

PROGRESS REPORT ON GRASS SEED PRODUCTION RESEARCH

prepared by

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Grass-Legume Seed Institute Presentation Roseau, MN - February 22, 2012

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Roseau ,Mn 1967-2011.**

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Yearly Total(in.)	DEVIATION	Park' blg.
														FROM MEAN	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	-3.09	
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	7.68	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	2.06	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	3.03	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	-3.93	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	-3.15	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	-0.83	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	4.22	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	-4.20	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	-6.42	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	-2.81	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	-1.63	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	-4.79	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	-3.10	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	1.35	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	-2.04	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	-0.30	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	-4.82	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	2.80	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	-2.87	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	-4.33	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	-5.32	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	-0.54	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	-10.57	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	8.04	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	-1.63	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	-0.46	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	-3.65	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	-0.30	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	3.74	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	-1.58	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	2.69	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	0.64	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	5.98	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	-3.46	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	3.57	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	2.22	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	11.88	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	9.04	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	-5.76	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	3.05	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	4.27	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	4.31	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	5.66	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	-4.53	375
45 year average annual precipitation													22.25		

*Precipitation amounts used are from the Roseau research site April-September and the National Weather Service the remainder of the year.

Table 2.

2007 Kentucky Bluegrass Variety Trial
Field 1 Magnusson Research Farm

Variety	Seed Lot	Seed yield					Harvest-2011			% Heading-2011		
		2009-11 %of mean	#/acre				Height(in.)	Lodging*	Date	6/1	6/9	6/17
			2011	2010	2009	2009-11						
Dragon	3671	170	776	745	650	724	28	1.3	7/11	2	58	100
Rhythm	3804	128	453	482	703	546	27	1.5	7/19	0	3	45
Diva	3853	123	484	464	622	523	27	1.5	7/19	0	33	84
A99-3124	3777	119	578	355	588	507	25	1.5	7/19	0	3	40
A99-2950	3771	117	524	435	541	500	28	1.5	7/19	0	15	83
A99-2626	3792	115	506	404	568	492	26	1.8	7/19	0	1	33
Midnight	3539	113	372	337	740	483	25	1.3	7/19	0	1	35
A97-1287	3802	112	457	335	638	477	25	1.3	7/19	0	13	60
Abbey	3608	112	350	607	481	479	25	1.3	7/19	0	8	60
157	3805	112	377	517	544	479	25	1.8	7/19	0	6	55
Evora	3803	109	468	314	608	463	29	1.5	7/19	0	35	90
A99-2679	3774	106	462	335	554	450	25	1.0	7/19	0	2	38
Park	3540	106	473	321	562	452	32	4.5	7/8	30	90	100
Unique	3794	101	459	312	526	432	25	2.0	7/19	0	3	38
BAR Pp 0468	3799	90	359	343	444	382	24	2.0	7/19	0	3	40
A97-1436	3764	87	368	299	439	369	25	1.8	7/19	0	8	55
Huntington	3854	88	410	288	426	375	32	2.3	7/19	8	73	100
A93-201	3850	93	511	297	377	395	29	1.3	7/14	3	43	95
PpH8510	3851	66	216	154	468	279	23	1.0	7/19	1	30	75
1949	3808	72	352	158	411	307	27	1.0	7/19	0	16	75
Thorough-blue	3852	66	490	254	311	280	29	2.5	7/14	8	83	100
Bariris	3798	64	314	243	303	273	31	7.3	7/19	1	45	97
Mystere	3855	69	234	123	329	296	32	1.0	7/19	1	43	86
640	3806	64	256	103	303	273	26	1.0	7/19	0	15	75
LSD @5% level		15	102	92	91	66	2	1.1	3	3	9	9

Mean seed yield 2009-11= 427#/ac.

Experimental Design: RCB with 4 reps

* Lodging-1=erect ;9=flat

Management:

All plots burned 8/13/2010

110+70+70+11s applied 10/16/10

.75pt. 2,4-D+.75pt Banvel applied 9/24/10

3 oz. Tilt applied 6/4/11

Table 3.

2008 Kentucky Bluegrass Variety Trial
Field 5 Magnusson Research Farm

Variety	Seed lot	Seed Yield			Harvest-2011			% Heading-2011					
		2010-11 %of Mean	#/acre			Ht.(In.)	Lodging*	Date	6/1	6/4	6/9	6/13	6/17
Dragon	3671	148	760	633	697	28	1	7/8	3	20	58	83	99
Abbey	3608	143	758	591	675	25	1	7/15	0	1	10	28	68
A99-2679	3774	100	607	337	472	24	1.5	7/19	0	0	4	14	38
A99-3124	3872	99	607	326	466	25	1.8	7/19	0	0	5	14	30
A99-2626	3792	95	600	299	449	25	1.8	7/17	0	0	5	13	38
Unique	3794	92	560	303	432	25	1.3	7/19	0	0	7	14	35
A99-2950	3771	91	535	321	428	27	1	7/15	0	1	21	48	85
Park	3888	83	408	368	388	33	4.3	7/8	40	75	97	99	99
A97-1436	3764	79	433	314	374	26	1.5	7/17	0	1	16	43	73
Midnight	3539	71	390	281	336	25	1	7/19	0	0	2	10	43
LSD @ 5%Level		21	49	81	54	1.1	1.1	1	3.8	4.6	7	7	9

Mean seed yield 2010-11= 472#/ac.

Experimental Design: RCB w/4 reps

Management:

All plots burned 8/13/2010

110+70+70+11s applied 10/16/10

.75pt. 2,4-D+.75pt Banvel applied 9/24/10

3 oz. Tilt applied 6/4/11

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Table 4.

2009 Kentucky Bluegrass Variety Trial
Field 5 Magnusson Farm-2011 data

Variety	Seed lot	Seed Yield #/ac.	Harvest			% Heading		
			Ht.(In.)	Lodging*	Date	6/4	6/13	6/22
Dragon	3671	615	28	1.3	7/8	15	75	99
Abbey	3608	562	27	1.0	7/13	1	36	95
A99-2679	3774	462	26	2.5	7/18	0	23	88
A99-3124	3897	457	27	2.8	7/15	0	14	83
A99-2626	3899	401	27	1.8	7/17	0	13	80
A99-2950	3898	390	28	4.0	7/16	0	40	99
Midnight	3539	332	27	1.5	7/18	0	11	80
Park	3888	169	32	6.8	7/8	48	97	99
LSD @5%Level		92	1.7	2.0	1/3	6.9	12.4	6.3

Experimental Design: RCB w/4 reps

Management:

110+70+70+11s applied 10/16/10

.75pt. 2,4-D+.75pt Banvel applied 9/24/10

3 oz. Tilt applied 6/4/11

Table 5.

2008 Fine Fescue Variety Trial

F5 Magnusson Research Farm-Roseau,Mn

Variety	Fescue Species	Seed yield(#/ac.)					Harvest-2011			% Heading-2011		
		2011	2010	2009	2009-11	2010-11	Ht.(in.)	Lodging*	Date	6/1	6/4	6/13
MN-HD1	Hard	297	827	232	452	562	24	1	7/7	25	39	90
Chariot	Hard	89	662	48	266	376	24	1	7/7	14	24	68
SR3150	Hard	114	656	98	289	385	24	1	7/7	13	24	68
LongfellowII	Chewings	500	638	NH**	379	569	31	2.8	7/11	1	21	80
Azay	Sheep	24	506	NH**	177	265	20	1	7/10	NA**	NA**	NA**
67135	Sheep	248	207	NH**	152	227	30	3.8	7/11	25	40	88
LSD @ 5% level		80	176	53	72	100	1.6	0.7	1.2	8	11	10

Experimental Design: RCB with 4 reps

* Lodging-1=erect ;9=flat

**insufficient heading to rate/harvest

Management:

Residue clipped off after harvest

.75pt. 2,4-D+.75pt Banvel applied 9/24/10

Fertilized 60+30+30+6s 10/16/10

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Table 6.2009 Prairie Junegrass(*Koeleria macrantia*) Variety Trial

Magnusson Research Farm

Source-Origin	Seed lot	Line	Seed yield (#/ac.)			Harvest-2011	
			2011	2010-11	2010	Ht.(in.)	Lodging*
Colorado	3929	KC	410	256	101	23	1
Nebraska	3928	ND(KN)	500	305	110	24	1
Weaver Dunes	3930	WD	369	191	13	27	1
LSD @ 5% level			128	71	63	2.2	0

Experimental Design:RCB with 3 reps

* Lodging-1=erect ;9=flat

Harvest Date 7/16/2011

Management:

.75pt 2,4-D+.75pt.Clarity 9/22/2010

30+15+15+3s applied 10/16/10

50+0+0 5/19/2011

Table 7.

2010 Perennial Ryegrass Variety Trial- fall planting
 F2 Magnusson Research Farm- 2011 Data

Variety	seed lot	Seed Yield (#/ac.)	Harvest			chlorophyll** rating 8/4/2011
			Lodging*	Ht.(in.)	Date	
Arctic Green	3921	1599	4.5	25	7/30	137
Spreader III x P201	3934	1329	3.8	28	7/31	155
Brightstar SLT	3661	1264	2.8	25	8/8	165
MSP germplasm	3935	1264	3.5	24	8/1	152
Affinity	3500	1222	5.0	27	7/31	141
Survivor	3848	1102	4.8	29	8/2	144
NK-200	3917	1068	3.8	32	8/8	151
922	3926	582	1.8	27	8/8	204
LSD @5% level		143	2.1	1.8	1.4	12

Experimental Design:RCB with 4 Reps

* Lodging;1=erect;9=flat

**Chlorophyll-Relative chlorophyll rating- higher number = greener color

Seeded with Kincaid No-till drill seeder in 7.5" rows into wheat stubble 8/27/10

Management:

60-30-30-7s 10/15/2010 + 60-0-0 5/19/2011

3/4pt 2,4-D+3/4pt.Banvel, 10oz. Puma and 10 oz. Quilt applied as separate applications

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Table 8.

2010 Perennial Ryegrass Winter Hardiness Variety Trial-2011 Data
 F5 Magnusson Research Farm and St.Paul Campus U of M

Line	seed lot	Winter Injury*		
		Roseau 4/26/11	Roseau 5/19/11	St.Paul 4/21/11
Affinity	3500	2.0	1.3	1.0
Arctic Green	3921	1.4	1.3	1.0
Brightstar SLT	3661	2.5	1.6	1.0
ftm bl c1-07	3936	1.6	1.3	1.0
08ftmsesl	3937	1.6	1.4	1.0
ftm blc2-09	3938	2.1	1.8	1.0
NK-200	3917	2.0	1.0	1.0
Quebec	3941	2.9	2.0	1.0
ftm wt c2-09	3939	2.3	1.5	1.0
fts rdc1-07	3940	2.1	1.5	1.0
winter hardy select	3931	2.1	1.4	1.0
Ribeye(annual)	3689	7.3	5.5	6.5
Spreader III x P201	3934	1.9	1.0	1.0
Survivor	3848	2.0	1.5	1.0
922	3926	2.1	1.8	1.0
MSP germplasm	3935	2.5	1.8	1.0
LSD @5% level		0.9	0.8	0.5

Experimental Design:RCB with 4 Reps

*Winter Injury- 1=No Injury; 9=dead

Seeding dates:(No cover crop)

Roseau 8/28/10 St.Paul 9/8/2010

Table 9.

2011 Fungicide trials on Arctic Green Perennial Ryegrass

2 Location summary

Treatment	Rate	Seed Yield (#/ac)			Ht.(in.)		Lodging*		Color**	
		MagPlots	Helmstetter	Mean	MagPlots	Helm	MagPlots	Helm	MagPlots	Helm
Quilt Excel 2.2se	20oz.	1220	1218	1219	22	27	4.3	7.0	5.5	7.8
Quilt Excel 2.2se	14oz.	1206	1222	1214	23	26	3.8	6.8	5.3	7.3
Quilt Excel 2.2se	10.5oz.	1296	1191	1243	23	25	4.0	7.3	5.5	7.3
Quilt Excel 2.2se	7oz.	1322	1222	1272	24	25	4.8	6.8	5.0	6.5
Quilt(old form)	10.5oz.	1345	1387	1366	23	25	5.3	7.0	6.0	6.8
Prosaro 421 SC	7.7oz.	1327	1128	1228	24	25	4.8	6.8	5.3	6.8
Prosaro 421 SC	5.8oz.	1169	1215	1192	23	26	3.5	7.0	5.5	6.8
Absolute 4.36 sc	7.7oz.	1275	1336	1305	22	25	4.3	7.3	5.0	6.5
Stratego YLD	5.4oz.	1260	1124	1192	24	26	4.3	6.5	6.5	6.8
Gem	4oz.	1128	1470	1299	23	24	3.8	7.3	4.5	6.5
Folicur	5.4oz.	1244	1213	1229	23	26	4.8	7.5	4.8	6.0
Tilt	4oz.	1307	1153	1230	23	26	4.5	6.8	4.8	6.3
Stratego YLD+Folicur	5.4oz.+5.4oz.	1215	1291	1253	24	25	3.3	6.5	4.8	7.3
Untreated check	None	934	1039	987	22	27	2.5	6.0	3.5	4.8
	LSD @5% level	174	292	170	1.6	2.0	2.0	1.0	2.0	1.2

Locations: Helmstetter farm-north of Roosevelt
Magnusson Research farm-F2A

Plot size-10' x 30'
Plot size-10' x 25'

Experimental Design: RCB with 4 reps

* lodging; 1=none; 9=flat

**color;1= light green;9=dark green

Insufficient rust infestation to rate

Applications made 7/6/2011 to Magnusson plots. Plants fully headed and some pollen shedding.

Magnusson Location application information

7/6/11 6:00pm 75F RH 80% - wind WSW 4-7mph

ryegrass fully headed- some pollen shedding 20" canopy

Helmstetter applications made 7/7/2011. Ryegrass fully headed.

7/7/2011 11:00am 70F RH 80%- wind WSW 5mph

ryegrass 80% headed - 22" canopy height

Application equipment:

CO2 bicycle sprayer w/10' boom(6 nozzels on 20" spacing) @ 27psi & 12.5GPA
nozzels=TT11002VP(turbo t-jets)

Trade name/additive common name/formulation

Quilt/.5%COC	propiconazole 1.04# + azoxystrobin .62#
Quilt Xcel/.5%COC	propiconazole 1.02# + azoxystrobin 1.18#
Prosaro 421SC/.25%NIS	prothioconazole 1.76# + tebuconazole 1.76#
Absolute/.5%COC	tebuconazole 2.18# + trifloxystrobin 2.18#
Stratego YLD/.25%NIS	prothioconazole 1.05# + trifloxystrobin 3.13#
Gem/.25%NIS	trifloxystrobin 4.17#
Folicur/.25%NIS	tebuconazole 3.6#
Tilt	propiconazole3.6#

Observations/Conclusions:

Higher seed yields were obtained by applying a fungicide at both locations in this year of low rust pressure
Specific fungicide and rate had no significant seed yield effect averaged over the 2 locations-2011

Table 10.

2011 Perennial Ryegrass spring burning trial
Magnusson Research Farm-F2A

Treatments	Dates	Seed Yield	
		(#/ac.)	Harvest Date
1 Early Burn	4/26	1224	7/30
2 Late Burn	5/17	1088	8/5
3 No Burn		1213	7/30
LSD @ 5% level		NS	1

Arctic Green perennial ryegrass spring planted under wheat
4/26/2011 generally a good burn with most residue removed. Soil condition was very wet.
5/17/2011 Hot burn with all residue removed. Crowns injured and stand reduced.
Soil moisture was adequate but dry on top.

Soil temperature @ 2" depth on early burn vs. no burn areas(stubble)
reading taken between 6&7 PM each day

2011 Date	sky			
	condition	stubble	burn	
2-May	sunny	48.8	50.6	
3-May	sunny	51.1	54.6	
4-May	cloudy	46.2	48.0	
5-May	Pcloudy	51.1	53.8	
6-May	Pcloudy	53.1	56.0	
7-May	cloudy	51.9	55.7	
12-May	cloudy	50.2	50.6	
14-May	sunny	51.6	54.6	
15-May	sunny	55.7	65.6	
16-May	sunny	57.4	63.1	
18-May	sunny	59.7	64.4	
22-May	Pcloudy	63.0	66.9	
24-May	sunny	59.9	64.2	
26-May	sunny	59.2	64.3	
29-May	Pcloudy	59.0	63.0	canopy closure

Observations/Conclusions:

With seemingly ideal early spring burn conditions, no seed yield increase was obtained
Soil temperatures warmed up faster during the day in burn areas

Table 11.

2010 Starter fertilizer applied in furrow to perennial ryegrass
Magnusson Research Farm-F1-2011 data

	Seed Yield (#/ac.)	Harvest	
		Ht.(in.)	Lodging*
1) No Treatment	1137	26	5.3
2) 7+31+30	1124	25	5.3
3)12+31+12+6s	1148	26	5.0
4) 11-52-0	1280	25	5.3
LSD @5% level	NS	NS	NS

Planting date-9/20/2010; variety- Arctic Green

* Lodging-1=erect;9=flat

Fertilizer applied down the tube with ryegrass at planting

Soil test results:

P2O5	K2O	Sulfate	PH	%Organic matter
20#/ac.	270#/ac.	8#/ac.	8.1	2.8

Observations/Conclusions:

Fertilizer applied with seed at planting in the fall did not influence fall seedling growth or significantly affect seed yield

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Table 12.

Rooting zone of perennial ryegrass - after harvest

2 Locations

Soil core depth	% root dry matter		
	fall plant		spring plant
	Roseau*	Lake of the Woods*	
	2006	2011	2011
0-6"	75	75	90
6-12"	9	14	5
12-18"	7	6	3
18-24"	3.6	5	2
24"-34"	5.5	NA**	NA**

Mean of 3 soil cores taken in August after ryegrass harvest

*Roseau-Magnusson farm 3 miles north west of Roseau

**Soil cores were not able to be taken below 24" in 2011.

Roots separated and weighted from soil cores in 6" increments

Table 13.

2010-11 Top Dress Fertility - Arctic Green Perennial Ryegrass
 Magnusson Research Farm-F6
 ALL PLOTS RECEIVED 7+30+40 10/21/2010

Trt.#	Amount of added fertilizer/source	Application Timing****	seed yield #/ac.	Harvest		
				Ht(in.)	Lodging***	Date
1	0		470	18	1.0	7/29
2	60+0+0	Fall	901	21	1.3	7/29
3	100+0+0	Fall	1441	23	2.5	7/29
4	50urea+50coated N	Fall	1222	21	1.5	7/29
5	100+0+0+22s	Fall	1378	23	2.5	7/29
6	140+0+0	Fall	1563	23	4.0	7/31
7	90urea+50coated N	Fall	1501	23	4.5	8/1
8	(25+25)(25+25)**	Split	1421	23	2.5	7/30
9	60+0+0	Split	1325	22	2.3	7/29
10	100+0+0	Split	1416	22	3.3	7/31
11	100+0+0+22s	Split	1441	23	4.0	7/31
12	140+0+0	Split	1554	24	5.0	8/1
13	75urea+25coated N	spring	1588	23	3.3	8/2
14	60+0+0	spring	1215	22	2.0	7/29
15	100+0+0	spring	1416	22	2.5	7/31
16	100+0+0+22s	spring	1503	23	2.0	8/1
17	140+0+0	spring	1514	23	3.5	8/2
18*	80+0+0	Fall+liquid	1155	21	1.8	7/29
19*	100+0+0	Split+Liquid	1155	22	2.5	8/1
20*	80+0+0	Fall+liquid	1084	21	1.5	7/29
LSD @5% level			156	1.6	1.0	1.4

*18-(60#N fall)+ 3 gal. 28%N 6/20+3 gal. 28% 7/9

*19- (60#N fall) +30# dry N+3 gal. 28%N 6/20

*20-(60#N fall)+22# dissolved urea 6/20+22# dissolved urea 7/9

** (25#coated N +25#urea fall)+(25#coated +25#urea spring)

***Lodging;1=Erect;9=flat

****Fall=10/21, spring=5/22, split= 1/2 fall , 1/2 spring

Spring dry fertilizer applications 5/22/11

Fall dry fertilizer treatments 10/21/10

Liquid fertilizers applied with backpack sprayer at 25GPA

8 oz. Apogee 6/16/11

soil test 10/18/2010

P2O5	K2O	Sulfate	NO3-N	PH	%Organic matter
38#/ac.	290#/ac.	12#/ac.	22#/ac.	8.0	3.4

Observations/Conclusions:

140# Nitrogen rates generally had the highest seed yields although

75# N urea+ 25# N ESN applied in spring was highest yielding treatment

Late applications of liquid fertilizer did not significantly improved seed yield

Table 14.

Liquid fertilizer applications to 'Arctic Green' perennial ryegrass
F6 Magnusson Research Farm

Trt#	Treatment	Fungicide	Fertilizer		Seed Yield	Harvest		RCI**
		Rate/ac.	Rate/ac	Analysis	#/ac.	Ht.	Color*	chlorophyll
1	Alliance		5 gal.	3.5-0-0-4s	767	20	4.0	117
2	Alliance + Folicur***	4 oz.	5 gal.	3.5-0-0-4s	824	21	5.7	132
3	28% N		3 gal.	9-0-0	770	20	5.0	121
4	28% N + Folicur	4 oz.	3 gal.	9-0-0	940	21	5.0	132
5	28% N + Headline	8 oz.	3 gal.	9-0-0	779	20	6.0	129
6	Liquid urea		20#	9-0-0	844	20	4.3	119
7	Liquid urea + Folicur	4 oz.	20#	9-0-0	951	21	5.0	133
9	Folicur only 4oz.	4 oz.			773	19	4.0	117
8	None added				801	20	4.7	130
LSD @5% level					102	1.2	1.2	14.7

Harvest date- 7/28/2011

*Color-9=darkest green;1=less green

** Relative Chlorophyll Index, post harvest- higher number =greener

***Folicur must be mixed thoroughly with water BEFORE Alliance is added to mix

Applied all treatments 6/24-11 3:00pm 50% heading- wind SW 2-5mph.

Fungicides/Additives:

Alliance= 3.4# AMS equivalent/gallon

Folicur- tebuconazole 3.6#

Liquid urea=20# dry urea mixed with water

Headline- pyraclostrobin 2.09#

28%(UAN)=liquid urea ammonium nitrate

Observations/Conclusions:

Liquid nitrogen mixed with any fungicide tended to produce the highest seed yields

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Table 15.

2011 Weed control/growth regulator management in fall plant 'Arctic Green' perennial ryegrass
Magnusson Research Farm- F2A

Trt#	Treatment	Application date			Seed Yield	%weed control		Harvest	
		2,4-D+Clarity	Assure II	Apogee	(#/ac.)	Broadleaf	Grass	Ht.(in.)	Lodging***
1	2,4-D +Clarity	6/6	NONE	6/14	1279	100	0	25	5.0
2	Assure II/2,4-D+Clarity	6/14	6/6	6/14**	1189	100	85***	28	7.0
3	Assure II	NONE	6/6	6/14	1237	47	100	24	2.3
4	2,4-D +Clarity/Assure II- standard	6/6	6/10	6/14	1374	100	100	23	2.7
5	2,4-D +Clarity/Assure II	6/6	6/14	6/6 & 6/14*	1189	100	100	26	4.7
6	2,4-D LV6+Clarity+Assure II+ Apogee	6/20	6/20	6/20	1243	100	53	27	7.0
LSD @5% level					NS	11	15	2	1.5

Application rates(except treatment 6):

2,4-D amine+Clarity= 3/4pt+3/4pt.

Assure II= 10oz.+ .25%NIS

Apogee=6oz. + 2pt. Alliance(AMS+ water conditioner)

TRT #6= 1pt 2,4-D ester(LV6)+1pt.Clarity+10oz.Assure II+6 oz. Apogee all tank mixed

*3 oz.Apogee tank mixed with herbicide on each date

**6oz.Apogee tank mixed with broadleaf herbicide

***Foftail barley still alive but not headed

**** Lodging-1=Erect;9=Flat

All plots harvested 7/30/11

6/6/11 TRTS 1-5, 9pm, 65F ,wind N3mph Growth Stage=late boot

6/14/11 TRTS 2-5 ,2:30 pm,77F

Partly cloudy, RH61%, windSSE5-10mph

Growth Stage- early heading 12-16 inches tall

6/20/11 TRT 6 6-20, 2:00pm, 66F

Cloudy, 80% RH,wind E 5-10mph

Growth Stage- 14-18 inches tall 40% headed

Observations/Conclusions:

Late applications of a 'shotgun' tank mix(TRT#6) reduced grass weed control and growth regulator effect

Standard separate applications of growth regulators and weed control produced best overall results

Table 16.

2011 Assure II Tank Mixes with Apogee applied to Arctic Green Per. Ryegrass
Magnusson Research Farm-F7SW

Treatment	Product	Rate	Adjuvunct	Seed Yield #/ac.	Harvest	
					Ht.(in.)	Lodging*
1	Assure/Apogee	10/4	NIS+AMS	862	24	1.7
2	Assure+Apogee	10+4	NIS	904	22	1.7
3	Assure+Apogee	10+8	NIS	859	22	1.3
4	Assure+Apogee	10+4	NIS+AMS	847	23	1.7
5	Assure+Apogee	10+8	NIS+AMS	833	20	1.3
6	Assure/Apogee	10/4	NIS+AMS	850	22	1.7
LSD @5% level				NS	2.8	NS

Experimental Design:RCB with 3 reps

*Lodging-1=erect;9=flat

6/9/11 Tank mix treatments 2-5 and Assure II alone in treatments 1&6

6/9 applications 6:30pm, 63F ptly cldy,RH 48%, wind ENE 5-10mph

Ryegrass growth stage= 3 nodes- trace heading ,6"-12" tall

6/13/11 Apogee in treatments 1 & 6

6/13 application 7:30am,63F Cldy,RH75%, wind SSE 5-10mph

Ryegrass growth stage= early heading, 8"-14" tall

Table 17.

2011 Seeding Year Weed Control in Spring Wheat with Underseeded Grasses
F7NW Magnusson Research farm

Trt.#	Treatment	Herbicide tolerance*			% Stand 10/21/2011		
		Ky.bluegrass	per.ryegrass	tall fescue	Ky.bluegrass	per.ryegrass	tall fescue
1	Achieve L	G	G	F	90	95	70
2	Affinity+2,4-D	G	F	F	90	75	65
3	Assert	F	G	G	70	95	85
4	Avenge	G	G	G	85	90	85
5	Axial	G	P	P	80	15	0
6	Callisto-3 oz.	G	G	G	100	95	95
7	Callisto -5 oz.	G	G	G	80	95	90
8	Everest 70WG	G	F	F	95	65	60
9	Everest 2.0	G	F	F	95	70	60
10	Express+2,4-D	G	F	G	80	70	80
11	Nortron	G	G	G	85	90	80
12	Tecoma	P	G	G	10	90	80
13	Wolverine	P	G	F	0	90	75
14	No treatment	G	G	G	95	100	90
LSD @5% level					8	7	11

*Tolerance based on stand 10/21/2011;G=good ,F=fair ,P=poor tolerance

Experimental design- Split-plot with 4 reps

All treatments applied 6/24/11 9:00AM 70F west wind 0-3mph

Application growth stages- 6/24:

spring wheat- 6-8" tall 3 leaf tillering

perennial ryegrass 1.5"-2" 2-3 leaf

tall fescue 2" 2-3 leaf

ky.bluegrass 1" 1-2 leaf

1pt. Buctril applied to all 6/24/11 5:00pm wind west 0-5mph

Spring wheat-Samson

Kentucky bluegrass - Park

Tall fescue- Durana

Perennial ryegrass-Arctic Green

Trt.#	Treatment	Rate/Adjuvunct	active ingredient/ac.
1	Achieve Liquid	.5pt+.25%NIS+2.5% -28%N	.208# tralkoxydim
2	Affinity+2,4-D	.6oz.+1/2pt.LV6+.25%NIS	.0094#thifensulfuron+.0094#tribenuron+.375#2,4-DE
3	Assert	1.2pt+.25%NIS	.375# imazamethabenz
4	Avenge	3pt+.25%NIS	2# difenoquat
5	Axial	1pt.	.42# pinoxedin
6	Callisto	3oz.+1%COG+2.5%- 28%N	.094# mesotrione
7	Callisto	5oz.+COG +2.5% - 28%N	.157# mesotrione
8	Everest 70WG	.6oz.+ .25%NIS	.026# flucarbazone
9	Everest 2.0	.9oz.+ .25%NIS	.025# flucarbazone+safener
10	Express+2,4-D	.3oz.+1/2pt. 2,4-D LV6+.25%NIS	.0094# tribenuron+.375# 2,4-DE
11	Nortron	2 pt	1# ethofumesate
12	Tecoma	10oz.	.078# fenoxaprop
13	Wolverine	1.7pt. +2.5%-28%N	.08# fenoxaprop+.036# pryrasulfotole+.087# bromoxynil
14	No treatment		

Observations/Conclusions:

Axial gave better control of ryegrass seedlings than Everest formulations

Express/Affinity reduced ryegrass stands

Table 18.

2011 Wild oat control in ' Arctic Green' Per. Ryegrass
 Kraig Lee and Amundson Bros. farms- north of Wannaska*

Treatment	Seed Yield--#/acre			Ht. at harvest		Wild oat control **		
	Lee	Amundson	2 location-mean	Lee	Amundson	30-Jun	Harvest	
						Lee	Lee	Amundson
No Treatment	1414	1191	1302	29.5	24.5	1.0	1.0	1.0
Assure II	1409	1098	1253	27.0	24.0	9.0	8.5	6.5
Assert	1186	812	999	25.0	25.0	7.0	6.0	3.0
Avenge	1378	1204	1291	28.0	24.5	9.0	8.5	7.0
Callisto 6oz.	1338	1280	1309	27.5	23.0	5.0	3.5	4.0
Callisto 3oz.	NA	1151	NA	NA	24.5	NA	NA	4.0
Fusilade	NA	1097	NA	NA	24.0	NA	NA	7.5
Nortron	1371	NA	NA	28.5	NA	7.0	9.0	NA
Karmex	1289	NA	NA	25.0	NA	5.0	6.5	NA
Outlook	1338	NA	NA	27.0	NA	3.0	3.0	NA
Dual II Magnum	1436	NA	NA	27.0	NA	2.0	3.5	NA
Dimension 2EW	1396	NA	NA	26.5	NA	1.5	1.5	NA
Achieve L	1249	NA	NA	28.0	NA	7.0	3.0	NA
LSD @ 5% level	NS	437	288	2.0	NS	3.2	3.1	NA*

*Selected sites had AOPP(Assure II/Puma) resistant wild oat problems

**Wild oat control;1=none- 9=complete. Amundson location had insufficient wild oats to rate on many plots

Lee Location:

Pre emergence Treatments applied 5-5-11
 Partly cloudy, 59F, wind WNW 0-5 mph
 ryegrass-2"-3"
 Trt 8-11 applied 6-9 @ 10:00 am
 Partly cloudy 61F, 50% RH
 Wind NNW 0-5 mph
 Ryegrass 8-14 inches tall 2-3 nodes
 Wild oat 3-6 inches tall 1-3 leaf
 harvest date 7/28/11

Amundson Location:

Treatments applied 6-21-11 9:30 am
 Cloudy, 64F, RH 57%,
 Wind ENE 10-15
 Ryegrass 14-18 inches 50% headed
 Wild oat 2-6 inched 2-3 leaf
 Harvest date 7/27/11

Treatment	Rate/Adjuvant	Common name	AI/Gal.
Achieve L	8 oz.+ .5%Supercharge+2.5%AMS	Tralkoxydim	3.33#
Assure II	10oz.+ .25%NIS	Quizalofop	.88#
Assert	1.2 pts.+1%COG	Imazamethabenz	2.5#
Avenge	3 pt.	Difenzoquat	2#
Callisto	6oz.+1%COG+2pt.28%N	Mesotrione	4#
Callisto	3oz.+1%COG+2pt.28%N	Mesotrione	4#
Fusilade DX	10oz.+ .25%NIS	Fluazifop	2#
Nortron	2 pt.	Ethofumesate	4#
Karmex	1#	Diuron	80%DF
Outlook	12 oz.	dimethenamid	6#
Dual II Magnum	1.2pt.	Metolachlor	7.64#
Dimension 2EW	1pt.	Dithiopyr	2#

Observations/Conclusions:

Avenge provided good wild oat control
 Nortron provided good wild oat control where applied pre-emergent at the Lee location
 Callisto applications did not adequately control wild oats
 Assert reduced ryegrass seed yield at both locations

Table 19.

2011 Growth Regulator applied to Arctic Green Perennial Ryegrass

2 locations-Roseau and Lake of the Woods

Treatment	Application date**	Rate oz./acre	Seed Yield--#/AC.			seed yield % of check	Helmstetter		Magnusson	
			Helmstetter	Magnusson	Average		lodging	Ht.(in.)	lodging	Ht.(in.)
None	None	None	1153	874	1013	100	8.8	31	4.7	26
Apogee	14-Jun	4	1592	940	1266	125	6.0	24	1.7	21
Apogee	14-Jun	6	1492	919	1206	119	5.3	24	1.3	22
Apogee	14-Jun	8	1563	874	1219	120	5.0	24	1.3	22
Apogee	6/14+6/21	3+3/4+4*	1543	824	1184	117	4.5	23	1.0	20
Apogee	21-Jun	6	1421	791	1106	109	6.3	24	1.0	21
Apogee	21-Jun	8	1269	901	1085	107	6.8	25	1.0	20
Apogee	21-Jun	12	1356	776	1066	105	7.0	24	1.0	19
LSD @5% level			148	144	121	10.3	1.1	2	0.8	2

Lake of the Woods =Helmstetter Farm north of Roosevelt

Roseau location-Magnusson Research Farm-F6

Apogee applied with 2.4pt Alliance+.25%NIS/acre. 10' bike sprayer -12gpa @27psi

Plots 10'x30' -Design-RCB with 3/4 reps(Roseau 3 reps,LOW 4 reps)

*Magnusson location-3+3 Assure II application tank mixed with 3oz. Apogee 6/8

*Split rate at Helmstetter=4+4 Apogee applied at 2 dates with no herbicide

** Average of 2 locations

Magnusson=6/8,6/13&6/19

Helmstetter=6/14&6/23

Helmstetter Location treatment conditions:

6/14/11-application conditions

9:00am prtly cldy 63F,78%RH, wind s 5-10mph

ryegrass early headed 12-16" ht.

dry matter-3.55 t/ac.

6/23/11- conditions

6:00pm 80F wind s 5mph

ryegrass 20" ht. and 60% headed

dry matter-3.13 t/ac.

color***-6,density***-7,Ht.-21"

***color-9=darkest green

density-9=highest density

Magnusson location treatment conditions:

6-8-11 5:00pm

prtly cldy 58F, 70%RH, wind N 10mph

ryegrass 3 nodes-9" ht.,color-6***,density-7*** dry matter-1.8 T/ac.

6-13-11-application conditions

8:30am ptly cldy, 73F, 70RH wind SSE 5-10mph

ryegrass early headed 10-14 inches tall-dry matter-2.6 T/ac.

dry matter-2.6 t/ac.

6-19-11- conditions

8:30pm 66F, 83%RH Ptly cldy wind E 5-10mph

ryegrass 14-20" and 3-4 nodes- 30% headed- dry matter- 3.13 T/ac.

Herbicide applications- Magnusson only

6/3/11 - .75pt. Clarity+.75pt.2,4-DAmine

6/8/11-Assure II 10oz.(tank mixed only with 1st split Apogee treatment)

Observations/Conclusions:

Seed yield and lodging effects from Apogee were more beneficial on the LOW location(better crop growth than Roseau)

Overall yields were better with the early Apogee applications

Table 20.

2008-11 Planting Date/Rate of Fall Planted 'Arctic Green' Perennial Ryegrass
 Magnusson Research Farm-Roseau Granite spring wheat used as cover

YIELD DATA:			Seed Yield -% of mean				Seed Yield
			4 yr. ave.	2 yr. ave.	2011	2010	#/ac.
Seeding date	Seeding Rate**	Cover Crop*	2008-11	2010-11	2011	2010	2011
21-Jul	5 pounds	Wheat @ 20#/A	NA	104	108	101	1368
21-Jul	8 pounds	Wheat @ 20#/A	NA	113	108	118	1371
4-Aug	5 pounds	Wheat @ 20#/A	NA	102	118	83	1502
4-Aug	8 pounds	Wheat @ 20#/A	NA	102	117	85	1481
17-Aug	5 pounds	Wheat @ 20#/A	NA	113	118	108	1502
17-Aug	8 pounds	Wheat @ 20#/A	NA	109	116	101	1472
26-Aug	5 pounds	Wheat @ 20#/A	130	116	122	110	1543
26-Aug	8 pounds	Wheat @ 20#/A	NA	111	116	105	1475
1-Sep	5 pounds	Wheat @ 20#/A	127	113	117	108	1487
1-Sep	8 pounds	Wheat @ 20#/A	NA	98	116	78	1478
8-Sep	5 pounds	Wheat @ 20#/A	96	NA	66*	111	833
8-Sep	8 pounds	Wheat @ 20#/A	NA	NA	60*	115	764
15-Sep	5 pounds	Wheat @ 20#/A	88	102	100	103	1273
15-Sep	8 pounds	Wheat @ 20#/A	NA	101	102	100	1299
22-Sep	5 pounds	Wheat @ 20#/A	54	67	50	86	630
22-Sep	8 pounds	Wheat @ 20#/A	NA	75	65	86	821
LSD @ 5% level			25	16	25	31	326
Mean seed yield (#/ac.)			1058	1199	1269	1130	1269

Seeding date	Seeding Rate	Cover Crop	2011 Harvest		
			Lodging**	Ht.	Date
21-Jul	5 pounds	Wheat @ 20#/A	5.0	26	7/26
21-Jul	8 pounds	Wheat @ 20#/A	3.7	26	7/25
4-Aug	5 pounds	Wheat @ 20#/A	5.3	25	7/25
4-Aug	8 pounds	Wheat @ 20#/A	5.0	25	7/26
17-Aug	5 pounds	Wheat @ 20#/A	5.0	26	7/23
17-Aug	8 pounds	Wheat @ 20#/A	6.7	26	7/23
26-Aug	5 pounds	Wheat @ 20#/A	5.3	26	7/22
26-Aug	8 pounds	Wheat @ 20#/A	6.7	26	7/23
1-Sep	5 pounds	Wheat @ 20#/A	7.7	27	7/24
1-Sep	8 pounds	Wheat @ 20#/A	8.0	26	7/25
8-Sep	5 pounds	Wheat @ 20#/A	4.0	27	7/27
8-Sep	8 pounds	Wheat @ 20#/A	4.3	28	7/26
15-Sep	5 pounds	Wheat @ 20#/A	6.0	28	7/27
15-Sep	8 pounds	Wheat @ 20#/A	7.0	28	7/27
22-Sep	5 pounds	Wheat @ 20#/A	5.0	28	8/2
22-Sep	8 pounds	Wheat @ 20#/A	5.0	27	8/1
LSD @ 5% level			2.1	2	2

*Rabbit damage

**Lodging-1=none;9=flat

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Table 21.

2009-10 'Arctic Green' perennial ryegrass planted in the fall
 in black ground at 3 seeding rates with spring wheat *
 Magnusson Research Farm

Seeding Rate (#/ac.)	Seed Yield-#/ac.		2011 Harvest	
	2010	2011	Lodging**	Ht. (in.)
3#	1028	NA	NA	NA
5#	970	1427	5.8	24
8#	943	1298	6.5	25
12#	NA	1287	6.8	27
LSD @5% level	NS	NS	0.9	1.1

Experimental Design= RCB with 4 reps

* Granite spring wheat planted at 20#/ac. along with ryegrass into tilled soil

**Lodging - 1=none; 9=flat Harvest date-7/26/10 & 8/1/2011

Seeding Date- 9/14/2009 & 9/9/2010

Table 22.

2010-11 'Dynamic II' Tall Fescue Grass Weed Control
 F1 Magnusson Research farm- seeded with spring wheat 7/13/09

Treatment/Rate/adjuvant	Application timing		Seed Yield (#/ac.)		Ht.(in.)	%F.barley control*
	2010	2011	2010	2011		
Puma 10 oz.	5/29/10	None	1061	NH	NH	NH
Wolverine 1.7pt.	5/29/10	None	1333	NH	NH	NH
Rimfire 2 oz.+5%NIS+2.5%N	5/29/10	None	526	NH	NH	NH
Assert 1.2 pt.+5%HCMSO	5/29/10	None	704	NH	NH	NH
Everest .61oz.+25%NIS	5/29/10	None	187	NH	NH	NH
Achieve L .5pt.+5%Supercharge+2.5%N	5/29/10	None	26	NH	NH	NH
Karmex 80WP 1#	10/14/09	10/25/10	1355	1396	35	90
Princep 4L 3 pts.	10/14/09	10/25/10	1233	1423	35	85
Assure II 10 oz.+25%NIS	None	6/3/11	NH	167	22	99
Nortron 2pt.	None	9/21/10	NH	1507	34	50
No Treatment	None	None	1123	1525	34	0

Not all plots replicated- no analysis of treatment variances done

*Visual rating of %foxtail barley suppression 7/16/11

3/4pt. Clarity+3/4pt. 2,4-D applied to all plots 9/24/10.

10/25/2010 tall fescue 4-6" tall 40F wind ese 5-10

6/3/2011 tall fescue 8-12" tall vegetative 65F wind wsw 5-10

Harvest date-7/15/10

Harvest date-7/21/11(estimated 10-15% shattered)

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Table 23.

2010-11'AMF 107' Meadow Fescue Grass Weed Control
 Magnusson Research Farm-F7NW seeded under wheat 4/24/10

Treatment	Rate/adjuvant	Application		Harvest		
		Date	Seed Yield #/acre	Ht.(in.)	Lodging**	Color*
Nortron	2pt.	6/3/2011	642	41	8.0	4.5
Paramount	12oz.+1%COG	6/3/2011	593	39	6.0	5.0
Puma	10oz.	6/3/2011	571	41	7.5	5.5
Callisto	3 oz.+1%COG+2.5%- 28%N	6/3/2011	495	37	5.5	6.0
Assert	1.2pt+.25%NIS	6/3/2011	183	38	5.5	7.5
Assure II	10oz.+25%NIS	6/3/2011	138	37	2.5	6.0
Achieve L	.5pt+.25%NIS+2.5% -28%N	6/3/2011	49	31	1.0	8.0
Nortron	2pt.	9/21/2010	460	39	7.5	5.5
Karmex	1#	10/25/2010	593	39	6.0	5.0
Princep	3pt.	10/25/2010	152	32	3.5	7.5
LSD @5%level			186	7.8	3.4	2.9

Harvested 7/21/2011-- estimated 10-20% Shattering

*color-1=light green;9=dark green

**Lodging -1=erect;9= flat

Clarity+2,4-D to all plots 9/15/2010 & 6/3/2011

9/21/10 meadow fescue 8-14" tall

48F Cldy wind wnw 5mph

Heavy residue

10/25/11 meadow fescue 10-16" tall

46F cldy ese wind 5-10

6/3/2011 cloudy 70F, 85% humidity

wind WSW 5-10

fescue 12-16" ht, full flag extension

Trade name	Common name	Al/Gal.or #
Achieve L	Tralkoxydim	3.33#
Assure II	Quizalofop	.88#
Assert	Imazamethabenz	2.5#
Callisto	Mesotrione	4#
Everest 70WG	flucarbazone	70%
Nortron	Ethofumesate	4#
Karmex 80WP	Diuron	80%DF
Paramount	quinclorac	75%
Princep	simazine	4#
Puma	fenoxaprop	1#
Rimfire	propoxycarbazono+mesosulfuron	8.14%+2.03%
Wolverine	fenoxypop+pryrasulfotole+bromoxynil	.38+.17+.41

Table 24.

2010 In furrow fertilizer applications to spring wheat with underseeded ryegrass
 2010 Fall fertilizer applications to perennial ryegrass
 2010 Wheat and 2011 ryegrass data summaries
 F7 SW Magnusson Research Farm

Trt.#	Treatment/source	<u>2010 spring wheat data</u>					<u>2011 Perennial ryegrass data</u>					
		24-Apr-10	Bu./acre	Protein	Tissue samples*		18-Oct-10	Seed yield #/ac.	Harvest		Tissue samples*	
		In furrow analysis			surface application	Ht.(in.)	Lodging**		%P	%S		
1	MES10 +30 K2O	9+30+30+7s	74.95	11.77	0.32	0.195	50+30+30+7s	1149	24	3.0	0.2	0.14
2	MES10(2x) +30 K2O	18+60+30+14s	76.15	11.40	0.31	0.185	50+0+30	1203	22	3.3	0.13	0.1
3	MES10(2x) +60 K2O	18+60+60+14s	70.10	11.80	0.32	0.203	50+0+0	1125	23	3.5	0.21	0.15
4	MES15 +30 K2O	9+30+30+11s	75.31	11.57	0.30	0.18	50+30+30+11s	1149	23	3.8	0.22	0.16
5	MESZ +30 K2O	9+30+30+7s+1z	72.67	11.23	0.31	0.203	50+30+30+7s+1zn	1172	23	2.5	0.13	0.1
6	MAP + 30 K2O	9+30+30	74.65	11.07	0.32	0.198	50+30+30	1098	24	3.0	0.17	0.12
7	No Treatment	None	68.86	11.57	0.29	0.175	50+0+0	1093	24	3.0	0.14	0.13
8	MES10+30K2O	9+30+30+7s***	67.35	11.30	0.31	0.193	50+30+30+7s	1067	24	2.8	0.18	0.12
LSD @10% level			6.29	0.49	0.03	0.02		130	1.4	1.1		

Experimental Design= RCB with 4 reps

Plot size= 6' x 20'

*Whole plant tissue samples taken at anthesis

Ryegrass 6/24/2011; wheat 7/1/2010

** Lodging-1=none;9=flat

***Surface applied after planting 4/24/2010

perennial ryegrass variety- Arctic Green

spring wheat variety-Samson

Fertilizer mixed with seed (wheat + ryegrass) and planted

60# N Urea broadcast preplant to entire area 4/23/2010

50# N Urea applied 5/15/2011 to all plots

SOIL SAMPLES:

4-12-2010- Base- Rep samples- composite information

P2O5(#/ac.)	K2O #/ac	SO4 #/ac.	Zn #/ac.	PH	%organic matter
18	250	69	0.5	8	3.4

10-18-2010-Overall mean of 8 treatments(individual treatments similar except #4 slightly higher SO4

P2O5(#/ac.)	K2O #/ac	SO4 #/ac.	Zn #/ac.	PH	%organic matter
14	250	12	0.7	8.1	3

Table 25.

2010-11 Grower planted in furrow fertility trial-spring wheat/perennial ryegrass

4 locations - Roseau/Lake of the Woods area

All field operations and management was done by growers except the ryegrass fertility treatments

Wheat data-2010**Magnusson/Helmstetter/Howell***

In furrow fertility/Rate	Yield-- Bu./acre				% Protein			
	Magnusson	Helmstetter	Howell*	Mean	Magnusson	Helmstetter	Howell*	Mean
MES10 9+30+25+7s	65.60	46.31	63.19	58.87	11.0	11.9	14.5	12.44
MAP 6+30+30	63.87	46.25	62.58	58.13	10.8	11.8	14.5	12.37
LSD @10% level	NS	NS	NS	NS	NS	NS	NS	NS

3 Location means:

In furrow fertility / Rate	Bu./acre	% Protein	Tissue samples at anthesis				
			N	P	K	S	ZN
MES10/MESZ 9+30+25+7s	58.87	12.44	2.14	0.247	2.51	0.186	11.61
MAP 9+30+25	58.13	12.37	2.07	0.247	2.66	0.182	10.48
LSD @10% level	NS	NS	NS	NS	NS	NS	NS

Perennial Ryegrass data-2011**Magnusson/Helmstetter/Tveit* combined data**

Fertility 10/16/2010***	yield--#/acre				yield--% of mean			
	Magnusson	Helmstetter	Tveit	mean	Magnusson	Helmstetter	Tveit	mean
MAP 56+30+30	463	800	1395	886	90	103	105	99
MES10 59+30+30+7s	529	800	1275	868	103	103	97	101
Urea only 50+0+0	552	726	1296	858	107	93	98	99
LSD @10% level	NS	NS	NS	NS	NS	NS	NS	NS

3 Location means:

Fertility 10/16/2010***	Seed yield		Tissue samples at anthesis			
	#/ac.	Lodging**	%N	%P	%K	%S
MAP 56+30+30	886	2.7	1.1	0.16	1.3	0.11
MES10 59+30+30+7s	868	3.3	1.2	0.17	1.4	0.12
none 50+0+0	858	2.5	1.2	0.17	1.6	0.11
LSD @10% level	NS	NS	NS	NS	NS	NS

*Plots established in spring of 2010.

Howell ryegrass spring plant and Helmstetter and Magnusson ryegrass fall plant areas not used. Tveit fall plant added

**Lodging- 1=Erect;9=Flat

***Fertilizer treatments applied 10/16/2010 with 12' Gandy drop spreader

Locations:

Magnusson- northwest of Roseau- 2 mi.east of Magnusson Research farm

Helmstetter- 6 miles northwest of Roosevelt

Howell-8 miles south west of Roseau

Tveit- 2 miles north of Roosevelt

Table 26.

2011-12 InFurrow fertility trial-spring wheat/ perennial ryegrass

East side field 8 west side Magnusson Research Farm

2011 SPRING WHEAT DATA:

Trt#	Treatment	Total fertilizer applied	Fertilizer application in furrow	Grain yield		Relative* chlorophyll reading	****Tissue samples		
				Bu./ac.**	%protein		%P	%K	%S
1	MES10	90+30+30+7s	9+30+30+7s	86.2	13.6	319	0.24	1.2	0.32
2	MES10+30#ESN-corrected N	90+30+30+7s	39+30+30+7s	89.3	13.6	292	0.24	1.2	0.32
3	MES10 (2x)+K20(2x)	90+60+60+14s	18+60+60+14s	89.2	13.7	358	0.25	1.1	0.35
4	MES15	90+30+30+14s	9+30+30+14s	88.1	13.4	287	0.23	1.2	0.32
5	MESZ	90+30+30+14s+1z	9+30+30+7s+1zn	89.0	13.3	357	0.23	1.2	0.31
6	MAP	90+30+30	7+30+30	88.6	13.8	297	0.24	1.2	0.33
7	no treatment	90+0+0	None	82.3	13.5	327	0.22	1.3	0.30
8	MES10 Surface apply till in	90+30+30+7s	None	86.1	13.6	276	0.24	1.2	0.34
9	MES10+30#ESN	120+30+30+7s	39+30+30+7s	89.5	13.9	331	0.25	1.2	0.35
10	MES10+60#ESN-corrected N	90+30+30+7s	69+30+30+7s	90.4	13.9	288	0.24	1.2	0.33
11	30# ESN only-corrected N	90+0+0	30+0+0	84.5	13.9	255	0.22	1.1	0.30
12***	MES10+Foliar***	90+30+30+7s	9+30+30+7s	84.5	14.0	265	0.24	1.2	0.31
LSD @10% level				4.9	0.4	62			

Seeded 5/19/2011 with Hege plot seeder in plots 6' x 20'

Experimental Design: RCB with 4 reps

Spring wheat- Samson; perennial ryegrass-Arctic Green

*Chlorophyll readings 8/4/2011; higher figures= more chlorophyll(greener)

** yields corrected to 12% moisture

*** 30#N(28%N) applied as foliar at anthesis

****Flag Leaf Tissue Samples Taken at Anthesis-1 composite sample/treatment

Soil test results= 55# NO3-N/acre 0-24"

P2O5= 14#/ac. P2O5

PH=7.8

K= 185#/ac. K2O

S=15#/ac. SO4

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Table 27.

2011-12 Grower In furrow fertility trial-spring wheat+underseeded perennial ryegrass

Helmstetter Farm - Lake of the Woods

Planting Date 4/28/2011

All plots received a total of 140+30+20+7.5s

2011 SPRING WHEAT DATA:

Treatment	In furrow fertilizer*	Grain yield Bu./ac.**	test		Tissue samples*		
			weight	Protein	%P	%K	%S
MES10	12+30+20+7.5s	66.4	63.2	13.8	0.22	1.17	0.34
MAP+AMS	9+30+20+7.5s	68.6	62.7	13.8	0.22	1.20	0.33
MES10+ESN	39+30+20+7.5s	64.5	64.0	13.7	0.23	1.20	0.32
LSD @10% level		4.6(NS)	1.1	.5(NS)	0.1	0.09	0.03

*Tissue samples- flag leaf samples taken at anthesis 7/6/2011

** yields corrected to 12% moisture

Experimental Design: RCB w/3 reps

Plot size= 79' x 500' grower harvest

Arctic Green per. Ryegrass seeded @6#/ac.

Barlow spring wheat planted at 120#/ac.

Plots seeded,managed and harvested by grower

70-0-0 applied pre-plant and incorporated

60-0-0 applied 6/15/11(except 30-0-0 to ESN area)

Pre-plant soil test results= P= 14#/ac. P2O5

PH=7.9

K= 210#/ac. K2O

S=9#/ac. SO4