

## **PROGRESS REPORT ON GRASS SEED PRODUCTION RESEARCH**

prepared by

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**Table 1. Monthly and Year End Precipitation Totals\***  
**Roseau ,Mn 1967-2010.**

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	-3.20	
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	7.57	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	1.95	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	2.92	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	-4.04	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	-3.26	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	-0.94	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	4.11	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	-4.31	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	-6.53	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	-2.92	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	-1.74	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	-4.90	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	-3.21	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	1.24	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	-2.15	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	-0.41	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	-4.93	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	2.69	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	-2.98	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	-4.44	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	-5.43	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	-0.65	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	-10.68	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	7.93	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	-1.74	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	-0.57	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	-3.76	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	-0.41	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	3.63	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	-1.69	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	2.58	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	0.53	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	5.87	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	-3.57	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	3.46	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	2.11	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	11.77	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	8.93	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	-5.87	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	2.94	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	4.16	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	4.20	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	5.55	350
													<b>44 year average precipitation</b>	<b>22.36</b>	

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

**Table 2.**

2005 Kentucky Bluegrass Variety Trial  
Field 7SE Magnusson Research Farm

Variety	Seed lot #	Seed Yield (#/Ac.)							Fall Regrowth*** 9/4/2009	2010 % Heading			
		estimated		2007-9 % of mean	harvested #/Ac.					18-May	22-May	26-May	12-Jun
		2010	2010**		2007-9	2009	2008	2007					
Miracle	3550	338		142	557	678	482	511	1.5	0	13	33	83
Minnfine	3672	438		142	557	738	495	437	5.0	20	65	90	100
A99-2893	3636	325		124	486	446	504	508	2.0	0	0	0	25
Dragon	3671	500	323	124	486	595	390	473	3.3	0	10	35	100
A99-3124	3700	375	194	123	482	384	506	555	1.5	0	0	0	33
Brilliant	3670	363		123	482	401	624	419	1.8	0	0	0	33
A99-2628	3634	325		122	479	446	513	479	2.0	0	0	0	35
A99-2679	3737	363	232	119	468	442	508	455	2.0	0	2	6	45
Abbey	3608	288	230	119	466	502	248	649	3.0	0	0	0	50
A99-2674	3475	400		117	458	359	482	533	1.3	0	0	0	33
A99-2626	3633	275	190	113	446	437	502	399	1.8	0	0	0	30
A99-2670	3697	300		113	443	355	491	484	2.0	0	0	2	35
Park	3540	350		112	442	566	363	395	5.0	9	40	75	100
Voyager II	3674	350		109	427	421	459	401	2.0	0	0	2	38
A97-1289	3470	250		94	369	332	357	419	1.3	0	2	11	72
Nublue	3727	250		84	329	299	359	330	2.8	0	1	6	73
Nuglade	3728	175		82	323	230	370	368	1.5	0	0	0	18
Midnight	3539	163		81	317	268	326	357	1.8	0	0	0	28
Sonic	3673	163		70	276	256	321	250	4.9	0	6	23	94
Midnight Star	3552	363	136	64	251	248	167	339	3.3	0	0	4	75
A99-2950	3699	213		63	248	198	285	259	1.5	0	0	2	53
A99-2235	3696	238		59	232	210	207	279	2.0	0	1	5	48
A97-1436	3629	325		59	230	176	230	285	1.0	0	0	0	45
Avalanche	3647	188		47	186	145	210	203	2.5	0	5	20	91
<b>LSD @5% Level</b>		78	65	11	44	70	68	65	0.6	2	5	5	14

Mean yield 2007-9=393#/ac

Experimental Design: RCB with 4 reps

\* Lodging-1=erect ;9=flat

\*\* Harvested only best remaining varieties 7/7/10. Park and Minnfine had shattered too badly for harvest.

\*\*\*fall regrowth post burn; 5= uniform,dense,green regrowth, 1=little-no greenup

All plots cut 8/8/09, desiccated with Gramoxone Max+NIS 8/12/09, and burned 8/23/09

Management:

120+30+40+10s applied 10/16/09

.75 2,4-D+.75pt Banvel applied 9/22/09

3 oz. Tilt applied 5/27/10

**Table 3.**

2007 Kentucky Bluegrass Variety Trial  
Field 1 Magnusson Research Farm

Variety	Seed lot#	Source	Seed yield			2010 Harvest			2010 % Heading					
			2009-10 %of mean	#/acre		Height(in.)	Lodging*	Date	18-May	22-May	29-May	1-Jun	12-Jun	
				2010	2009									
Dragon	3671	N. excel	<b>165</b>	745	650	28	1.0	2-Jul	0	14	68	93	100	
Rhythm	3804	Int'l-DLF	<b>140</b>	482	703	28	1.3	7-Jul	0	0	2	13	85	
Abbey	3608	check	<b>128</b>	607	481	26	1.0	5-Jul	0	0	11	33	91	
Diva	3853	ProseedN. excel	<b>128</b>	464	622	28	1.8	7-Jul	0	0	25	55	100	
Midnight	3539	check	<b>127</b>	337	740	26	2.3	8-Jul	0	0	0	5	78	
	157	3805	UM/soma	<b>125</b>	517	544	24	1.0	5-Jul	0	0	7	25	88
A99-2950	3771	UM	<b>115</b>	435	541	29	1.5	7-Jul	0	0	8	33	94	
A97-1287	3802	Int'l-DLF	<b>115</b>	335	638	25	1.3	7-Jul	0	0	10	35	91	
A99-2626	3792	Mag-plots	<b>115</b>	404	568	24	1.3	7-Jul	0	0	3	13	73	
A99-3124	3777	UM	<b>111</b>	355	588	26	1.0	7-Jul	0	0	2	11	70	
Evora	3803	Int'l-DLF	<b>109</b>	314	608	26	1.0	7-Jul	0	4	33	55	96	
A99-2679	3774	UM	<b>105</b>	335	554	24	1.0	7-Jul	0	0	1	9	73	
Park	3540	check	<b>104</b>	321	562	33	2.5	30-Jun	3	35	94	100	100	
Unique	3794	check	<b>99</b>	312	526	23	1.5	10-Jul	0	0	1	13	68	
BAR Pp 0468	3799	Barenbrug	<b>93</b>	343	444	25	1.0	7-Jul	0	0	5	18	80	
A97-1436	3764	UM	<b>87</b>	299	439	24	1.0	7-Jul	0	0	10	33	89	
Huntington	3854	ProseedN. excel	<b>84</b>	288	426	31	1.3	3-Jul	0	15	68	90	100	
A93-201	3850	ProseedN. excel	<b>79</b>	297	377	27	1.3	2-Jul	0	9	53	80	100	
PpH8510	3851	ProseedN. excel	<b>73</b>	154	468	24	1.0	6-Jul	0	2	25	55	90	
	1949	3808	UM/soma	<b>67</b>	158	411	24	1.0	7-Jul	0	0	9	35	85
Thorough-blue	3852	Proseed/Nexcel	<b>67</b>	254	311	29	1.5	1-Jul	0	24	80	95	100	
Bariris	3798	Barenbrug	<b>64</b>	243	303	32	2.0	5-Jul	0	3	43	80	100	
Mystere	3855	ProseedN. excel	<b>53</b>	123	329	32	1.3	3-Jul	0	3	45	58	92	
	640	3806	UM/soma	<b>48</b>	103	303	22	1.0	5-Jul	0	0	5	18	60
LSD @5% level			<b>16</b>	92	91	2	0.9	2	1	4	9	12	11	

Mean seed yield 2009-10= 424#/ac.

Experimental Design: RCB with 4 reps

\* Lodging-1=erect ;9=flat

All plots cut 8/8/09, desiccated with 1 pt. Gramoxone Max+NIS 8/12/09, and burned 8/23/09

Management:

120+30+40+10s applied 10/17/09

.75pt. 2,4-D+.75pt Banvel applied 9/22/09

3 oz. Tilt applied 5/27/10

**Table 4.**

2008 Kentucky Bluegrass Variety Trial  
Field 5 Magnusson Research Farm

Variety	Seed lot	Seed Yield		Harvest			% Heading			
		Mean	(#/ac.)	Ht.(In.)	Lodging*	Date	22-May	26-May	1-Jun	12-Jun
Dragon	3671	<b>168</b>	633	25.8	1	5-Jul	9	35	85	100
Abbey	3608	<b>157</b>	591	21	1	5-Jul	0	1	48	90
Park	3888	<b>98</b>	368	29.8	1	30-Jun	38	80	100	100
A99-2679	3774	<b>89</b>	337	19.8	1.3	13-Jul	0	0	9	58
A99-3124	3872	<b>86</b>	326	19	1.3	12-Jul	0	0	4	50
A99-2950	3771	<b>85</b>	321	22.5	1	9-Jul	0	1	35	90
A97-1436	3764	<b>83</b>	314	21.5	1.5	10-Jul	0	0	30	89
Unique	3794	<b>80</b>	303	19.5	1	12-Jul	0	0	4	53
A99-2626	3792	<b>79</b>	299	17.3	1	13-Jul	0	0	7	53
Midnight	3539	<b>75</b>	281	20.5	1	12-Jul	0	0	5	60
LSD @ 5% Level		<b>21</b>	81	2.4	0.4	4	5	8	9	10

Mean seed yield= 377#/acre

Experimental Design: RCB w/4 reps

Management:

Fertilized 70+20+30+7s 10/15/09

.75pt. 2,4-D+.75pt Banvel applied 9/22/09

3 oz. Tilt applied 5/27/10

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**Table 5.**

2007 Tall Fescue Seed Production Variety Trial  
Magnusson Research Farm -F7NW

Variety	Seed lot	Seed Yield					Harvest-2010	
		% of mean	#/ac.				Lodging*	Ht.(in.)
		2008-9	2008-9	2010**	2009	2008		
2124-4-A	3833	<b>144</b>	<b>1388</b>	NH	925	1851		
Barvado	3800	<b>127</b>	<b>1218</b>	<b>493</b>	613	1822	1.3	38
2050-7-A	3832	<b>126</b>	<b>1212</b>	NH	723	1702		
2012-2-A	3830	<b>126</b>	<b>1209</b>	NH	542	1875		
2024-10-C	3831	<b>125</b>	<b>1200</b>	NH	714	1686		
Wolfpack	3718	<b>113</b>	<b>1083</b>	NH	575	1590		
Rembrandt	3834	<b>112</b>	<b>1080</b>	NH	555	1606		
Bingo	3714	<b>112</b>	<b>1075</b>	NH	613	1537		
Barcarella	3823	<b>97</b>	<b>935</b>	<b>508</b>	595	1276	5.0	45
Drover	3828	<b>94</b>	<b>904</b>	<b>401</b>	580	1229	3.8	43
Bariane	3825	<b>75</b>	<b>724</b>	<b>290</b>	388	1059	6.5	43
BarElite	3824	<b>73</b>	<b>697</b>	<b>297</b>	297	1097	6.3	43
Barolex	3826	<b>67</b>	<b>644</b>	<b>147</b>	219	1070	7.5	40
PBR	3801	<b>58</b>	<b>561</b>	<b>132</b>	169	952	6.0	39
Pradel(mf)	3829	<b>51</b>	<b>492</b>	<b>114</b>	337	647	6.3	43
LSD @5% level		<b>16</b>	<b>154</b>	<b>110</b>	141	251	<b>1.1</b>	<b>3</b>

2008 average yield = 1400 #/ac.      2009 average yield = 523 #/ac.

2 year average    961 #/ac.

Management:

Seeded 5/18/07 under wheat - 6#/ac.

120+30+40+10s applied 10/17/09

Experimental Design:RCB with 4 reps

\* Lodging; 1=erect; 9=flat

\*\* Only harvested forage type fescues 7/15/10

**Table 6.**

2008 Fine Fescue Variety Trial  
 F5 Magnusson Research Farm-Roseau,Mn

Variety	Species	Seed yield(#/ac.)		Harvest		
		2009	2010	Ht.(in.)	Lodging*	Date
MN-HD1	Hard	232	<b>827</b>	27	1	7/2/10
Chariot	Hard	48	<b>662</b>	29	1	7/2/10
SR3150	Hard	98	<b>656</b>	29	1	7/2/10
LongfellowII	Chewings	NH	<b>638</b>	35	4.3	7/7/10
Azay	Sheep	NH	<b>506</b>	22	1	7/2/10
67135	Sheep	NH	<b>207</b>	33	4	7/7/10
LSD @ 5% level		53	<b>176</b>	2	0.6	1

Experimental Design: RCB with 4 reps

\* Lodging-1=erect ;9=flat

Management:

Residue clipped/ baled off after harvest 8/12/09

2,4-D+ Clarity applied 9/16/09

Fertilized 70+20+30+7s 10/15/09

12 oz. Fusilade DX applied 5/6/10

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**Table 7.**

2009 Prairie Junegrass(*Koeleria macrantia*) Variety Trial  
 Magnusson Research Farm-2010  
 Seeded 7/23/09\*

Source-Origin	Line	Seed yield (#/ac.)	% Stand 7/12/10	Ht.(in.) harvest	%Heading	
					5/24/10	6/2/10
Colorado	KC	101	88	19	8	33
Nebraska	ND(KN)	110	85	19	7	27
Weaver Dunes-SE. Mn	WD	13	72	19	T	8
LSD @ 5% leve		63	9	NS	6	21

Experimental Design:RCB with 3 reps

Harvest Date 7/12/2010

\*Seeding date probably too late for optimum yield in 2010

55+30+40+8s applied 10/20/09

**Table 8.**

2009 Perennial Ryegrass Winter Hardiness Variety Trial

St.Paul ,Mn

seeded 9/14/09

Roseau

seeded 9/3/09

Winter Injury\*

Variety	seed lot	Winter Injury*	
		St.Paul 4/20/2010	Roseau 4/24/2010
Affinity	3500	1	1
Arctic Green(MHT)	3900	1.1	1
Brightstar SLT	3661	1.3	1
FTM blue c1-09	3914	1	1
FTM red c1-08	3915	1	1
FTM white c1-09	3916	1.5	1
NK-200	3538	1.3	1
Quebec	3913	1	1
Ragnar II (P201)	3611	1	1
Ribeye(annual)	3689	5	3.8
Spreader III x P201	3910	1	1
Survivor	3848	1	1
WH x TQ(Polar Green)	3372	1	1
MSP comp. Watkins	3912	1.8	1
LSD @5% level		0.6	0.6

Experimental Design=RCB with 4 reps

\*Winter Injury- 1=no injury;9=dead

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**Table 9.**

2010 Grid Frame Stand\*Modification Trial

Magnusson Research Farm-Roseau,Mn

Fall Seeded Variety Arctic Green into wheat stubble

Stand\*\*

Treatment (%squares w/plants)	Seed Yield (#/ac.)
15%	838
33%	1010
50%	1118
100%	1186
LSD @5% level	299

\*Grid Frame consists of metal lattice with 6" x 7.5" squares;seeding done in 7.5" rows

\*\* Treatments= hand pulled all plants EXCEPT 1-2 plants left in specified % squares/plot

100% stand is natural solid stand in 7.5" rows

4- 2.5' x 2.5' grids per plot established 4/9/2010. 3 replications

Harvest Date- 7/29/10

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2009 Ryegrass Stand Evaluation- Magnusson Farm

Quest' Perennial ryegrass 1.5 mi. west of Roseau

Stand*	Seed Yield (#/ac.)
39%	553
56%	1048
73%	1066

\*Stand = % of the 6" x 7.5" grid frame squares with at least 1 plant

**Objective:**

Determine correlation of stand reduction level to seed yield



**Table 12.**  
2009 Early Plant Covers and Fall Plant Ryegrass  
Magnusson Research Farm- Roseau

Cover Crop	cover seeding rate(#/ac.)	Ryegrass-2010		Cover Crops- 2009		
		Seed Yield #/ac.	Lodging at harvest	Dry matter tons/ac.	cover % dry matter	cover Ht.(in.)
None	None	1412	8.0			
<b>Grasses</b>						
OP grain sorghum	20	1638	3.7	1.15	21	28
Manta millet	20	1573	5.7	1.89	31	27
barley	100	1005	3.0	2.05	41	28
Pipes sudangrass	40	1439	1.7	1.76	22	40
german millet	20	1501	6.0	1.92	22	28
Special Effort sorghum sudangrass	40	1588	2.3	1.93	19	43
Glenn spring wheat	150	1362	6.0	2.20	39	33
D.E. rape*	20	NH*	NH*			
Reeves oats	100	1415	4.0	2.81	36	38
pearl millet	20	1650	2.3	0.90	21	23
proso millet	20	1579	5.3	1.60	25	25
<b>Legumes/forbs</b>						
4010 field pea	150	1534	6.3	3.06	17	47
hairy vetch	30	601	3.7	1.53	17	18
crimson clover	30	1600	3.3	1.57	16	21
Mammoth red clover*	15	NH*	NH*			
AC Green chickling vetch	50	1436	5.7	2.00	16	33
berseem clover	15	963	2.0	1.71	14	21
TA 2053 soybean	100	1478	3.7	1.76	20	28
common buckwheat	60	1463	3.3	2.08	25	32
LSD @5% Level		260	2.8	0.47	2	7

\*not harvested - ryegrass stand insufficient for harvest  
Covers planted 6/18/09 and harvested 8/27/09 at 5" cutting height  
Ryegrass planted into remaining stubble after covers harvested 8/27/09 @ 5#/ac.  
Perennial ryegrass harvested 7/29/10

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**Table 12b.**  
2009 Late Cover Crop Species for Establishment of Perennial Ryegrass  
Magnusson Research Farm- Roseau

Cover crop	cover seeding rate(#/ac.)	Seed Yield (#/ac.)
None	None	1273
Spring canola	3.5	1359
Manta Millet	4.2	1237
Spring Barley	21.0	1350
Pipes sudangrass	8.3	1424
german millet	4.2	1133
Granite spring wheat	31.0	1412
D.E. Rape	4.2	755
Reeves Oats	21.0	1320
TA 2053 soybean	21.0	1225
Pearl millet	4.2	1436
proso millet	6.2	1201

LSD @5% level 283

All plots badly lodged at harvest- no growth regulator applied  
Ryegrass and covers seeded together on 8/12/09  
Perennial ryegrass harvested 7/31/10

**Objectives:**  
Determine dry matter yields of cover crops harvested prior to seeding ryegrass  
Determine effect of cover species on ryegrass seed yield



**Table 15.**

2010 Fungicide Application to 'Arctic Green' Perennial Ryegrass

2 Locations= Pieper Farm and Magnusson Research Farm

Treatment	Rate	Seed Yield (#/ac)		
		Pieper	MagPlots	2 Location mean
1) Folicur *****	4 oz.	<b>663</b>	NA	NA
2)Folicur	4 oz.+ .25%NIS	<b>740</b>	1014	877
3)Tilt	4 oz.	<b>693</b>	880	787
4)Quilt	12oz.	<b>907</b>	1088	998
5)No Treatment*		<b>226*</b>	951	589
6)Absolute	6oz.+ .5%HCCOC	<b>1094</b>	1103	1099
LSD @5% level		<b>238</b>	202	167

Treatment	Rate	Pieper location only				
		Test wt. (#/bu.)*		30-Jun	at Harvest	
		Pieper	MagPlots	Rust**	Color***	Lodging****
1) Folicur *****	4 oz.	25.9	NA	4.0	1.3	5.7
2)Folicur	4 oz.+ .25%NIS	26.2	27.9	3.3	2.7	7.0
3)Tilt	4 oz.	26.0	27.2	3.0	2.0	5.3
4)Quilt	12oz.	26.9	28.2	3.0	4.3	6.7
5)No Treatment*		19.9	26.4	6.0	1.0	4.0
6)Absolute	6oz.+ .5%HCCOC	26.4	28.6	2.0	6.3	4.0
LSD @5% level				1.6	0.9	NS

Pieper Location = Dan Pieper Farm- Sandy Shores ,Lake of the Woods

MagPlots Location = Magnusson Research Farm

\* Test wt.- 1 composite sample from each treatment location

\*No treatment on Pieper location has very light seed and actual seed yield may be lower than indicated

\*\*Rust visual rating- 1=least;9=worst

\*\*\*Color-visual rating 1=green;9=brown

\*\*\*\*Lodging-1=erect;9=flat

\*\*\*\*\* - Folicur with no adjuvant -Pieper only

**Pieper** Applications 6/22/10. Harvested 7/21/10

cldy wind 0-5 ese 65F Heavy pollen shedding

**Magnusson Research Farm Plots** Application date 6/24/10.

Harvest date 7/29/10- All plots severely lodged- no observed differences among treatments

Trade name	common name	Active (#/gal.)
Folicur	tebuconazole	3.6#
Tilt	propiconazole	3.6#
Quilt	propiconazole+azoxystrobin	1.04#+.62#
Absolute	tebuconazole+trifloxystrobin	2.18#+2.18#

**Objectives:**

Determine best treatment option for fungicide applications on heavy infestations crown and stem rust



**Table 18.**

Large Plot Grower Harvest Spring Urea and Foliar 'N' Applications  
 To 'Tandem' Perennial Ryegrass  
 Magnusson Farm - Roseau, Mn

Applications*	Spring N Fertilizer applied	Total nitrogen applied	Corrected Clean Seed Yield		clean seed Test wt. per bushel
			(#/ac)	% moisture at harvest	
1	0	50#	986	12.1	29.9
2	25	75#	979	14.2	29.1
3	50	100#	800	15.6	28.6
4	50+3**	103#	1173	15.4	27.9
LSD at 5% level			136	3	0.8

\*N urea source treatments applied 5/12/10. Grower applied 50+30+30 in October 2009 to entire field.  
 \*\*Foliar treatment=1 gallon/acre RSA gradual N 30-0-0 (3# nitrogen) 100% headed - pollen shedding- 6/30  
 Experimental Design= RCB with 3 replications(12 plots)  
 Plot size= 25' x 500'(.29acres) - Entire plot swathed and combined separately by Magnusson Farms  
 Sub samples taken from each plot to determine %clean seed,moisture and test wt.

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**Table 19.**

2010 Top Dressing of Nitrogen Fertilizer to Perennial Ryegrass  
 At 2 On Farm Locations

Treat#*	Additional spring #N applied 46-0-0		Seed yield % of mean					Mag Helm		Mag Helm		Mag Helm	
	Mag	Helm	2009-10			2010		Color **	Lodging***	Ht.(in.)	Ht.(in.)	Ht.(in.)	
			all location	Roseau	LOW	Mag	Helm						
1	0	0	74	69	80	77	99	2.0	2.0	2.8	2.0	23.5	22.8
2	50	90	109	108	110	106	114	3.0	4.5	7.0	7.3	26.3	24.8
3	50	90	113	110	117	99	115	3.0	5.0	6.5	7.5	25.8	25.0
4	50	90	95	98	91	103	92	4.0	6.3	6.3	6.0	26.0	24.8
5	50	90	96	96	97	104	101	5.8	7.0	6.5	5.0	26.0	24.3
6	50	90	92	101	83	102	79	7.3	8.0	6.3	3.8	25.3	24.5
7	25+25	45+45	123	120	127	109	107	3.8	6.0	7.3	7.5	27.0	24.5
8	25+25	45+45				102	92	4.8	6.8	6.8	8.0	26.0	24.8
9	47+3	NA				98	NA	4.3	NA	6.0	NA	25.5	NA
LSD @5% level			12	16	15	10	14	1.4	1.3	1.5	1.7	1.3	1.2
Mean seed yield - #/acre						1144	1456						

\* Applications dates and sequential treatment dates listed below for 2009-10  
 \*\* Color,1=brown stubble; 9=green stubble  
 \*\*\*Lodging,9=flat;1=no lodging  
 \*\*\*\*Foliar apply during late heading 6/30/10- Magnusson site only  
 Foliar treatment= 1 gallon/acre RSA Gradual N(30-0-0) 3# nitrogen

**Location- Mag=** Magnusson Farms just southwest of Magnusson Research Farm var. 'Tandem'  
 50+30+30 applied to all plots October 2009  
**Location- Helm=** Helmstetter Farm north of Roosevelt var. 'Arctic Green'  
 30+30+30 Applied to all plots October 2009  
 Both locations fall seeded into summer fallow/preventive plant

Treat#	Application Dates		Growing Degree Days at Application	
	2009	2010	2009	2010
1	0	0		
2	5/14/2009	4/19/2010	460	380
3	5/30/2009	5/6/2010	740	670
4	6/11/2009	5/21/2010	1000	1050
5	6/25/2009	5/29/2010	1500	1280
6	7/9/2009	6/10/2010	1800	1600
7	5/14+6/17	5/6+5/29	460+1500	670+1280
8		5/21+6/10		1050+1600
9		5/21+foliar****		

**Objectives:**

Determine best timing of spring urea applications.

**Table 20.**

2009-10 Top Dress Fertility - Arctic Green Perennial Ryegrass  
Magnusson Research Farm

trt #	Total # nitrogen fertilizer	Urea source		Spring application timing	Seed Yield		Harvest		Harvest date	Stubble green up* 7/27/2010
		Spring-N Application Rate	Liquid** foliar applications		% of mean	(#/ac.)	Lodging	Height		
1	7	0		0	<b>70</b>	816	1.0	21.8	20-Jul	1.5
2	107	100#		5/10/2010	<b>105</b>	1224	8.5	25.3	25-Jul	4
3	57	0		0	<b>83</b>	968	2.0	22.0	20-Jul	1
4	57	0		0	<b>81</b>	950	2.8	22.0	20-Jul	1
5***	107	38#	4 x 3#	5/21/2010	<b>97</b>	1133	7.3	24.8	25-Jul	2.8
6***	107	44#	2 x 3#	5/21/2010	<b>115</b>	1345	7.5	25.3	25-Jul	3
7	82	25#		5/10/2010	<b>97</b>	1133	2.5	23.0	21-Jul	1
8	107	50#		6/1/2010	<b>102</b>	1195	4.5	23.0	24-Jul	3
9	82	25#		6/1/2010	<b>94</b>	1099	3.8	23.0	21-Jul	2
10	107	50#		5/10/2010	<b>101</b>	1180	8.3	25.5	25-Jul	3.3
11	107	25#+25#		5/10+6/10	<b>104</b>	1218	7.5	25.0	25-Jul	2.3
12	107	50#		6/10/2010	<b>108</b>	1264	4.3	24.5	25-Jul	3
13	107	50#		6/22/2010	<b>99</b>	1162	2.3	23.0	23-Jul	5.3
14	107	25#+25#		5/10+6/10	<b>111</b>	1296	6.3	24.5	25-Jul	2.3
15	105	16+16+16		4/17+6/1+6/22	<b>107</b>	1247	7.3	25.0	25-Jul	3.3
16***	104	16+16	1 x 15#	4/17+6/1+(6/22 liquid)	<b>110</b>	1291	6.3	24.8	25-Jul	2.5
17***	107	47#+Npact	1 x 3#	5/10+(6/22 liquid)	<b>108</b>	1265	8.0	25.8	25-Jul	1.8
18***	105	47#+BlackLabelZn	1 x 1#	5/10+(6/22 liquid)	<b>107</b>	1251	8.0	25.5	25-Jul	1.5
LSD @5% level					<b>19</b>	222	2.0	1.6	2	1.7
Mean seed yield- #/ac.					1169					

All plots received 7+31+40 and all plots except #1 & #2 received an additional 50#N(urea) 10/14/09  
Ryegrass fall seeded into wheat stubble

\*Stubble color -post harvest as measure of nitrogen use/availability ;1=no regrowth, brown stubble ; 9= green,lush regrowth

\*\* Liquid foliar applications:(# of applications x # nitrogen/application)

\*\*\*Trt.#

- 5 4 x 3# applications(28-0-0/N-PaK28) timing=Broadleaf ,grass ,growth regulator,and fungicide
- 6 2 x 3# applications(28-0-0/N-PaK28) timing=Broadleaf and fungicide
- 16 1 x 15# application(28-0-0/N-PaK28) on 6/22
- 17 1 x 3# Nortrace N-Pact (26-0-0) on 6/22
- 18 1 x 1# N BlackLabel ZN (6-20-0-.77zn)on 6/22

Dry fertilizer used:

7+31+40 11-52-0(MAP) + 0-0-60(MOP)

Urea 46-0-0

### Objectives:

Determine best timing and rate of spring fertilizer application

Determine effect of liquid N applications

**Table 21.**

2009-10 Fertility Source x Rate x Timing

Perennial Ryegrass v. 'Arctic Green' spring planting under wheat- Magnusson Research Farm

Trt.#	Fertilizer Rate:	Application timing*	Seed Yield- % of Mean			2010 Yield (#/ac.)	stubble Color** 7/27/2010	Harvest		
			2009-10	2010	2009			date	Lodging	Ht.(in)
1	0		41	31	51	348	2.5	19-Jul	1.0	19.0
2	60+0+0	14-Oct	82	82	82	934	1.0	19-Jul	1.8	21.5
3	100+0+0	14-Oct	101	100	101	1135	1.0	21-Jul	6.0	24.0
4	50urea+50ESN	14-Oct		101		1148	1.0	20-Jul	6.0	23.3
5	100+0+0+22s	14-Oct	102	103	100	1175	1.3	19-Jul	4.8	23.5
6	140+0+0	14-Oct	108	109	107	1242	1.0	22-Jul	7.0	25.5
7	90urea+50ESN	14-Oct		114		1300	1.3	23-Jul	7.3	25.5
8	60+0+0	10/14+6/1	83	69	96	789	5.0	20-Jul	3.0	22.0
9	100+0+0	10/14+6/1	106	100	111	1135	3.3	19-Jul	1.0	23.0
10	(25+25ESN)+(25+25ESN)	10/14+6/1		96		1086	3.8	20-Jul	3.0	22.3
11	100+0+0+22s	10/14+6/1	102	101	102	1153	3.3	20-Jul	2.5	22.5
12	140+0+0	10/14+6/1	107	114	99	1296	4.5	20-Jul	4.5	23.5
13	60+0+0	6-May	97	98	96	1110	3.5	23-Jul	4.0	23.5
14	100+0+0	6-May	114	108	119	1224	2.3	20-Jul	2.8	25.0
15	75+25ESN	6-May		106		1206	2.0	23-Jul	5.8	23.5
16	100+0+0+22s	6-May	109	107	110	1220	2.0	21-Jul	4.3	24.5
17	140+0+0	6-May	124	121	126	1371	3.5	23-Jul	6.0	24.8
18	60+0+0	10/14+4/14+6/1		97		1106	4.0	21-Jul	5.8	22.3
19	100+0+0	10/14+4/14+6/1		108		1231	2.3	19-Jul	1.8	25.5
20	(17+17ESN)+(17+17ESN)+33	10/14+4/14+6/1		101		1151	3.0	23-Jul	5.8	25.0
21	100+0+0+22s	10/14+4/14+6/1		114		1293	2.5	23-Jul	7.8	26.0
22	140+0+0	10/14+4/14+6/1		117		1331	3.0	23-Jul	7.8	25.8
LSD @5% level			12	13	16	155	1.1	1.9	1.4	1.5
Treatment mean #/acre=				1136	1274					

All plots received 7+31+40 10/14/09

\*Split fertility rates applied equally between fall and spring dates

\*\*Stubble color - post harvest ;1=no regrowth, brown stubble ; 9= green,lush regrowth

Fertilizer used:

7+30+40 11-52-0(MAP) + 0-0-60(MOP)  
 AMS 21-0-0-24  
 Urea 46-0-0  
 coated Urea(ESN) 44-0-0

**Objectives:**

Determine effect of fertilizer rate,timing and grade to perennial ryegrass for seed production

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**Table 22.**

2009 Fertilizer Applied at Planting to 'Arctic Green' Perennial Ryegrass

Planting Date- 9/20/2009

Fertilizer rate	Seed Yield (#/ac.)
1) 0	1324
2) 7+31+12	1002
3) 5+24+0	1084
4) 5+24+30	1074
LSD @5% level	NS

Ryegrass seeded in 3 -6" rows/ plot x 4 replications

2 rows of spring wheat seeded between plots

**Table 23.**

2010 Early Spring applications of Fertilizer to 'Arctic Green' Perennial Ryegrass  
2 Lake of the Woods Locations and Magnusson Research Farm-Roseau,Mn.

Analysis of Fertilizer applied    Fertilizer used		LOCATION										
		Helmstetter			Magnusson		Helmstetter			Magnusson		
		3 location			Pieper		Pieper					
		Mean			seed yield (#/ac.)					Dry matter(tons/acre)		
	No Treatment	<b>1276</b>	1590	941	1296		3.1	2.1	3.9			
9+30+30+7s	MES10 +30 K2O(MOP)	<b>1283</b>	1646	972	1231		3.2	3.0	3.3			
12+30+30+14s	MES15 +30 K2O(MOP)	<b>1267</b>	1476	995	1331		3.6	3.0	3.9			
9+30+30+7s+1z	MESZ +30 K2O(MOP)	<b>1344</b>	1690	1095	1247		3.2	2.5	4.8			
6+30+30	MAP + 30 K2O(MOP)	<b>1269</b>	1467	1070	1271		3.2	3.0	4.7			
6+30+30+33s+16Mg	MAP+ 30 K2O(KMAG)	<b>1188</b>	1438	961	1166		3.2	3.2	3.4			
	LSD @ 5% level	<b>134</b>	203	NS	NS		NS	NS	0.9			
					Harvest Ht.(in.)			Lodging at Harvest(9=flat)				
	No Treatment	24.8	24.5	25.8		7.5	4.5	7.0				
9+30+30+7s	MES10 +30 K2O(MOP)	24.8	25.8	26.8		7.5	7.0	8.3				
12+30+30+14s	MES15 +30 K2O(MOP)	24.8	25.5	25.8		8.3	6.3	8.0				
9+30+30+7s+1z	MESZ +30 K2O(MOP)	25.3	25.8	27.0		8.3	7.0	8.5				
6+30+30	MAP + 30 K2O(MOP)	25.0	25.5	27.5		8.3	5.7	8.5				
6+30+30+33s+16Mg	MAP+ 30 K2O(KMAG)	25.3	24.5	26.5		7.5	5.0	7.8				
	LSD @ 5% level	NS	NS	NS		NS	1.8	1.4				

Plot size = 8' x 15'

Experimental design= RCB with 4 replications

**Magnusson Plots-** no fertilizer fall 2009

50# N applied along with treatments 4/17/10 + 50-0-0 applied 5/21/10

Soil test results 4/10/10 = ph 8.0 , Olsen P 15#, K 205#, 3%OM, ZN 0.5#, S 9#

**Helmstetter Plots-** 30+30+30 applied 10/09

Also add 50#N to all plots with treatments 4/21/10 +50-0-0 5/21/10

Soil test results 4/10/10 = ph 7.9 , Olsen P 19#, K 152#, 2.7%OM, ZN 0.5#, S 50#

**Pieper Plots-** 50+0+0 applied 10/09

Treatments applied 4/21/10(grower applied 80-0-0 4/21/10)

Soil test results 4/10/10 = ph 8.1 , Olsen P 20#, K 140#, 3.5%OM, ZN 1.1#, S 64#

**Objectives:**

Determine effect on seed yield and other yield components of early spring applied Microessentials fertilizer

**Table 24.**  
Park Kentucky Bluegrass Fertility Trials Summary  
at 2 Northern Minnesota Locations- 2010 Harvest

Fertilizer Treatment	Applied Rate**	Application Date	Treatment Explanation	Overall***						2010 Data						
				% of mean	Seed Yield as % of yearly mean/location				Seed Yield (#/acre)			Mean of 2 locations at harvest				
					2010		2009		2008		Mean of Roseau locations	LOW	LOW	Ht(in.)	Lodging*	
Roseau	LOW	Roseau	LOW	Roseau	LOW	Roseau	LOW	2								
1) MAP+MOP+urea	115+70+100	10/15/2009	Typical grower application and timing(CHECK)	102	112	92	109	99	115	83	343	408	278	32	5.4	
2) MAP+MOP+AMS+urea	115+70+100+22s	10/15/2009	Typical grower application and timing+ AMS	105	121	95	101	94	132	88	363	439	288	32	4.1	
3) MAP+MOP+AMS+urea+ESN(40#N)	115+70+100+22s	10/1/2009	Early timing of typical application rate+AMS+coated N	126	114	138					416	415	417	33	5.8	
4) MAP+MOP+AMS+urea	115+70+100+22s	10/1/2009	Early timing of typical application rate+AMS	112	107	114		108		119	367	390	343	33	4.9	
5) MAP+MOP+AMS+urea+ESN(20#N)	115+70+100+22s	10/15/2009	Typical grower application and timing+AMS+coated N	111	101	121					367	368	366	32	4.9	
6) MAP+MOP+AMS+urea urea 60+0+0 4/19/2010	55+70+100+22s	10/15/2009	Typical application rate+AMS but 1/2 N applied in spring	84	85	83					279	308	250	34	7.3	
7) MAP+MOP+AMS+urea urea 20+0+0 4/19/2010	95+70+100+22s	10/15/2009	Typical application rate+AMS but 20# N applied in spring	101	85	93	109	119			295	310	281	33	5.1	
8)** MAP+MOP+urea	60+70+100	10/15/2009	Typical application date applied with 1/2 normal N rate	70	75	64					233	272	194	32	2.5	
LSD @5% level				20	28	29	17	32	12	27	67	103	87	1	1.5	
Trial year average- #/acre				332	364	302	682	579	423	496						

\*Lodging- 1=no lodging;9=severe lodging

\*\* Nitrogen application(average)=115#/ac.

\*\*\*Overall mean=calculated for available number of years and locations except treatment #8 is 1/2 rate

2 on farm locations=

LOW- Lake of the Woods 2008-10(Helmstetter location)=130#N

Roseau-2010(Dahlgren location)=100#/ac. N

Roseau-2008-9(Rice location)=100#/ac. N

Standard residue management,weed control and fungicide applications made by grower.

Experimental design: RCB with 4 reps

Soil Test Results for 10/11/2009

Roseau	LOW
PH- 7.8	PH- 7.7
Olsen P2O5-12#	Olsen P2O5- 20#
K2O - 214#	K2O - 140#
SO4 - 12#	SO4 - 14#
%OM -5.1%	%OM -5.1%

Fertilizer Sources/Analysis:  
MAP= 11+52+0  
MOP =0+0+60  
AMS(Ammonium sulfate)= 21+0+0+24s  
ESN(coated urea)= 43+0+0  
Urea= 46+0+0

**Objectives:**

Determine effect of fertilizer grade and application dates to kentucky bluegrass for seed production



**Table 26.**

2010 Large Plot Grower Harvest Starter Fertilizer Trial  
Spring Wheat Underseeded with Ryegrass at 3 Locations

Fertility**		Yield	test wt.	
Treatment	Location*:	(bu./ac)	(#/bu.)	Protein
MES 10	<b>Helmstetter Farm</b>	46.31	63.2	11.87
MAP	<b>Helmstetter Farm</b>	46.25	63.2	11.83
	LSD @10% level	NS(1.1)	NS(0.25)	NS(0.1)
MESZ	<b>Howell Farm</b>	63.19	64.1	14.53
MAP	<b>Howell Farm</b>	62.58	63.9	14.5
	LSD @10% level	NS(8.09)	NS(0.51)	NS(0.39)
MES 10	<b>Magnusson Farm</b>	67.10	59.8	10.93
MAP	<b>Magnusson Farm</b>	65.57	59.9	10.77
	LSD @10% level	NS(6.3)	NS(0.67)	NS(0.19)
MES 10	<b>3 Location mean</b>	58.87	62.33	12.44
MAP	<b>3 Location mean</b>	58.13	62.37	12.37
	LSD @10% level	NS(1.94)	NS(0.18)	NS(0.09)

Composition of listed elements for MAP vs. MES10 treatments at 3 locations  
Flag leaf tissue samples taken at flowering 7/1/10

Treatment	N(%)	P(%)	K(%)	CA(%)	MG(%)	S(%)	ZN(ppm)
MAP	2.07	0.247	2.66	0.37	0.219	0.182	10.48
MES10/MESZ	2.14	0.247	2.51	0.363	0.239	0.186	11.61
LSD @10%	0.26	0.03	0.29	0.06	0.03	0.03	1.32

\*Location=

Helmstetter- North of Roosevelt- Lake of the Woods area

Howell- Danny Howell Farm- SE of Badger- Roseau cty.

Magnusson Farm-2mi. West of Magnusson Research farm-Roseau cty.

Plot size= 80' x 500'-- Experimental Design= RCB with 3 reps

\*\*Fertility treatments applied by grower in furrow at seeding.

MES10= 9-30-30-10s

MESZ= 9-30-30-10s-1zn

MAP= 6-30-30

Soil test results	PH	% Organic matter	Olsen		DTPA-	
			P2O5 #/ac.	K2O #/ac.	Zinc #/ac.	SO4 #/ac.
Helmstetter	8	4.10	19	304	1.1	26
Howell	8	2.80	15	215	0.4	25
Magnusson	8.1	3.20	17	280	0.4	12

### Objectives:

Determine effect of grower applied Microessentials vs. MAP fertility treatments applied in furrow to spring wheat underseeded with perennial ryegrass.

**Table 27.**

In Furrow Fertilizer Applied to Wheat with Underseeded  
 Arctic Green Per.Ryegrass- 2010 Yield data  
 Magnusson Research Farm Seeded 4/24/10

**Fertilizer****Treatment**

<b>Analysis</b>	Treatment	Trt.#	Bu./acre	test wt	moisture	Protein
9+30+30+7s	MES10 +30 K2O	1	74.95	59.97	13.77	11.77
18+60+30+14s	MES10(2x) +30 K2O	2	76.15	59.53	14.07	11.40
18+60+60+14s	MES10(2x) +60 K2O	3	70.10	59.67	13.95	11.80
9+30+30+14s	MES15 +30 K2O	4	75.31	59.72	13.97	11.57
9+30+30+7s+1z	MESZ +30 K2O	5	72.67	59.43	13.83	11.23
9+30+30	MAP + 30 K2O	6	74.65	59.55	13.95	11.07
	No Treatment	7	68.86	59.78	13.75	11.57
9+30+30+7s	<small>broadcast MES10+30K2O</small>	8	67.35	59.53	14.03	11.30
*LSD @10%			6.29	0.22	0.19	0.49

\*Designed as an RCB with 4 reps but only 3 replicates used because of water damage

60# N Urea broadcast preplant to entire area

Soil test results	PH	% Organic matter	Olsen P2O5 #/ac.	K2O #/ac.	DTPA-Zinc #/ac.	SO4 #/ac.
4/22/10 composite-all treatments	8	3.4	17	250	0.5	69
<b>October 15 soil sample by treatment</b>						
MES10 +30 K2O	1	8.2	2.9	14	270	0.8
MES10(2x) +30 K2O	2	8.2	3.0	16	276	0.6
MES10(2x) +60 K2O	3	7.8	2.8	62	446	0.8
MES15 +30 K2O	4	8	3.0	14	248	0.6
MESZ +30 K2O	5	8.2	2.9	14	240	0.6
MAP + 30 K2O	6	8.1	3.1	12	252	0.6
No Treatment	7	8.2	2.8	10	254	0.6
broadcast MES10+30K2O	8	8.1	2.8	14	258	0.8

**Objectives:**

Determine effects of Microessentials in furrow application to spring wheat underseeded with perennial ryegrass.