TRIAL REPORT

Evaluation of Hibrix with reduced rates of super phosphate fertiliser for growth and energy effects in pasture

Waroona, Western Australia, 2014

Hibrix Sales Pty Ltd
ABN 80 131 466 343

32 Watts road
Shoalwater, 6169
Western Australia
www.hibrix.com
Sales@hibrix.com

Protocol Number:
5050 pasture 2014

Client:
Tony Hiscock
Alcoa

Author:
Michael Reilly

Report Number:
HBX 002-13

Report Date:
26-June-2015

CONTENTS

SUMMARY

At Waroona in the Peel region of Western Australia in 2014, 12 of 1m square wire cattle cages were placed at random to evaluate the effects of Hibrix pasture treatment combined with 200kg/ha of phosphate fertiliser and 37kg/ha of Nitrogen topdressing versus the growers standard fertiliser usage of 400kg/ha of phosphate fertiliser and 150kg/ha of nitrogen topdressing. The trial was split into two variants being pivot irrigated pasture and flood irrigated pasture. Each variant had three replicates. Hibrix was applied by spray boom in 12m strips. Each cage was harvested with hand shears, weighed on site, dried and analysed for digestible energy and feed analysis.

The biomass of the Hibrix treated plots was significantly higher than the non-Hibrix plots. With the pivot irrigated pasture showing the most significant increase. On average Hibrix increased the pasture biomass yield by 34% across the trial.

The protein content and metabolisable Energy (Mj/kg Dm) were significantly higher in the Hibrix treatments.

There were no visible signs of phytotoxicity or adverse crop effects by any treatment in this trial.

INTRODUCTION

Aims

- To significantly reduce fertiliser run off into the Harvey drain.
- To evaluate and compare the effects of Hibrix on the growth and quality of pasture when using a Hibrix and NPK fertiliser combination.
- To confirm the safety of Hibrix to pasture.

MATERIALS AND METHODS

Treatments

Super Phosphate applied as prill through a standard fertiliser spreader.
Grassboost applied as prill through a standard fertiliser spreader.
Urea applied as prill through a standard fertiliser spreader.
Hibrix applied through spray boom as a single broadcast soil application.

No.	Treatment	Rate (per hectare)				
		Hibrix Pasture (L/ha)	Super Phospate 32 **(kg/ha)**	Grassboost treatment 1 **(kg/ha)**	Grassboost treatment 2 **(kg/ha)**	Urea
FL-H-1,2,3	Hibrix + Super Phosphate 32 + Grassboost + Urea	2.5	50	75	75	37
FL-S-1,2,3	Super Phosphate 32 + Grassboost + Urea	0	100	150	150	150
PI-H-1,2,3	Hibrix + Super Phosphate 32 + Grassboost + Urea	2.5	50	75	75	37
PI-S-1,2,3	Super Phosphate 32 + Grassboost + Urea	0	100	150	150	150

Chronology of events

Date	Event
26/06/14	Super Phosphate applied
27/10/14	Grassboost applied
29/10/14	Hibrix applied
04/12/14	Flood Irrigated Pasture Biomass assessment
04/12/14	Pivot Irrigated Pasture Biomass assessment
07/01/15	Flood Irrigated Pasture Biomass assessment
07/01/15	Pivot Irrigated Pasture Biomass assessment
02/02/15	Pivot Irrigated Pasture Biomass assessment
09/02/15	Flood Irrigated Pasture Biomass assessment
12/02/15	Grassboost applied
06/03/15	Pivot Irrigated Pasture Biomass assessment
12/03/15	Flood Irrigated Pasture Biomass assessment
26/03/15	Nitrogen topdress with urea
10/04/15	Pivot Irrigated Pasture Biomass assessment
10/04/15	Flood Irrigated Pasture Biomass assessment
13/05/15	Pivot Irrigated Pasture Biomass assessment
13/05/15	Flood Irrigated Pasture Biomass assessment

RESULTS

Table 1. Pasture biomass

No.	Pasture biomass (KG per Hectare)					
	First Cut	Second Cut	Third Cut	Forth Cut	Fifth Cut	Sixth Cut
FL-S-1	5400	10910	8160	10980	9400	3370
FL-S-2	5900	11020	6760	8800	5980	1910
FL-S-3	6090	9780	7760	5230	6150	2020
PI-S-1	3970	5700	4990	7520	10010	8780
PI-S-2	3560	5140	4730	8060	8240	5840
PI-S-3	6650	8310	6200	10180	12250	10890
FL-H-1	7800	19660	13780	12020	13570	5340
FL-H-2	6670	16190	9720	12050	12850	5320
FL-H-3	5650	14090	8200	7920	7010	2190
PI-H-1	9100	6460	6170	9320	12040	10040
PI-H-2	5330	6510	4540	8770	11700	8700
PI-H-3	9790	9230	8550	12130	14760	9980

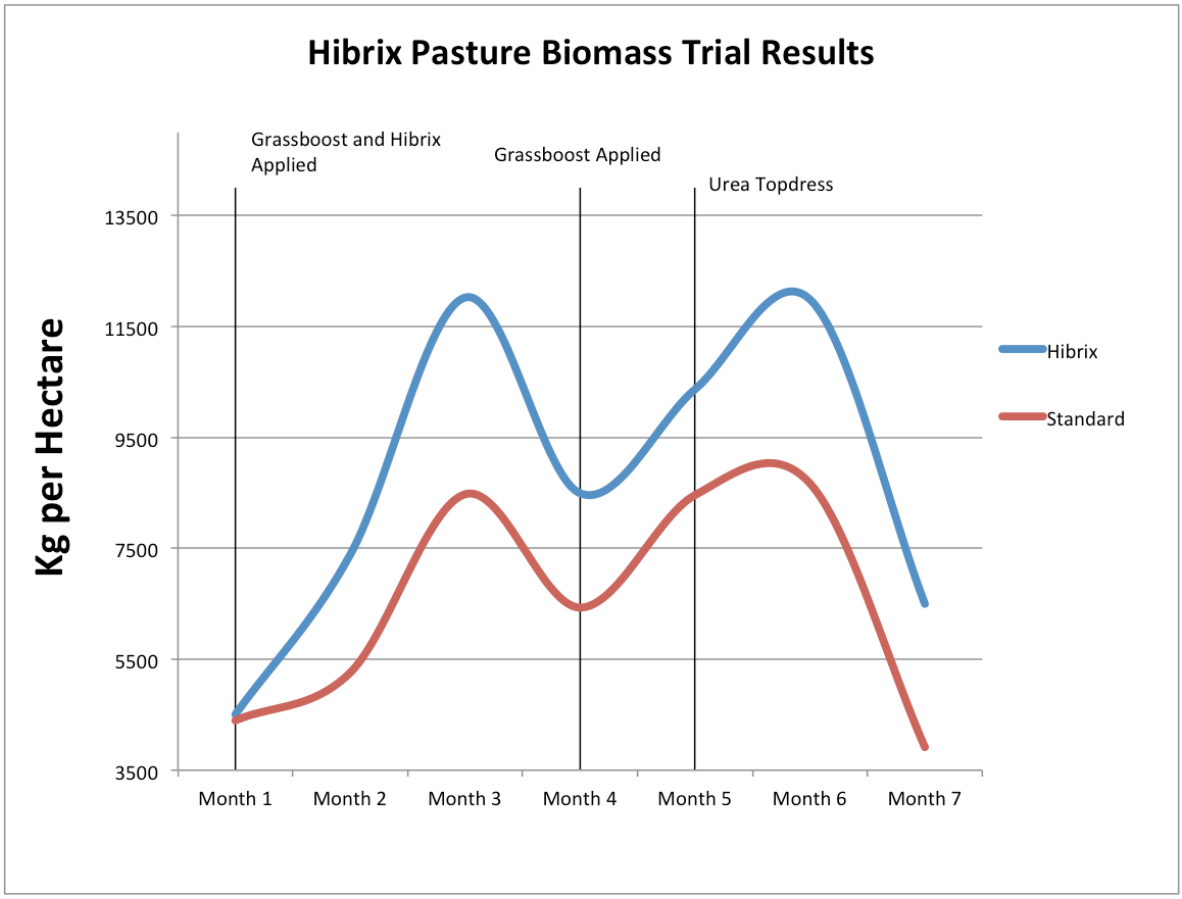


Figure 1: Mean Pasture Biomass (Kg / Ha)

Table 2. Fodder analysis

Sample No	DM %	Moisture %	Crude Protein (% of DM)	Acid Detergent Fibre	Neutral Detergent Fibre	Digestibility (DMD)	Digestibility (DOMD)	Est. Metabolisable Energy (MJ/kg DM)
FL-H-1	88.9	11.1	16	34.6	63.2	61.2	58.6	8.9
FL-H-2	87.7	12.2	16.9	30.6	58	64.1	61.1	9.4
FL-H-3	88.7	11.3	17.3	33.1	60.3	62.8	60.1	9.2
FL-S-1	87.6	12.4	16.5	31.4	59.2	63.6	60.7	9.3
FL-S-2	88.8	11.2	13.4	31.6	61	61.4	58.8	8.9
FL-S-3	87.3	12.7	15.9	28.9	54.8	64.4	61.4	9.5
PI-H-1	86.5	13.5	20.5	28.2	51.3	68	64.4	10.1
PI-H-2	85.8	14.2	17.2	28.4	53.2	68.9	65.2	10.2
PI-H-3	87.4	12.6	15.6	31.3	62.2	66	62.7	9.7
PI-S-1	88.8	11.2	15.4	32	60.2	62.9	60.1	9.2
PI-S-2	89.6	10.4	12.9	34.8	59.9	61.9	59.3	9
PI-S-3	87.6	12.4	13.8	32.1	65.3	63.9	60.9	9.4

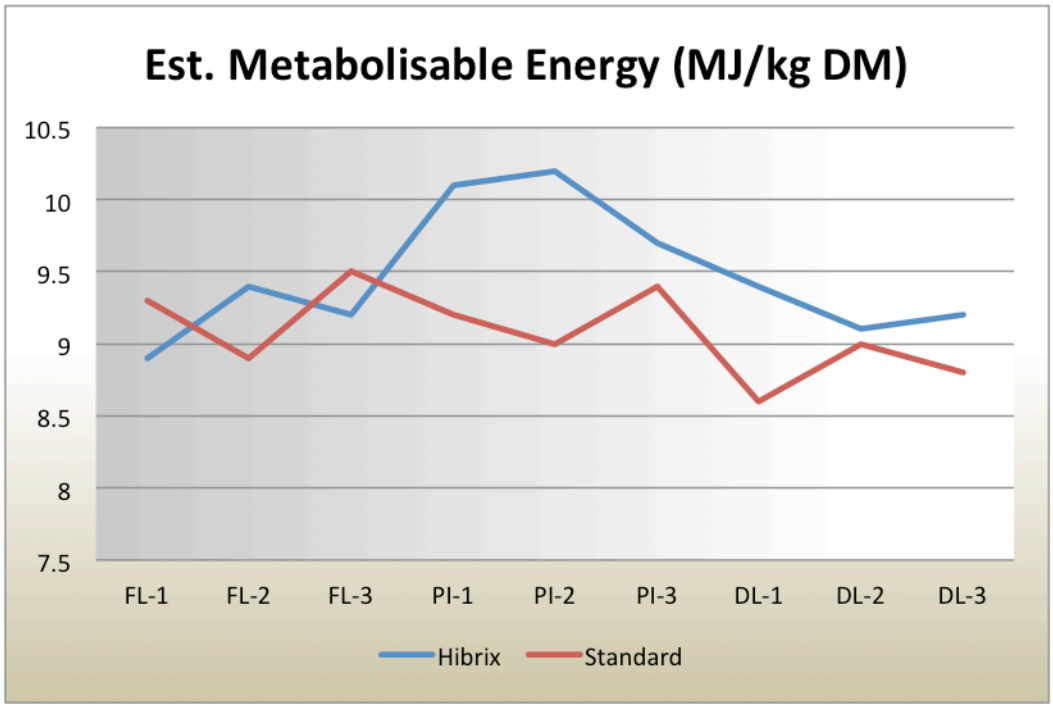


Figure 2: Metabolisable Energy (MJ/kg DM)

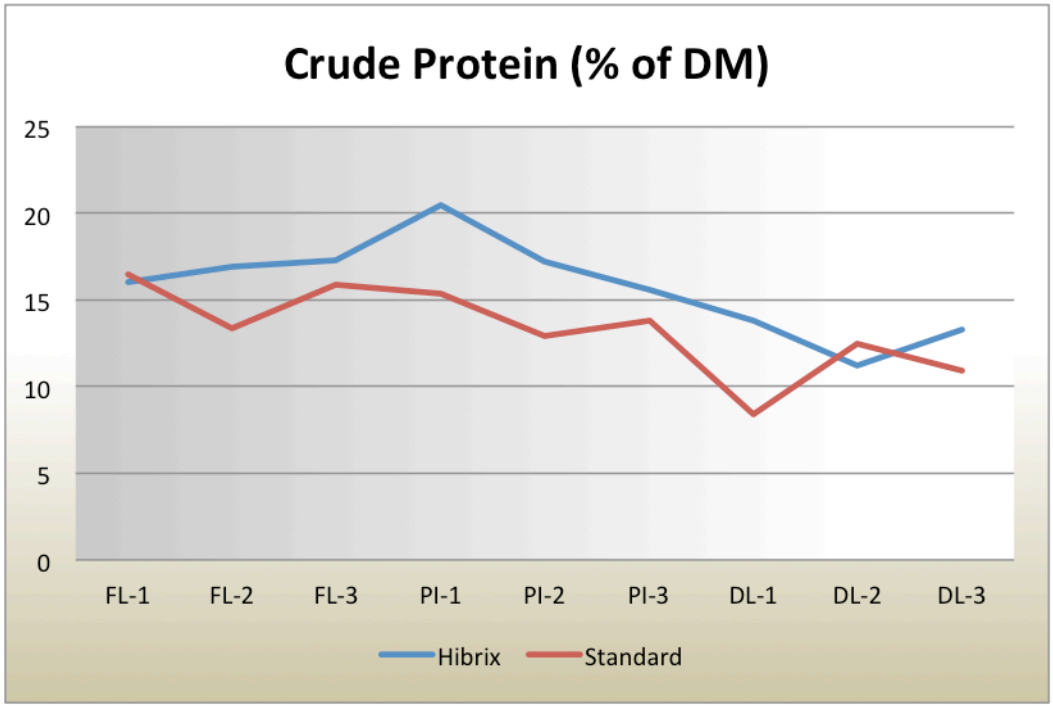


Figure 3: Crude Protein (% of DM)

Cost Benefit Analysis on 65 hectares

Input costs

Fertiliser Input Prices		
	Cost	Unit
Hibrix	$20	Litre
Super Phosphate 32	$600	Tonne
Grassboost	$407	Tonne
Urea	$546	Tonne
Potash	$600	Tonne

Application rates per hectare (kg)				
	Hibrix	Super Phosphate 32	Grassboost (2 applications)	Urea
Hibrix system	2.5	50	150	37
Standard system	0	100	300	75

Input Cost Comparison per Hectare	
Hibrix system	$161.25
Standard system	$223.05

Summary

Adopting the Hibrix system would provide a saving of $61.79 for every hectare converted. The increase in pasture quality and quantity will provide further financial benefits. Environmental benefits include a very significant reduction in fertiliser run off into the Harvey drain.

DISCUSSION

The trial was conducted across three sandy loam paddocks used exclusively for rotational grazing. The first paddock was un-irrigated dry land, the second was flood irrigated and the third was pivot irrigated. 12 metre wide strips were pegged through the centre of each paddock.

Three of 1 metre by 1 metre wire mesh cages were placed along the centre line of the trial strip at approx. fifty metre intervals. Three identical cages were placed at similar intervals outside of the trial strip. The cages were wired to star pickets to prevent the cattle from moving them. The trial consisted of a total of 18 cages (3 Hibrix and 3 standard in each paddock x 3 paddocks).

On each trial strip super phosphate was applied at 50kg/ha (half rate) and Hibrix applied using a conventional spray boom. The remainder of the paddock received 100kg/ha of super phosphate. Thee Hibrix trial strip had 75kg/ha of Summit Grassboost (half rate) the remainder of the paddock received 150kg/ha. Later during the trial the Hibrix trial strip had a further 75kg/ha of Summit Grassboost (half rate) the remainder of the paddock received 150kg/ha. The trial strip and the remainder of the paddock were both treated with 75kg/ha of Urea top dressing.

Regular visual assessments were done to ensure the cages remained in position and intact. After each paddock was grazed the cages were removed and the pasture was harvested using hand shears to a level matching that of the surrounding grazed pasture. The cuttings were bagged and weighed on site. When required sub samples were taken for fodder analysis to be done.

The non Hibrix cages yielded a mean biomass of 7.1 tonnes. All Hibrix treatments significantly increased the biomass weights with increases ranging from 19% to 49%. The mean biomass weight from the Hibrix treatments was 9.5 tonnes per hectare.

There was significant increase in metabolisable energy (ME) with increases ranging from 1.1% to 13%. The mean ME increase across all cages was 4.3%.

There was significant increase in the crude protein content with increases ranging from 8.8% to 64.2%. The mean crude protein increase across all cages was 20.6%.

There were no visible signs of phytotoxicity or adverse crop effects by any treatment in this trial.

CONCLUSIONS

The trial was conducted in sandy loam paddock of summer pasture with varying rates of super phosphate, the reduced super phosphate was treated with Hibrix at 2.5 L/ha.

The following was concluded:

- Hibrix treatments significantly increased pasture biomass across all cages. Increases ranged from 19% to 49% with the average being 34%.
- Hibrix significantly increased the mean metabolisable energy in 77% of cages.
- Hibrix significantly increased the mean pasture protein content in 77% of cages.
- All treatments increased biomass.
- There were no visible signs of phytotoxicity or adverse crop effects by any treatment in this trial.

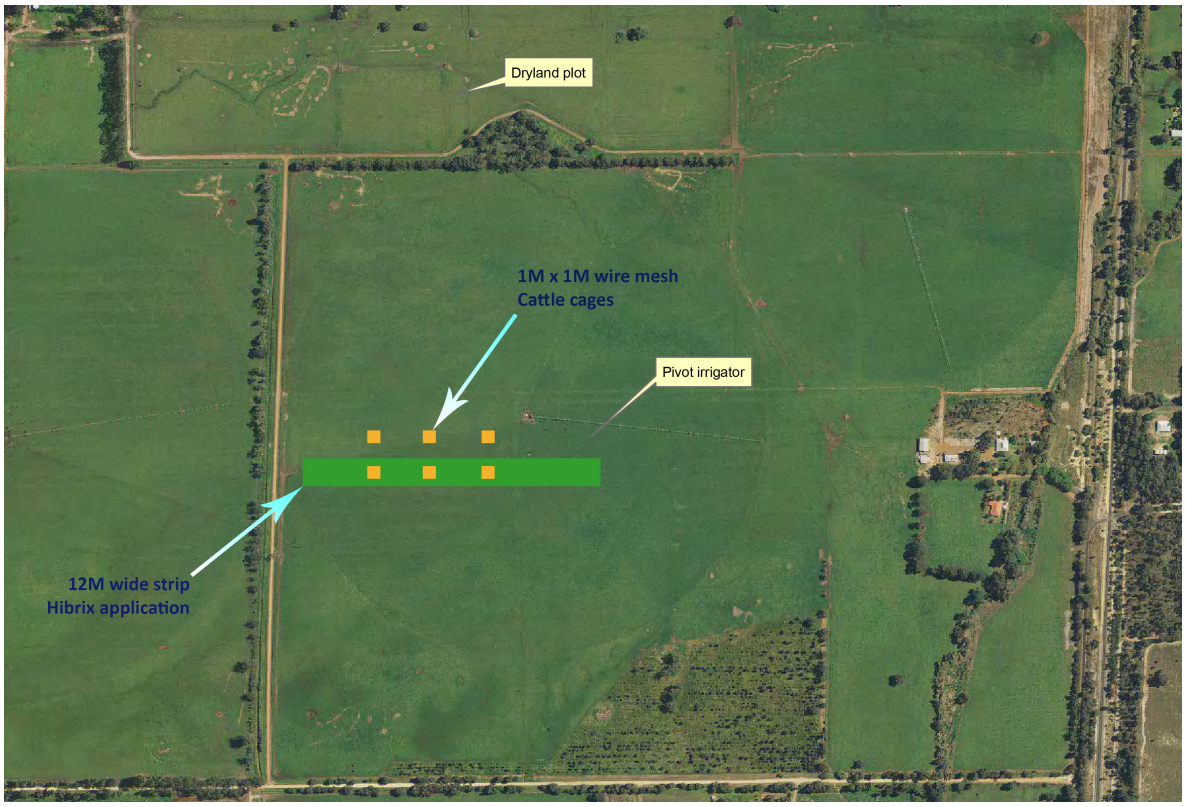
APPENDICES

Appendix i. Trial details

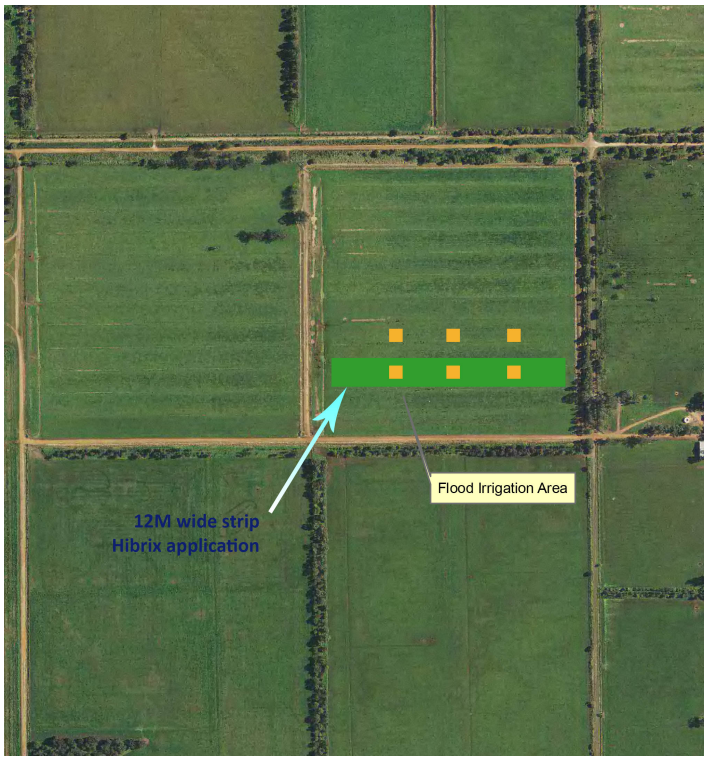
Site details

Grower	**Tony Hiscock**
Location	Waroona, Western Australia, 6215
GPS co-ordinates	32.886433 115.875490
Paddock name	Stage 3
Paddock history	Pasture in 2010, 2011, 2012, 2013
Soil type	Sandy loam
Crop	Summer Pastures
Variety	Kikuyu, Perennial Rye, White Clover
Trial design	Randomised complete block
Replications	9
Plot size	1 m x 1 m
Commencement date	26/06/2014
Completion Date	28/05/2015

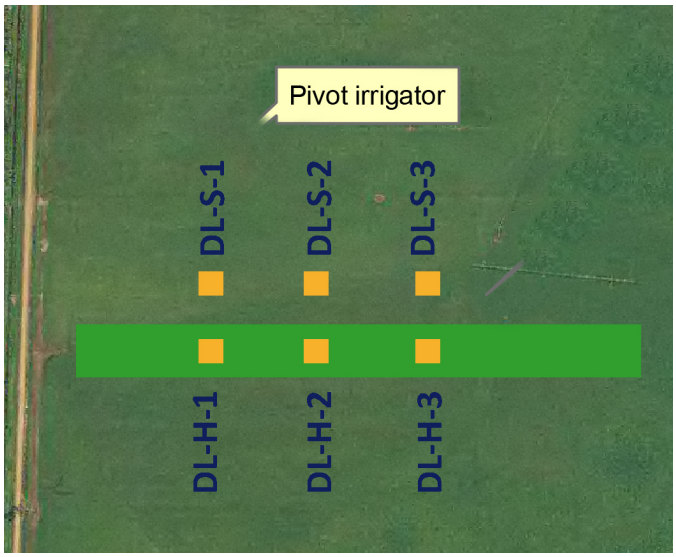
Trial location map and plan – No 2 Pivot irrigation paddock. **North ↑**

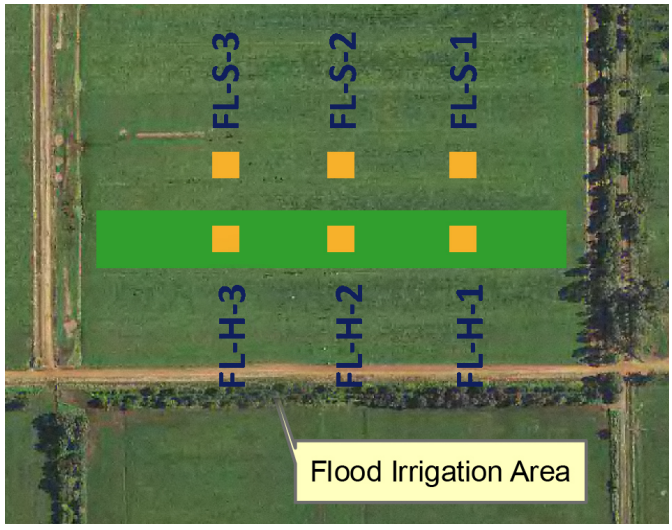


Trial location map and plan – Agenta and Stage 3. **North ↑**



Cage sample identification plan





Application details – spray

Application equipment				
Method	Low volume broadcast boom spraying			
Equipment	Tractor mounted compressed air boom sprayer			
Spray volume	100 L/ha			
Treatment applications				
Application number	1			
Date	29/10/14			
Times	0800 - 1600			
Treatments applied	3			
Temperature (°C)	28			
Relative humidity (%)	31			
Cloud cover (%)	30			
Wind direction	SSE			
Wind speed (km/h)	6			
Soil moisture	moist			

Assessments

Crop Biomass										
Date	04/12/14	07/01/15	02/02/15	09/02/15	06/03/15	12/03/15	10/04/15	13/05/15		
Paddocks	Flood Land Pivot Irrigated	Flood Land Pivot Irrigated	Pivot Irrigated	Flood Land	Pivot Irrigated	Flood Land	Flood Land Pivot Irrigated	Flood Land Pivot Irrigated		
Sample size	Whole Cage									
Method	After each paddock was grazed the cages were removed and the pasture was harvested using hand shears to a level matching that of the grazed pasture. Cages were then returned to their original position.									
Statistical analysis	The cuttings were bagged and weighed on site. When required sub samples were taken for fodder analysis to be done.									
Crop safety										
Date	28/11/14	04/12/14	07/01/15	02/02/15						
Paddocks	Dry Land	Flood Land Pivot Irrigated	Flood Land Pivot Irrigated	Pivot Irrigated						
Sample size	Whole plot									
Method	Visual assessment of each cage. No phytotoxicity or adverse crop effects were observed.									
Statistical analysis	Not applicable									

Appendix iv. Meteorological details

Year: **2014 / 2015** **Location**: **Waroona, Western Australia**

	Oct-14			Nov-04			Dec-04			Jan-15		
Graph	Lowest Temp	Highest Temp	mm Rain	Lowest Temp	Highest Temp	mm Rain	Lowest Temp	Highest Temp	mm Rain	Lowest Temp	Highest Temp	mm Rain
1st	9.3	26.9	0	8.8	27.3	0	14.2	21.3	0	13.3	28.9	0
2nd	14.1	23.4	0.3	9.6	21.4	0	9.8	25.5	0.6	13.2	26.5	0
3rd	9.3	20.7	0	10.3	20.1	1.6	11.6	25.1	0	10.3	29	0
4th	8.3	21.6	1	7.5	26.2	0	10	25.7	0	12.8	35.7	0
5th	10.1	15.9	6.2	9.9	27	0	13.3	22.5	0	19	41.7	0
6th	4.7	16.8	12.2	7.4	18.8	0	11.6	28.9	0	19.7	33.1	0
7th	2.5	19.4	0.1	9.9	19.2	3.6	13.5	30.8	0	16.1	30.4	0
8th	4.9	19.7	0	7	23.8	0	13.2	24.5	0	12.3	28.5	0
9th	12	19.9	1.4	11.2	34.6	0	9	21.8	0	13.4	27.2	0
10th	6.9	20.2	0.2	15.5	21.6	0.2	8.8	26	0	14.1	28.6	0
11th	7	18.9	0	11.2	21	0.2	12.8	31.1	0	12.9	30.4	0
12th	9.6	18.3	0	8.7	20.9	0	12.3	26.3	0	12.5	32.8	0
13th	5.6	22.7	0	7.6	18.1	0	10	26.6	0	15.5	35.7	0
14th	5.7	27.3	0	4.4	21.3	0.4	10.1	27	0	16.3	33.3	0
15th	9.4	32	0	6.6	23.5	0	10.3	21.4	0	16.4	30.9	0
16th	13.8	26.1	0	10.4	29	0	7	23.9	0	13.2	32.2	0
17th	14.3	21.1	0	10.8	26.8	0	8	25.8	0	15.1	37.3	0
18th	12.5	17.6	0	11.1	25.9	0	10.2	30.6	0	17.5	31.5	0
19th	10.8	13.6	0.8	10	22.3	0	14.1	38.1	0	15.9	27.4	0
20th	10	19.4	4.6	10.2	21.4	0	19.1	30.2	0	13.4	39	0
21st	6.7	24.2	0	13.8	21	2.2	13.8	27.5	0	16.9	36.9	0
22nd	12.2	29.7	0	10.8	20.4	2.4	12.1	27.2	0	17.4	30.7	0
23rd	13.6	20.4	0	12.2	20.8	0.8	13.2	29.1	0	13.6	30.4	0
24th	9.2	22.9	0.4	6.3	26.3	0	13	30.4	0	12.1	28.7	0
25th	10.4	20.2	0	11.1	31.5	0	12.5	29.4	0	13.7	30.9	0
26th	12.1	20.6	1.8	16	27.4	0	11.4	31.5	0	12.5	34.1	0
27th	7.3	23.2	0	16	21.6	8.6	13.8	32.9	0	16.6	37.2	0
28th	10.5	28	0	13.5	22.8	6.8	14.2	30.8	0	20.8	38.9	0
29th	13.9	28.2	0	14.8	25.2	0	15.3	34.1	0	20.6	36.3	0
30th	12.1	19.7	0	11.5	27.4	0	17.8	37.8	0	18.3	37	0
31st	10.8	23	2.6				14.9	29.7	0	16.2	30.8	0