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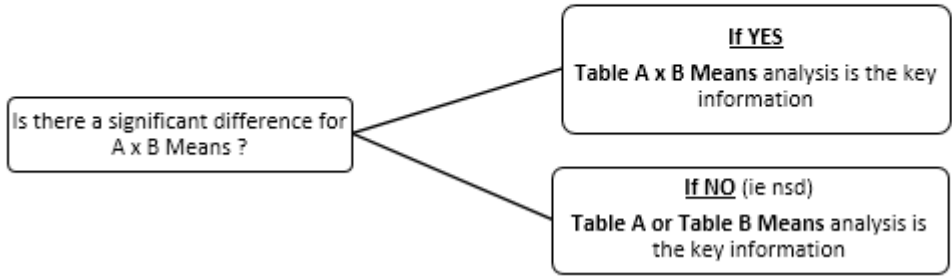
**N Management in Sorghum**

Trial ID: LB1719                                      Location: St Ruth                                      Trial Year: 2017  
Investigator: Linda Bailey

<b>Objective:</b>	To evaluate the impact of urea timing, method and rate in Sorghum (Trial initiated as part of wheat project. Limited planting moisture meant paddock planted to sorghum)		
<b>Planting Date:</b>	27/10/2017		
<b>Planting Equipment:</b>	Small Plot Disc Planter		
<b>Row Spacing:</b>	1 m		
<b>Planting Rate:</b>	Target 8 Plants/m row		
<b>Planting Depth:</b>	4.5cm		
<b>Nitrogen Source:</b>	Urea only		
<b>Application Code:</b>	A	B	C
<b>Application Date:</b>	17/01/2017	8/03/2017	3/08/2017
<b>Method &amp; Rates:</b>	Spread, no incorporation: 50, 100 and 200 kg N/ha		
	Spread with incorporation by narrow point tyne: 100 kg N/ha		
	Spread AFTER cultivation by narrow point tyne: 100 kg N/ha		
	Banded: 100 kg N/ha		
	Split Application: 50 kg N/ha spread, no incorporation followed by 50 kg N/ha spread at GS30 (30/11/2017)		
<b>Harvest Date:</b>	3/03/2018		
<b>Trial Reliability:</b>	Moderate		
<b>Keywords:</b>	Nitrogen, Sorghum		

NB: Trial designed and analysed as a Factorial

	In Simple Terms
Table of A Means:	Mean of 'METHOD X RATE' performance with ALL 'TIMING' treatments
Table of B Means:	Mean of 'TIMING' performance with ALL 'METHOD X RATE' treatments
Table of A x B Means:	'METHOD X RATE' performance with EACH 'TIMING' treatment



## N Management in Sorghum

Trial ID: LB1719      Location: St Ruth      Trial Year: 2017

Crop Name Crop Variety Description Assessment Date Assessment Type Assessment Unit Crop Stage Majority Plant-Evaluation Interval ARM Action Codes				Sorghum MR Buster			
				9/11/2017 EMERGENCE /m Row 14 13 DP1 T1	Total Heads 13/02/2018 COUNT /m Row 109 DP1 T5	Immature Heads 13/02/2018 COUNT /m Row 109 DP1 T6	Moisture Adjusted 3/03/2018 YIELD t/ha 127 DP1 TY4
Trt No.	Treatment	Nitrogen Rate	Appln. Code				
<b>TABLE OF A MEANS (Method and Rate)</b>							
1	Untreated	-		8.0-	8.8e	0.7c	2.57-
2	Spread	50kg ai/ha		7.5-	9.3de	0.9b	2.43-
3	Spread	100kg ai/ha		7.9-	10.0ab	1.1ab	2.66-
4	Spread & Incorporated	100kg ai/ha		8.0-	9.7bcd	1.2ab	2.59-
5	Spread after Cultivation	100kg ai/ha		7.7-	9.4cd	1.2ab	2.56-
6	Banded	100kg ai/ha		8.2-	9.9abc	1.0ab	2.63-
7	Spread	200kg ai/ha		8.2-	10.5a	1.2a	2.76-
8	Split Application	100kg ai/ha		8.1-	9.5bcd	1.3a	2.56-
<b>TABLE OF B MEANS (Timing)</b>							
1	January		A	8.1-	9.9a	1.1-	2.67-
2	March		B	8.0-	9.8a	1.0-	2.55-
3	August		C	7.8-	9.2b	1.1-	2.56-
<b>TABLE OF A x B MEANS (Method and Rate x Timing)</b>							
1a	Untreated		A	8.7abc	8.9-	0.7-	2.37-
1b	Untreated		B	7.2de	9.0-	0.6-	2.45-
1c	Untreated		C	8.2a-e	8.5-	0.6-	2.89-
2a	Spread	50kg ai/ha	A	7.6a-e	9.4-	1.0-	2.51-
2b	Spread	50kg ai/ha	B	8.2a-e	9.8-	0.7-	2.50-
2c	Spread	50kg ai/ha	C	6.9e	8.8-	1.1-	2.30-
3a	Spread	100kg ai/ha	A	7.3de	9.6-	1.1-	2.69-
3b	Spread	100kg ai/ha	B	8.8ab	10.0-	1.0-	2.78-
3c	Spread	100kg ai/ha	C	7.6a-e	10.3-	1.2-	2.50-
4a	Spread & Incorporated	100kg ai/ha	A	8.1a-e	10.3-	1.3-	2.62-
4b	Spread & Incorporated	100kg ai/ha	B	8.7abc	9.4-	1.1-	2.40-
4c	Spread & Incorporated	100kg ai/ha	C	7.4cde	9.5-	1.1-	2.74-
5a	Spread after Cultivation	100kg ai/ha	A	8.3a-d	10.0-	0.9-	2.80-
5b	Spread after cultivation	100kg ai/ha	B	8.0a-e	10.0-	1.1-	2.73-
5c	Spread after cultivation	100kg ai/ha	C	6.9e	8.2-	1.4-	2.14-
6a	Banded	100kg ai/ha	A	8.1a-e	9.7-	1.0-	2.66-
6b	Banded	100kg ai/ha	B	7.6a-e	10.5-	1.1-	2.31-
6c	Banded	100kg ai/ha	C	8.9a	9.6-	1.1-	2.91-
7a	Spread	200kg ai/ha	A	8.1a-e	10.8-	1.3-	2.80-
7b	Spread	200kg ai/ha	B	8.0a-e	10.6-	1.2-	2.70-
7c	Spread	200kg ai/ha	C	8.4a-d	10.0-	1.1-	2.77-
8a	Split Application	100kg ai/ha	A	8.4a-d	10.3-	1.3-	2.88-
8b	Split Application	100kg ai/ha	B	7.5b-e	9.3-	1.3-	2.56-
8c	Split Application	100kg ai/ha	C	8.3a-d	8.8-	1.3-	2.25-

Means followed by same letter do not significantly differ (P=.05, LSD)

## N Management in Sorghum

Trial ID: LB1719

Location:

St Ruth

Trial Year: 2017

Crop Name Crop Variety Assessment Date Assessment Type Assessment Unit ARM Action Codes				Sorghum MR Buster				
				5/03/2018 PROTEIN %	5/03/2018 MOISTURE %	5/03/2018 TEST WEIGHT kg/hL	5/03/2018 SCREENING %	5/03/2018 N RECOVERY kg N/ha T2
Trt No.	Treatment	Nitrogen Rate	Appln. Code					
<b>TABLE OF A MEANS (Method and Rate)</b>								
1	Untreated			9.3c	14.3a	70.5-	1.3-	37.5-
2	Spread	50kg ai/ha		9.9ab	14.0bc	69.9-	1.3-	37.4-
3	Spread	100kg ai/ha		9.7ab	13.9c	69.4-	1.4-	40.9-
4	Spread & Incorporated	100kg ai/ha		10.1a	14.3ab	69.9-	1.3-	41.1-
5	Spread after Cultivation	100kg ai/ha		9.8ab	14.1abc	70.1-	1.3-	39.5-
6	Banded	100kg ai/ha		10.1a	14.1abc	69.9-	1.3-	41.1-
7	Spread	200kg ai/ha		9.6bc	14.0c	69.4-	1.3-	42.0-
8	Split Application	100kg ai/ha		9.8ab	14.1abc	69.2-	1.2-	39.8-
<b>TABLE OF B MEANS (Timing)</b>								
1	January		A	9.8-	14.1-	69.9-	1.3-	41.4-
2	March		B	9.7-	14.1-	69.7-	1.3-	39.1-
3	August		C	9.8-	14.1-	69.7-	1.3-	39.2-
<b>TABLE OF A x B MEANS (Method and Rate x Timing)</b>								
1a	Untreated	-	A	9.9-	14.2-	70.4-	1.3-	36.9-
1b	Untreated	-	B	9.1-	14.3-	70.4-	1.2-	35.1-
1c	Untreated	-	C	8.8-	14.4-	70.7-	1.4-	40.5-
2a	Spread	50kg ai/ha	A	9.8-	14.1-	70.3-	1.4-	38.2-
2b	Spread	50kg ai/ha	B	10.0-	14.2-	69.7-	1.3-	38.6-
2c	Spread	50kg ai/ha	C	9.9-	13.9-	69.7-	1.3-	35.3-
3a	Spread	100kg ai/ha	A	9.7-	13.8-	68.4-	1.3-	41.4-
3b	Spread	100kg ai/ha	B	9.7-	13.9-	69.9-	1.5-	42.5-
3c	Spread	100kg ai/ha	C	9.9-	13.9-	69.8-	1.3-	39.0-
4a	Spread & Incorporated	100kg ai/ha	A	10.3-	14.3-	70.2-	1.4-	42.3-
4b	Spread & Incorporated	100kg ai/ha	B	9.8-	14.5-	69.8-	1.3-	37.3-
4c	Spread & Incorporated	100kg ai/ha	C	10.0-	14.1-	69.8-	1.3-	43.9-
5a	Spread after Cultivation	100kg ai/ha	A	9.7-	14.3-	71.2-	1.3-	42.6-
5b	Spread after Cultivation	100kg ai/ha	B	9.7-	14.1-	69.2-	1.2-	42.1-
5c	Spread after Cultivation	100kg ai/ha	C	10.1-	14.0-	70.1-	1.6-	33.8-
6a	Banded	100kg ai/ha	A	10.0-	14.1-	70.6-	1.3-	42.6-
6b	Banded	100kg ai/ha	B	10.2-	14.1-	69.8-	1.4-	36.7-
6c	Banded	100kg ai/ha	C	10.0-	14.2-	69.2-	1.2-	43.9-
7a	Spread	200kg ai/ha	A	9.6-	14.2-	69.1-	1.4-	42.8-
7b	Spread	200kg ai/ha	B	9.5-	13.9-	70.1-	1.2-	40.9-
7c	Spread	200kg ai/ha	C	9.6-	13.9-	69.1-	1.3-	42.4-
8a	Split Application	100kg ai/ha	A	9.7-	14.2-	69.4-	1.2-	44.7-
8b	Split Application	100kg ai/ha	B	9.8-	13.8-	68.8-	1.3-	39.8-
8c	Split Application	100kg ai/ha	C	9.9-	14.3-	69.4-	1.3-	34.9-

## N Management in Sorghum

Trial ID: LB1719

Location:

St Ruth

Trial Year: 2017

FACTORIAL/POOLED ERROR AOV						
Sorghum - MR Buster						
9/11/2017						
EMERGENCE /m <sup>2</sup> 14 13 DP1 T1						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	95	102.164063				
R	3	8.304688	2.768229	3.044	0.0345	
A	7	4.372396	0.624628	0.687	0.6828	0.8
B	2	1.136719	0.568359	0.625	0.5383	0.5
AB	14	25.592448	1.828032	2.010	0.0295	1.3
ERROR	69	62.757813	0.909534			

FACTORIAL/POOLED ERROR AOV						
Sorghum - MR Buster						
Total Heads						
13/02/2018						
COUNT /m Row 109 DP1 T5						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	71	64.057639				
R	2	8.555278	4.277639	8.794	0.0006	
A	7	16.575170	2.367881	4.868	0.0004	0.6
B	2	6.665833	3.332917	6.852	0.0025	0.4
AB	14	9.884784	0.706056	1.451	0.1688	1.0
ERROR	46	22.376574	0.486447			

FACTORIAL/POOLED ERROR AOV						
Sorghum - MR Buster						
Immature Heads						
13/02/2018						
COUNT /m Row 109 DP1 T6						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	71	8.994306				
R	2	0.483611	0.241806	2.233	0.1187	
A	7	2.578503	0.368358	3.401	0.0052	0.3
B	2	0.165093	0.082546	0.762	0.4724	0.2
AB	14	0.785525	0.056109	0.518	0.9100	0.5
ERROR	46	4.981574	0.108295			

FACTORIAL/POOLED ERROR AOV						
Sorghum - MR Buster						
Moisture Adjusted						
3/03/2018						
YIELD t/ha 127 DP1 TY4						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	93	60.554717				
R	3	45.134590	15.044863	91.775	0.0001	
A	7	0.721911	0.103130	0.629	0.7301	0.33
B	2	0.258301	0.129151	0.788	0.4590	0.20
AB	14	3.456479	0.246891	1.506	0.1331	0.57
ERROR	67	10.983435	0.163932			

## N Management in Sorghum

Trial ID: LB1719

Location:

St Ruth

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FACTORIAL/POOLED ERROR AOV						
Sorghum - MR Buster						
5/03/2018						
PROTEIN %						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	95	42.142396				
R	3	17.088646	5.696215	25.213	0.0001	
A	7	5.524896	0.789271	3.494	0.0029	0.4
B	2	0.303333	0.151667	0.671	0.5143	0.2
AB	14	3.636667	0.259762	1.150	0.3332	0.7
ERROR	69	15.588854	0.225925			

FACTORIAL/POOLED ERROR AOV						
Sorghum - MR Buster						
5/03/2018						
MOISTURE %						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	95	20.479583				
R	3	10.081250	3.360417	32.076	0.0001	
A	7	1.712917	0.244702	2.336	0.0336	0.3
B	2	0.023333	0.011667	0.111	0.8948	0.2
AB	14	1.433333	0.102381	0.977	0.4852	0.5
ERROR	69	7.228750	0.104764			

FACTORIAL/POOLED ERROR AOV						
Sorghum - MR Buster						
5/03/2018						
TEST WEIGHT kg/hL						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	95	295.373333				
R	3	125.802500	41.934167	22.143	0.0001	
A	7	15.891667	2.270238	1.199	0.3153	1.1
B	2	1.095208	0.547604	0.289	0.7498	0.7
AB	14	21.911458	1.565104	0.826	0.6386	1.9
ERROR	69	130.672500	1.893804			

FACTORIAL/POOLED ERROR AOV						
Sorghum/ MR Buster						
5/03/2018						
SCREENING %						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	95	5.949896				
R	3	1.111146	0.370382	6.627	0.0005	
A	7	0.129063	0.018438	0.330	0.9378	0.2
B	2	0.007708	0.003854	0.069	0.9334	0.1
AB	14	0.845625	0.060402	1.081	0.3900	0.3
ERROR	69	3.856354	0.055889			

## N Management in Sorghum

Trial ID: LB1719

Location:

St Ruth

Trial Year: 2017

FACTORIAL/POOLED ERROR AOV Sorghum - MR Buster 5/03/2018 N RECOVERY kg N/ha T2						
Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	93	12741.459189				
R	3	8916.305816	2972.101939	69.842	0.0001	
A	7	252.343061	36.049009	0.847	0.5526	5.3
B	2	110.252229	55.126114	1.295	0.2806	3.3
AB	14	611.377499	43.669821	1.026	0.4392	9.2
ERROR	67	2851.180585	42.554934			

**Assessment Type**

N RECOVERY = Nitrogen recovery in grain

**Crop Stage Majority**

14 = 4 Leaves unfolded

**ARM Action Codes**

T1 = [C1]/4

T5 = [C8] / [C7]

T6 = [C10] / [C7]

TY4 = 0.5376344\*[C12]\*(100-[C16])/86.5

T2 = [C15]\*[C14]\*1.6

DP1 = Days after Planting

Application Description							
	A		B		C		D
<b>Application Date:</b>	17/01/2017		8/02/2017		3/08/2017		30/11/2017
<b>Application Method:</b>	SPREAD	BANDED	SPREAD	BANDED	SPREAD	BANDED	SPREAD
<b>Application Placement:</b>	TOPDRESS	BAND	TOPDRESS	BAND	TOPDRESS	BAND	TOPDRESS
<b>Next Moisture Occurred On:</b>	20/01/2017		14/03/2017		3/10/2017		3/12/2017

**Conclusions:**

This trial was established to evaluate the impact of urea application method and timing on wheat production. However a lack of planting moisture prevented wheat being planted and the treatments already initiated were utilised to generate sorghum data. Unfortunately, one section of the trial area was over-sprayed with a commercial fallow treatment. No data was generated from the damaged area. There was ~80 kg N/ha present to 120cm depth in the Untreated plots at planting with the majority in the 0-45cm depth.

Emergence counts showed no significant difference due to the main effects of application timing or N method and rate.

Head counts were taken 3 days prior to crop desiccation. There was a significant effect from timing of N application with increased total head counts from the January or March applications compared to the same treatments applied in August. There was also a N rate response evident. There was no significant difference apparent between the methods of application. Counts of immature heads showed all N rates and methods had significantly increased heads compared to the Untreated. These were unlikely to impact on yield due to crop desiccation shortly after assessment.

There was no significant difference in yield from any N rate, method or application timing with yields only averaging ~2.6t/ha. Significant increases in grain protein were apparent from all applications of N but at a low magnitude (~0.3-0.8%).

Under the low yields achieved, there was no significant impact on yield from any N application, despite positive results in head counts. The Untreated level of soil nitrogen at planting (80 kg N/ha) was sufficient for the yield potential achieved.

Soil samples taken two weeks after harvest from the Untreated and 200 kg N/ha plots showed limited movement of nitrogen in the soil. The majority of soil nitrogen was found in the top 30 cm of the soil profile: 64% of the extra N was still in the top 30 cm of soil from application in January 2017. For March 2017 and August 2017 applications this figure was 81% and 87% respectively.