2001

On-Farm Assessment of Starter K

SK-28

Adrian Johnston
Discretional Funding

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Summary:
A series of on-farm strip and small plot trials were carried out in Saskatchewan and Alberta (small plot only) in 2001 to evaluate the impact of starter KCl applications on spring and durum wheat response. Severe drought conditions limited the yield potential of most on-farm trials seeded on stubble, while fallow seeded trials showed average yields. Complications in capturing and retrieval of data (on-going) hampered the collection of all results for 2001. Where data was obtained, no response to starter KCl was recorded. A similar response was recorded in the small plot trials, with one exception. A positive K response was recorded at one trial location, significantly increasing grain yield over the check which received only N and S. Low yield potential, and warm soil conditions at most locations, is attributed to the lack of a P or K yield response. On-farm strip trials have been organized at four locations for 2002 (8 fields) to continue the evaluation. A cut-back in the Agrium field research program prevented the continuation of any small plot trials in 2002.

Lyle Minogue, Lacadena, SK **Summer 2001**

Durum wheat (AC Avonlea) seeded on chem-fallow fields
Soils were full of water at seeding (4" PAW)
Rainfall was 1" in May + 3" in July = 4" GSP
Farmer applied to both fields: 63 N, 35 P_2O_5, 0 K_2O, 0 S

Field 1: SE29 – 23 – 17 – W3 (seeded April 30 – combined Aug. 22)
Soil test recommendations for a target yield of 60 bu/A Durum wheat:
ETL: 20 N, 45 P_2O_5, 15 K_2O, 0 S
Wag: 41 N, 38 P_2O_5, 69 K_2O, 0 S (4.3" stored soil water + 4.3" ppt)

Wag back-cast based on precipitation received:
Estimated yield of 50 bu/A using 33 N, 31 P_2O_5, 56 K_2O, 0 S

Field Trial Results:

Rep	Seedling Stand[z] (plant/m^2)		Grain Yield[y] (bu/A)	
	Check	+ 20 K_2O	Check	+ 20 K_2O
1	228	187	49.2	49.8
2	164	180	50.0	49.4
3	152	155	49.9	50.1
4	140	148	49.8	49.0
Mean	**171**	**168**	**49.7**	**49.6**

[z] Seedling stand counts made at 5-leaf stage of growth.
[y] Grain yield determined using the "load" feature on a GreenStar yield monitor, from field plots that were 30' x 5010'.

Field 2: SW20 – 23 – 16 – W3 (seeded May 5 – combined Aug. 30)
Soil test recommendations for a target yield of 60 bu/A Durum wheat:
ETL: 0 N, 35 P_2O_5, 15 K_2O, 0 S
Wag: 53 N, 38 P_2O_5, 72 K_2O, 7 S (4.3" stored soil water + 4.3" ppt)

Wag back-cast based on precipitation received:
Estimated yield of 56 bu/A using 50 N, 36 P_2O_5, 68 K_2O, 6 S

Field Trial Results:

Rep	Seedling Stand[z] (plant/m^2)		Grain Yield[y] (bu/A)	
	Check	+ 20 K_2O	Check	+ 20 K_2O
1	150	133	Data lost due to harvesting error	
2	142	180		
3	137	156		
4	143	164		
Mean	**143**	**158**	**Est: 45 bu/A**	

[z] Seedling stand counts made at 5-leaf stage of growth.
[y] Grain yield determined using the "load" feature on a GreenStar yield monitor, from field plots that were 30' x 5010'.

Comments: Soils were warm at seeding. A dry, hot summer followed a cool spring. Excellent yields for the moisture received. No yield response observed to starter KCl.

Bill Aulie, Rouleau, SK **Summer 2001**

Durum wheat (AC Avonlea and Kyle) seeded on stubble fields
Soils were full of water at seeding (4" PAW)
Rainfall was 1.6" in July
Farmer applied to both fields: 65 N, 22 P_2O_5, 0 K_2O, 6 S

Field 1: S1/2 25 – 14 – 22 – W2 (N of Yard)
Soil test recommendations for a target yield of 45 bu/A Durum wheat:
ETL: 40 N, 35 P_2O_5, 15 K_2O, 0 S, 0 Cl
Wag: 65 N, 24 P_2O_5, 50 K_2O, 5 S (3.9" stored soil water + 2.0" ppt)

Wag back-cast based on precipitation received:
Estimated yield of 40 bu/A using 60 N, 22 P_2O_5, 46 K_2O, 4 S

Field Trial Results:

Rep	Seedling Stand[z] (plant/m^2)		Grain Yield[y] (bu/A)	
	Check	+ 20 K_2O	Check	+ 20 K_2O
1	315	307		
2	335	343	Maps still	
3	339	335	Not available	
4	311	307	No difference	Observed?
Mean	**325**	**323**		

[z] Seedling stand counts made at 5-leaf stage of growth.
[y] Grain yield determined using IHC – ATS yield monitor, from field plots that were 30' x 5010'.

Field 2: NE11 – 14 – 22 – W2 (South field – lentil stubble)
Soil test recommendations for a target yield of 45 bu/A Durum wheat:
ETL: 50 N, 45 P_2O_5, 15 K_2O, 10 S
Wag: 65 N, 19 P_2O_5, 48 K_2O, 8 S (3.9" stored soil water + 2.0" ppt)

Wag back-cast based on precipitation received:
Estimated yield of 41 bu/A using 60 N, 17 P_2O_5, 44 K_2O, 7 S

Field Trial Results:

Rep	Seedling Stand[z] (plant/m^2)		Grain Yield[y] (bu/A)	
	Check	+ 20 K_2O	Check	+ 20 K_2O
1	283	256		
2	323	342	Maps still	
3	374	354	Not available	

4	268	307	No difference	Observed?
Mean	**312**	**315**		

[z] Seedling stand counts made at 5-leaf stage of growth.
[y] Grain yield determined using IHC – ATS yield monitor, from field plots that were 30' x 5010'.

Comments: Soils were warm at seeding. A dry, hot summer followed a cool spring. Excellent yields for the moisture received. Yield data not available.

Bews Agrow, Eatonia, SK **Summer 2001**

Durum wheat (AC Napoleon) seeded on chem-fallow
Soils were full of water at seeding (4" PAW), however, the surface was dry.
Rainfall was 0.33" in May, 1.19 in June, 0.91" in July, 0.02 in August = 2.45"
Farmer applied to both fields: 12 N, 17 P_2O_5, 0 K_2O, 0 S

Field 1: SE 28 – 26 – 23 – W3
Soil test recommendations for a target yield of 50 bu/A Durum wheat:
ETL: 35 N, 30 P_2O_5, 15 K_2O, 0 S
WAg: 67 N, 30 P_2O_5, 63 K_2O, 0 S (3.9" stored soil water + 4.0" ppt)

WAg back-cast based on precipitation received:
Estimated yield of 36 bu/A using 47 N, 21 P_2O_5, 44 K_2O, 0 S

Field Trial Results:

Rep	Seedling Stand[z] (plant/m^2)		Grain Yield[y] (bu/A)	
	Check	+ 20 K_2O	Check	+ 20 K_2O
1	206	217		
2	237	239		
3	235	258		
4	250	273		
Mean	**232**	**247**	**21.9**	**20.5**

[z] Seedling stand counts made at 5-leaf stage of growth.
[y] Grain yield determined from a single harvested strips in each plot weighted at seed plant.

Comments: Site was dry on the surface at seeding and field experienced poor emergence due to lack of spring rains. Area remained dry through the season with re-crop fields being a failure.

Kim and Owen Hartman, Elrose, SK **Summer 2001**

Durum wheat (AC Avonlea) seeded on stubble.
Soils were dry on the surface at seeding (estimated 1 1/2" PAW)

Rainfall was = 1.5"
Farmer applied to both fields: 75 N, 40 P_2O_5, 0 K_2O, 10 S

Field 1 (Elrose field – lentil stubble):
Soil test recommendations for a target yield of 60 bu/A Durum wheat:
ETL: 0 N, 45 P_2O_5, 15 K_2O, 0 S, 0 Cl
WAg: 72 N, 34 P_2O_5, 58 K_2O, 6 S (3.9" stored soil water + 3.5" ppt)

WAg back-cast based on precipitation received:
Estimated yield of 23 bu/A using 27 N, 12 P_2O_5, 21 K_2O, 2 S

Field Trial Results:

Rep	Seedling Stand[z] (plant/m^2)		Grain Yield[y] (bu/A)	
	Check	+ 20 K_2O	Check	+ 20 K_2O
1	41	44		
2	48	54		
3	61	49	Yield estimated at 7 bu/A	
4	34	41		
Mean	**46**	**47**		

[z] Seedling stand counts made at 5-leaf stage of growth.
[y] Grain yield estimated from field total yield.

Field 2 (New Land – wheat stubble):
Soil test recommendations for a target yield of 45 bu/A Durum wheat:
ETL: 85 N, 45 P_2O_5, 15 K_2O, 10 S
WAg: 65 N, 29 P_2O_5, 59 K_2O, 0 S (3.9" stored soil water + 3.9" ppt)

WAg back-cast based on precipitation received:
Estimated yield of 16 bu/A using 23 N, 10 P_2O_5, 20 K_2O, 0 S

Field Trial Results:

Rep	Seedling Stand[z] (plant/m^2)		Grain Yield[y] (bu/A)	
	Check	+ 20 K_2O	Check	+ 20 K_2O
1				
2	Stand not counted due to very			
3	poor emergence		Yield Estimate	<7 bu/A
4				
Mean				

[z] Seedling stand counts made at 5-leaf stage of growth.
[y] Grain yield estimated from field total yield.

Comments: This site was dry at seeding, resulting in poor emergence. Very dry conditions persisted through the growing season, resulting in a crop failure. Challenges were encountered with the yield monitor – data lost.

Agrium Small Plot Trials **Summer 2001**

In cooperation with Lenz Haderlein of the Agrium field research program, small plot trials were established at 6 locations in Saskatchewan and Alberta. The objective of this project was to look for starter K responses, as well as determine if varying the rate of starter K had any effect. Phosphorus was also included in the study as a variable, as was Zn at some of the locations.

The sites were fertilized with N and S to soil test recommendations. The treatments included combinations of P, K and Zn (only some locations):

1. 0 K 0 P
2. 0 K 25 P
3. 15 K 0 P
4. 15 K 25 P
5. 30 K 25 P
6. 45 K 25 P
7. 45 K 25 P 3 Zn

Small plot trial locations, growing conditions, crop grown and fertilizer recommendations from both NorWest Labs (NWL) and Western Ag Innovations (WAg), 2001.

Location Yield goal	Lab	Growing Conditions	Crop	Recommendations (lb/A)				
				N	P_2O_5	K_2O	S	Zn
Canwood	NWL	Poor	CWRS	70	20	53	0	0
60 bu/A	WAg			125	36	73	0	0
Humbolt	NWL	Poor-Ave	CWRS	93	47	52	0	7
70 bu/A	WAg			145	44	0	0	0.2
Lloyd	NWL	Average-Good	CWRS	35	37	47	0	0
60 bu/A	WAg			83	38	13	0	0
Naicam	NWL	Poor-Ave	CWRS	105	41	0	0	0
71 bu/A	WAg			135	12	0	0	0
Rosetown	NWL	Very Poor	Durum	49	35	0	0	0
47 bu/A	WAg			70	29	60	1	0.2
Standard	NWL	Very Poor	Durum	40	16	0	0	0
48 bu/A	WAg			70	29	61	0	.1

CWRS – hard red spring wheat.
The NWL recommendation is the rate of N and S that were applied at each location.

Potassium was recommended at 5 of the 6 trial locations, by at least one of the one of the soil testing labs.

Seedling emergence (plants/m^2) response to P, K and Zn treatments at Agrium trial locations, 2001.

Tmt	K_2O	P_2O_5	Zn	Canwood	Humbolt	Lloyd	Naicam	Rosetown	Standard
1	0	0	0	136	103	136	N/C	93	119
2	0	25	0	168	125	140		114	124
3	15	0	0	129	99	141		114	114
4	15	25	0	150	120	139		91	114
5	30	25	0	148	124	138		104	110

6	45	25	0	160	113	140		108	114
7	45	25	3	-	119	-		90	128
$LSD_{0.05}$				NS	NS	NS		NS	NS

N/C – data not collected.

No significant difference was found in the seedling emergence data collected. Addition of P or K improved seedling stand relative to the unfertilized check in most trials. The high rates of K in the P+K treatments (5-7) did not appear to have a negative impact on seedling establishment.

Grain yield (bu/A) response to P, K and Zn treatments at Agrium trial locations, 2001.

Tmt	K_2O	P_2O_5	Zn	Canwood	Humbolt	Lloyd	Naicam	Rosetown	Standard
1	0	0	0	21.0	23.2b	44.3	35.8	12.3	11.6
2	0	25	0	22.6	29.1ab	45.1	39.1	12.8	11.3
3	15	0	0	25.3	31.3a	41.4	39.6	13.8	11.1
4	15	25	0	19.9	32.7a	42.5	34.6	13.3	12.7
5	30	25	0	24.2	26.6ab	45.9	39.0	13.4	12.4
6	45	25	0	24.7	26.5ab	41.9	32.5	12.5	10.4
7	45	25	3	-	31.9a	-	-	13.5	10.4
$LSD_{0.05}$				NS	*	NS	NS	NS	NS

Warm soil conditions resulted in no response to either P or K at 5 of the 6 trial locations. Only at Humbolt was a response to K observed. The addition of K increased yields over the unfertilized check. While not significant, the addition of P alone increased yields over the check. Increasing the rate of K above 15 lb K_2O/A did not improve the hard wheat response.

Comments: The growing conditions of 2001 resulted in few P or K responses at the trial locations used in this study. All trial locations experienced conditions that resulted in grain yields lower than set in the yield goal. As a result, the soil supply of P and K were sufficient to meet the crop demand recorded. The response at Humbolt was visually identified during the growing season, more than likely reflecting a minor K deficiency at this location to balance the N rate applied.

Due to a cut-back in resources, the Agrium field research program was unable to offer support to the starter-K project with field plots in 2002.