7	306	791	0.27	0.27	2.2	1.6
2)Standard In Furrow (7-30-30)+13-60-0 broadcast prior to spring tillage	**66.7**	**82.5**	9.5	4	9.7	4	319	801	0.28	0.28	2.5	1.5
LSD @5% level	**NS**	**4.6**	NA	NA	NS	1	NS	NS	NS	NS	NS	NS
CV(%)	4	5			32	31	2	1	10	1	9	1

Experimental design=RCB w/3reps

Plots size=70' x 600'

Broadcast application of MAP(7-30-0) prior to final seed bed tillage to both locations with 12' Gandy drop spreader

0-6" Soil test pre-plant - 5/25/2014					
	SO_4-S (ppm)	Olsen P (ppm)	K (ppm)	OM (%)	pH
Rice	7	9.5	126	4.5	7.8
Mag	6	4	100	3.8	7.8

*Adjusted to 12.5% moisture (Loc.1=62#/bushel;Loc.2=63.5#/ac.)

**RCI-(Relative Chlorophyl Index)-Higher number means higher relative amount of chlorophyl

Objectives:

Wheat yields in 2014 and soybean in 2015

Compare 2015 soybean yield where additional fertilizer was applied to determine if 'stockpiling ' of phosphorus is feasible in high PH soils

Table 22.

2014 Soybean Fertility Trial

Magnusson Farms-2 mi.west of Roseau

		Yield Bu./acre-13%moisture					oil components					RCI[3]		Plant Vigor[4]	Stand[5]	Tissue tests[6]								
Trt#	Fertility treatment	**2014**	2013**	**2013-14**	Protein[1]	oil[2]	Palmitic	Stearic	Oleic	Linoliec	Linolenic	7/24	7/31	7/24	7/3	Ca	Fe	Mg	Mn	N	P	K	S	Zn
																%	ppm	%	ppm	%	%	%	%	ppm
1	0-0-0 No added fertilizer	**32.3**	44.0	**38.2**	37.0	18.7	12.7	4.6	18.3	52.4	11.4	291	406	5.3	181.1	1.3	130	0.7	114	4.9	0.35	2.0	0.26	19.8
2	6-30-30 in-furrow at planting	**36.0**	39.4	**37.7**	37.3	18.9	12.5	4.4	18.8	51.9	11.8	283	396	4.8	173.9	1.3	139	0.67	107	5.0	0.37	2.2	0.26	18.2
3	6-30-0 in-furrow at planting	**39.0**	42.2	**40.6**	37.8	19.0	12.4	4.7	18.9	51.5	11.4	348	408	5.3	226.4	1.3	125	0.72	111	5.0	0.39	2.1	0.27	19.3
4	6-30-0 broadcast incorporated prior to planting	**35.2**	43.2	**39.2**	37.8	18.7	12.7	4.7	16.3	54.4	11.4	315	420	5.3	172.1	1.2	122	0.69	112	5.0	0.36	2.0	0.26	19.0
5	6-30-30 broadcast incorporated prior to planting	**36.5**	44.0	**40.2**	37.2	18.9	12.7	4.5	20.8	49.9	11.2	316	438	6.0	192.0	1.3	129	0.68	115	5.1	0.37	2.2	0.27	20.0
6	6-30-0 + $CaCl_2$ broadcast incorporated prior to planting	**36.6**	42.7	**39.6**	37.8	19.1	12.6	4.7	18.9	51.9	11.2	319	413	5.0	166.7	1.3	134	0.69	120	4.9	0.37	2.1	0.27	19.8
7	0-30-30 broadcast incorporated prior to planting*	**34.6**	46.5	**40.5**	37.4	18.2	12.9	4.5	20.3	50.4	11.8	309	438	5.0	201.0	1.2	137	0.66	113	5.0	0.37	2.1	0.26	19.0
8	0-0-30 broadcast incorporated prior to planting	**36.5**	42.7	**39.6**	37.9	18.9	13.0	4.8	16.9	53.5	11.6	316	421	5.5	179.3	1.3	136	0.68	113	5.0	0.37	2.2	0.26	19.8
9	6-60-30 broadcast incorporated prior to planting*	**37.2**	NA	NA	37.8	19.5	12.8	4.9	14.5	55.7	11.5	333	388	5.5	201.0	1.3	138	0.69	117	5.0	0.37	2.3	0.27	19.8
10	6-60-30 in-furrow at planting*	**35.8**	NA	NA	37.4	18.4	12.2	4.3	21.6	49.8	11.6	318	392	5.0	175.7	1.3	140	0.66	110	5.0	0.4	2.3	0.27	19.0
	LSD @5% level	**3.3**	6.2	**3.4**	NS	1.0	0.7	NS	NS	NS	NS	38	NS	NS	35.7	0.1	NS	0.06	NS	NS	0.03	0.2	NS	NS
	LSD @10% level	**2.7**	5.2	**2.8**	NS	0.9	0.6	NS	6	5.1	NS	33	43	1.1	29.6	0.07	17	0.05	12	NS	0.03	0.2	0.01	1.7
	CV(%)	**6**	10	**6**	3	4	4	11	27	8	5	8	9	17	13	5	11	6	9	5	6	6	4	7

Seeding rate= (190,000 PLS seeds/ac.) Planting date=5/29/2014

Plot size=6'x27'

Experimental Design-RCB w/4 reps

Past crop=spring wheat in 2013

Variety=Pioneer 900Y81--inoculated w/ PPST 120+

Fungicide-Evergo 1/Allegiance

**-2013 soybean trial-Magnusson Plots 5 mi. NW of Roseau

Other parameters in 2013 trial same as 2014.

* 0-46-0 used entirely or partially in these plots(other plots 11-52-0 only for P source)

[1]Protein- % seed protein db(dry matter basis)

[2]Oil- % seed oil db(dry matter basis)

[3]RCI- Relative Chlorophyll Level

[4]Plant Vigor- visual rating- 9=best vigor , 1=least vigor

[5]Stand= plants/acre x 1000

[6]Tissue test=10 new growth trifoliate leaves per plot sampled 7/24/2014(growth stage R1)

Fertilizer used:

MAP-11-52-0, P2O5- 0-46-0

MOP- 0-0-60

$CaCl^2$ - 57%Cl

Soil Test Results-pre-plant- 5/24/2014

P2O5 (phosphourus) Olsen 3 ppm

KCl (Potassium) 79 ppm

Organic matter- 3.8% PH= 8.1

SO4-sulfur 6 ppm

Table 23.

2014 Soybean On Farm Fertility Trial
Magnusson Farms-2 mi.west of Roseau

		Yield Bu./acre-13%moisture					oil components					RCI[3]		Plant Vigor[4]	Stand[5]	Tissue tests[6]								
Trt#	Fertility treatment	**2014**	2013**	**2013-14**	Protein[1]	oil[2]	Palmitic	Stearic	Oleic	Linoliec	Linolenic	7/24	7/31	7/24	7/3	Ca	Fe	Mg	Mn	N	P	K	S	Zn
																%	ppm	%	ppm	%	%	%	%	ppm
1	0-0-0 No added fertilizer	**35.6**	52.9	**44.3**	37.8	19.5	12.1	4.7	20.3	52.3	11.4	476	336	4.3	231.9	1.31	99	0.7	103	5.0	0.34	2.0	0.25	21.7
2	6-30-30 in-furrow at planting	**39.6**	55.6	**47.6**	39.0	19.6	11.9	4.9	18	54.2	10.5	539	362	5.3	195.7	1.22	110	0.6	119	5.1	0.4	2.1	0.28	21.7
3	6-30-30 Broadcast before planting*	**40.7**	52.5	**46.6**	39.7	19.7	11.7	4.9	17.3	54.3	10.1	523	414	6.0	233.7	1.18	117	0.58	107	5.1	0.38	2.0	0.27	24.0
	LSD @5% level	**1.4**	NS	**2.9**	NS	NS	NS	NS	NS	NS	NS	46	76	0.8	19.3	0.07	16	0.09	NS	NS	0.06	0.1	NS	2.2
	LSD @10% level	**1.1**	3.0	**2.2**	NS	NS	NS	NS	NS	NS	1	36	58	0.6	14.8	0.05	13	0.07	NS	NS	0.05	0.1	0.02	1.7
	CV(%)	**2**	4	**3**	3	3	3	14	28	8	5	4	9	6	4	3	7	6	10	2	7	2	5	4

Seeding rate=200,000 Planting date=5/31/2014
Variety-2014= Asgrow AG00133
Plot size=84' x 700' --Harvest area=40' x 700'
Experimental Design-RCB w/3 reps
Past crop=Spring wheat in 2013
Harvest date=10/10/2014

* 6-30-30 broadcast prior to final seed bed prep 5/24/2014
**-2013 soybean trial-Magnusson Farms 5 mi. NW of Roseau
Variety-2013=Syngenta X2R00730
[1]Protein- % seed protein db(dry matter basis)
[2]Oil- % seed oil db(dry matter basis)
[3]RCI- Relative Chlorophyll Level
[4]Plant Vigor- visual rating- 9=best vigor , 1=least vigor
[5]Stand= plants/acre x 1000
[6]Tissue test=10 new growth trifoliate leaves per plot sampled 7/24/2014(growth stage R1)
Fertilizer used:
MAP-11-52-0
MOP- 0-0-60
Soil Test Results 5/24/2014
Each replication (3) sampled separately--Mean of 3 reps
P2O5 (phosphourus) Olsen 3.7ppm
KCl (Potassium) 78 ppm
Organic matter- 3.7% PH= 8.1