



Report # LM1821

For

Vernado Group Limited

September 2018

SUMMARY

A field trial was conducted to evaluate the effects of GIBBOOST (gibberellic acid) and ENERghi(1-triacontanol) plant growth regulators on the growth of ryegrass pasture. The trial was conducted at Pukekohe in the winter/ spring of 2018.

A single application of treatments was applied to pasture within seven days of grazing. Gibboost was applied alone at 9 g/ha and tank mixed with EnergHi at 25 and 50 mL/ha. All treatments were tank mixed with the SURFACTANT at 25 mL/100L and applied at a water rate of 100 L/ha.

A pasture plate meter was used to record pasture height and dry matter per hectare at 15, 21 and 30 days after treatment (DAT). Plots were mowed at 21 and 30 DAT to determine pasture yield and samples were oven dried to determine percent dry matter.

Gibboost, Gibboost+ EnergHi at 25 mL/ha and Gibboost+ EnergHi at 50 mL/ha significantly increased pasture height and plate meter yield compared to untreated plots at 15, 21 and 30 DAT.

Gibboost+ EnergHi at 50 mL/ha significantly increased pasture height and plate meter yield compared to Gibboost alone at 30 DAT and trended to increase pasture height and yield compared to Gibboost+ EnergHi at 25 mL/ha at 15 and 21 DAT.

Pasture growth regulator treatments trended to increase harvested (mown) pasture yield compared to untreated plots at 21 DAT and significantly increased harvested pasture yield compared to untreated plots at 30 DAT.

Gibboost+ EnergHi trended to increase harvested fresh pasture yield compared to Gibboost applied alone at 21 and 30 DAT.

Gibboost+ EnergHi applied at 50 mL/ha trended to increase harvested pasture yield (fresh and dry) compared to Gibboost+ EnergHi at 25 mL/ha at 21 and 30 DAT.

There was no significant difference in harvested pasture yield between pasture growth regulator treatments at 21 and 30 DAT.

METHOD AND MATERIALS

Table 1 – Trial details

Trial identification	LM1821
Co-operator/Grower	
Location	Waiuku Road, Pukekohe
GPS co-ordinates	S-37.223779° E174.816747°
Soil type	Silt loam
Soil test	pH 6.2, Olsen P 25 mg/L, CEC 30 me/100g, K high; Ca high; Mg high; Na; low (see appendix)
Site history	Long term pasture
Trial design	Randomised block with 6 replicates. Plots 5 metres long x 1.6 metres wide
Application method	CO ₂ powered plot sprayer, 4 x 11002 even flat fan nozzles at 120kPa and 3.6 km/hr delivering 100 L/ha
Application details	27.08.18, 1100 hrs, Air 19.6- 20.6°C, RH 33-40%, Soil moist at 13.1°C, cloud cover 100%, wind nil
Rainfall mm	7 days pre – 0.0 24 hrs pre – 39.4 24 hrs post – 14.4 7 days post – 49.2

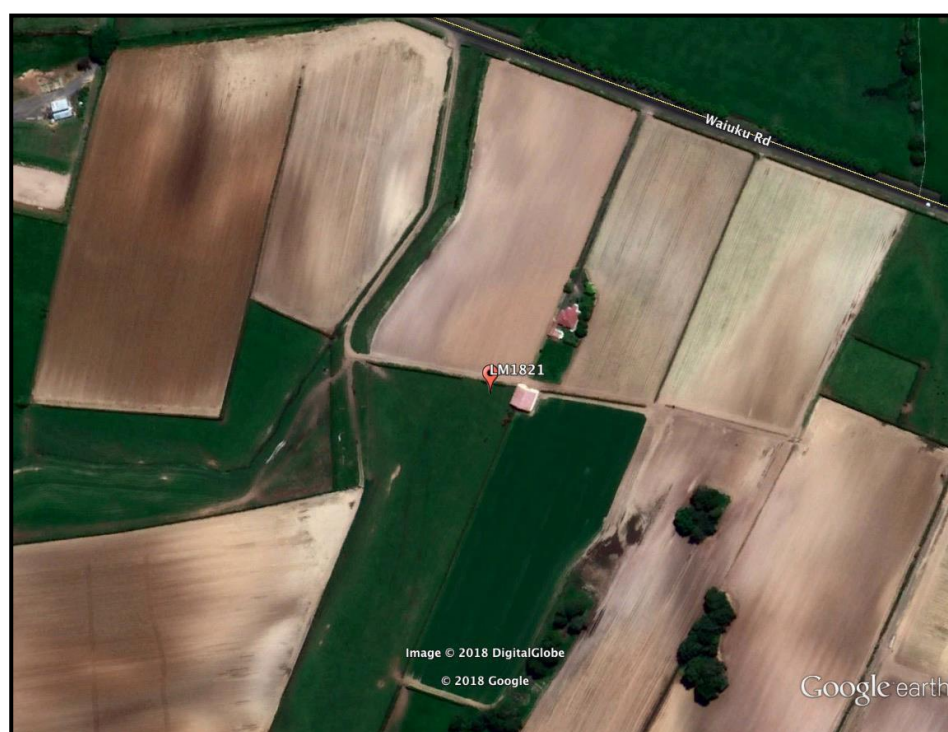


Photo 1 - Trial Location

Table 2 – Treatment details

Treatment applied	Application timing	Active rate (gai/ha)	Product rate (g or mL/ha)
1. Untreated control	-	-	-
2. Gibboost + Surfactant	Post mowing	8.1 -	9 25 mL/100L
3. Gibboost + EnergHi + Surfactant	Post mowing	8.1 0.375 -	9 25 25 mL/100L
4. Gibboost + EnergHi + Surfactant	Post mowing	8.1 0.75 -	9 50 25 mL/100L

Table 3 – Formulation details

Product	Active chemical
Gibboost	900 g/kg gibberellic acid water soluble powder
EnergHi	15 g/L 1-triacontanole soluble concentrate
Surfactant	950 g/L linear alcohol ethoxylate



Photo 1 – Trial site at 11 September, 15 DAT

ASSESSMENTS

1. Pasture height

At 15, 21 and 30 days after application (DAT), pasture height and yield (kgDM/ha) was measured using an electronic pasture plate meter. 10 sites were chosen at random and averaged for each plot.

2. Pasture yield

At 21 and 30 days after application pasture was collected from each plot using a rotary lawnmower with catcher. Fresh weights were recorded and a subsample taken for dispatch to Hill Laboratories, Hamilton for drying to calculate percent dry matter.

STATISTICAL ANALYSIS

Where appropriate, data presented have been subjected to analysis of variance and if significance has occurred, subjected to Tukey's HSD test showing honest significant differences (HSD 0.05). Means showing uncommon letters are statistically significantly different. The Coefficient of Variation (CV %) has also been calculated. All data were analysed using the statistical software in ARM 2018.3.

Table 4 – Trial diary

Date	Interval (days)	Activity	
August	20	-	Site grazed
	27	7	Treatments applied
September	10	14	Plate meter assessment
	17	7	Plate meter and yield assessment
	30	13	Plate meter and yield assessment

RESULTS AND DISCUSSION

The trial site was positioned in an area of long term permanent pasture that had a consistent sward. Ryegrass was predominant with some white clover and various broadleaf weeds.

Post grazing, the entire trial site was mowed with a mulching mower and clippings removed before treatments were applied on 27 August 2018. The site was not grazed by stock for the duration of the trial.

Pasture height was recorded using an electronic plate meter at 15, 21 and 30 days after treatment (DAT). One strip was mown from each plot at 21 and 30 DAT for yield, the mower height was set to cut at 50 cm.



Photo 2 – Trial site at 21 DAT



Photo 3 – Trial site at 30 DAT

Pasture height

At 15 DAT pasture height was 12.4 cm when measured using an electronic plate meter in untreated plots. All pasture growth regulator treatments significantly increased pasture height compared to untreated plots to between 16.3 and 16.7 cm on average.

By 21 DAT pasture height in untreated plots had increased to 15.4 cm on average. Treatment differences were similar to the assessment seven days earlier. All pasture growth regulator treatments significantly increased pasture height compared to untreated plots to between 18.8 and 19.1 cm.

Pasture height was 21.2 cm in untreated plots on average by 30 DAT. Gibboost treated plots significantly increased pasture height compared to untreated plots. Tank mixing EnergHi at 25 mL/ha with Gibboost trended to increase pasture height compared to Gibboost. Gibboost+ EnergHi at 50 mL/ha had an average pasture height of 26.2 cm, significantly higher compared to Gibboost alone.

Pasture yield

Yield evaluated using a pasture plate meter was 2238 kgDM/ha in untreated plots at 15 DAT. Gibboost+ EnergHi at 25 mL/ha had the highest pasture yield at 2842 kgDM/ha followed by Gibboost applied alone which yielded 2801 kgDM/ha. Gibboost

+ EnergHi at 50 mL/ha had the lowest pasture yield at 2782 kgDM/ha, however there was no significant difference between treatments.

By 21 DAT yield measured with the plate meter was 2658 kgDM/ha. All pasture growth regulator treatments significantly increased pasture yield compared to untreated plots. Pasture yield was similar for all pasture regulator treatments at between 2658 and 3179 kgDM/ha.

At 21 DAT untreated plots yielded 4256 kg/ha fresh yield and 753 kg/ha dry matter yield when harvested with a mower. Applying Gibboost alone increased fresh yield to 5456 kg/ha and dry matter yield to 955 kg/ha. The addition of EnergHi at 25 mL/ha to Gibboost trended to increase pasture fresh yield to 5667 kg/ha and dry matter yield to 975 kg/ha. Increasing the rate of EnergHi to 50 mL/ha trended to increase pasture yield compared to Gibboost+ EnergHi (25 mL/ha) to 5851 kg/ha fresh and 1006 kg/ha dry matter yield. There were no significant differences between pasture growth regulator treatments.

Pasture yield measured using a plate meter was 3461 kgDM/ha in untreated plots at 30 DAT. Similar to pasture height Gibboost+ EnergHi at 50 mL/ha had the highest pasture yield in the trial at 4173 kgDM/ha, significantly higher compared to Gibboost alone which had a yield of 3827 kgDM/ha and untreated plots. Gibboost+ EnergHi at 25 mL/ha trended to have lower pasture yield compared to Gibboost+ EnergHi (50 mL/ha) but trended to have a higher yield compared to Gibboost alone and had a significantly higher yield compared to untreated plots.

Untreated plots yielded 7137 kg/ha fresh and 1140 kg/ha dry matter when harvested with a mower at 30 DAT. Applying Gibboost and Gibboost+ EnergHi at 25 mL/ha or 50 mL/ha significantly increased pasture yield compared to untreated plots. Gibboost+ EnergHi trended to increase fresh pasture yield compared to Gibboost alone (to 9796 kg/ha) but not dry matter yield. Gibboost+ EnergHi at 50 mL/ha had the highest yield in the trial with 10293 kg/ha fresh and 1527 kg/ha dry yield. There were no significant differences between pasture growth regulator treatments.

There was no significant difference between treatments for percent dry matter content at 21 DAT or 30 DAT.

Product formulation

EnergHi was an experimental formulation. Gibboost (batch: 20170620) and Surfactant were sourced from current commercially available stock. There was no noticeable mixing or spraying difficulties with any material.

CONCLUSIONS

- ❖ Gibboost, Gibboost+ EnergHi at 25 mL/ha and Gibboost+ EnergHi at 50 mL/ha significantly increased pasture height and plate meter yield compared to untreated plots at 15, 21 and 30 DAT.
- ❖ Gibboost+ EnergHi at 50 mL/ha significantly increased pasture height and plate meter yield compared to Gibboost alone at 30 DAT and trended to increase pasture height and yield compared to Gibboost+ EnergHi at 25 mL/ha at 15 and 21 DAT.
- ❖ Pasture growth regulator treatments trended to increase harvested (mown) pasture yield compared to untreated plots at 21 DAT and significantly increased harvested pasture yield compared to untreated plots at 30 DAT.
- ❖ Gibboost+ EnergHi trended to increase harvested fresh pasture yield compared to Gibboost applied alone at 21 and 30 DAT.
- ❖ Gibboost+ EnergHi applied at 50 mL/ha trended to increase harvested pasture yield (fresh and dry) compared to Gibboost+ EnergHi at 25 mL/ha at 21 and 30 DAT.
- ❖ There was no significant difference in harvested pasture yield between pasture growth regulator treatments at 21 and 30 DAT.



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Research Officer
Peracto New Zealand Limited

APPENDIX

Table 6 – Treatment effect on pasture yield and dry matter at 15 and 21 DAT

Treatment	Product rate (g or mL/ha)	Mean pasture height and pasture yield		Mean pasture height, pasture plate yield, pasture fresh weight, % dry matter and dry weight				
		11 September (15 DAT)		17 September (21 DAT)				
		mean pasture height (cm)	kgDM/ha (plate meter)	mean pasture height (cm)	kgDM/ha (plate meter)	fresh weight (kg/ha)	% DM	DM (kg/ha)
1. Untreated	-	12.4 b	2238.3 b	15.4 b	2658.3 b	4255.6	17.8	752.9
2. Gibboost + Surfactant	9 25 mL/100L	16.4 a	2800.7 a	19.1 a	3178.7 a	5455.6	17.6	954.8
3. Gibboost + EnergHi + Surfactant	9 25 25 mL/100L	16.7 a	2842.7 a	18.8 a	3134.3 a	5666.7	17.2	975.1
4. Gibboost + EnergHi + Surfactant	9 50 25 mL/100L	16.3 a	2782.0 a	19.1 a	3176.3 a	5851.9	17.3	1006.1

HSD 0.05 (abc)

CV %

Treatment Prob (F)

358.10

8.07

0.0005

2.56

9.94

0.0005

2.5

8.31

0.0014

350.69

6.94

0.0014

NS

18.66

0.0553

NS

4.05

0.4760

NS

18.0

0.0714

Table 7 – Treatment effect on pasture yield and dry matter at 30 DAT

Treatment	Product rate (g or mL/ha)	Mean pasture height, pasture plate yield, pasture fresh weight, % dry matter and dry weight				
		mean pasture height (cm)	kgDM/ha (plate meter)	26 September (30 DAT) fresh weight (kg/ha)	% DM	DM (kg/ha)
1. Untreated	-	21.2 c	3461.0 c	7137.0 b	16.0	1139.5 b
2. Gibboost + Surfactant	9 25 mL/100L	23.8 b	3827.3 b	9755.6 a	15.5	1493.9 a
3. Gibboost + EnergHi + Surfactant	9 25 25 mL/100L	24.8 ab	3972.0 ab	9796.3 a	15.1	1457.8 a
4. Gibboost + EnergHi + Surfactant	9 50 25 mL/100L	26.2 a	4172.7 a	10292.6 a	14.9	1527.4 a

HSD 0.05 (abc)

CV %

Treatment Prob (F)

2.37

5.94

0.0001

332.04

5.17

0.0001

2122.21

13.79

0.0027

1.60

6.25

0.2579

213.40

9.13

0.0003



Hill Laboratories

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Certificate of Analysis

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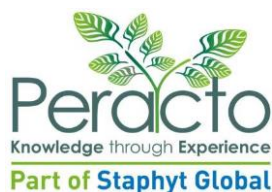
Client: Peracto NZ Limited	Lab No: 2047612	shpv1
Address: PO Box 383 Pukekohe 2340	Date Received: 13-Sep-2018	
	Date Reported: 19-Sep-2018	
	Quote No:	
	Order No:	
Phone: 09 238 1102	Client Reference:	
	Submitted By: Peracto NZ Limited	

Sample Name: LM1821 **Lab Number:** 2047612.1
Sample Type: SOIL Mixed Pasture (S1)

Analysis	Level Found	Medium Range	Low	Medium	High
pH	pH Units 6.2	5.8 - 6.2			
Olsen Phosphorus	mg/L 25	20 - 30			
Anion Storage Capacity*	% 94				
Potassium	me/100g 1.58	0.40 - 0.60			
Calcium	me/100g 14.6	4.0 - 10.0			
Magnesium	me/100g 1.65	1.00 - 1.60			
Sodium	me/100g 0.12	0.20 - 0.50			
CEC	me/100g 30	12 - 25			
Total Base Saturation	% 61	50 - 85			
Volume Weight	g/mL 0.78	0.60 - 1.00			
Potentially Available Nitrogen (15cm Depth)*	kg/ha 113	150 - 250			
Anaerobically Mineralisable N*	µg/g 97				
Organic Matter*	% 12.9	7.0 - 17.0			
Total Carbon*	% 7.5				
Total Nitrogen*	% 0.67	0.30 - 0.60			
C/N Ratio*	11.1				
Anaerobically Mineralisable N/Total N Ratio*	% 1.4	3.0 - 5.0			
Base Saturation %	K 5.3 Ca 49 Mg 5.6 Na 0.4				
MAF Units	K 25 Ca 14 Mg 29 Na 4				

The above nutrient graph compares the levels found with reference interpretation levels. NOTE: It is important that the correct sample type be assigned, and that the recommended sampling procedure has been followed. R J Hill Laboratories Limited does not accept any responsibility for the resulting use of this information. IANZ Accreditation does not apply to comments and interpretations, i.e. the 'Range Levels' and subsequent graphs.

Raw Data



Peracto New Zealand Limited

Evaluation of ENERGI and GIBBOOST for pasture response.

Trial ID: 1821
Protocol ID: LM1821
Project ID:

Location: Pukekohe
Investigator: Paul Munro
Study Director: Paul Munro
Sponsor Contact:

Trial Year: 2018

Description			PLOT -	Plate meter	PLOT -	Plate meter	PLOT -	PLOT -	PLOT -	PLOT -		
Part Rated			11.09.2018	11.09.2018	17.09.2018	17.09.2018	17.09.2018	17.09.2018	17.09.2018	17.09.2018		
Rating Date			HEIGHT	YIELD	HEIGHT	YIELD	YIELD	DM	Yield	Yield		
Rating Type			cm	KILOHM	cm	KILOHM	T-MET	%	kg DM/ha	kg DM/ha		
Rating Unit												
Trt-Eval Interval			15 DA-A	15 DA-A	21 DA-A	21 DA-A	21 DA-A	21 DA-A	21 DA-A	21 DA-A		
Trt	Treatment	Other	Other	Appl								
No.	Name	Rate	Rate	Code	Plot							
		Unit	Unit									
1	Untreated				2	13.1	2334.0	18.2	3048.0	5377.8	17.5	941.1
					8	10.7	1998.0	14.3	2502.0	3444.4	17.4	599.3
					10	12.8	2292.0	16.9	2866.0	4400.0	17.6	774.4
					13	12.6	2264.0	14.6	2544.0	3066.7	19.3	591.9
					18	11.4	2096.0	12.9	2306.0	4066.7	17.2	699.5
					21	13.9	2446.0	15.6	2684.0	5177.8	17.6	911.3
					Mean =	12.4	2238.3	15.4	2658.3	4255.6	17.8	752.9
2	Gibboost	9.0 g/ha		A	4	16.0	2740.0	19.1	3174.0	5466.7	17.3	945.7
	Surfactant	0.025 % v/v		A	7	16.0	2740.0	19.1	3174.0	5111.1	17.9	914.9
					12	16.4	2796.0	17.4	2936.0	5155.6	18.0	928.0
					15	17.8	2992.0	21.3	3482.0	7066.7	17.8	1257.9
					20	13.9	2446.0	17.4	2936.0	3955.6	18.2	719.9
					22	18.5	3090.0	20.5	3370.0	5977.8	16.1	962.4
					Mean =	16.4	2800.7	19.1	3178.7	5455.6	17.6	954.8
3	Gibboost	9.0 g/ha		A	1	17.2	2908.0	18.0	3020.0	5666.7	17.6	997.3
	EnergHi	25 ml/ha		A	6	19.8	3272.0	18.7	3118.0	6977.8	17.4	1214.1
	Surfactant	0.025 % v/v		A	9	15.7	2698.0	19.1	3174.0	5688.9	16.9	961.4
					14	18.4	3076.0	22.1	3594.0	6333.3	17.7	1121.0
					19	13.8	2432.0	16.6	2824.0	4488.9	17.3	776.6
					24	15.5	2670.0	18.4	3076.0	4844.4	16.1	780.0
					Mean =	16.7	2842.7	18.8	3134.3	5666.7	17.2	975.1
4	Gibboost	9.0 g/ha		A	3	15.7	2698.0	18.4	3076.0	5377.8	16.8	903.5
	EnergHi	50 ml/ha		A	5	13.6	2404.0	18.0	3020.0	4155.6	18.7	777.1
	Surfactant	0.025 % v/v		A	11	17.8	2992.0	19.6	3244.0	6822.2	17.6	1200.7
					16	17.1	2894.0	19.1	3174.0	7088.9	16.3	1155.5
					17	15.7	2698.0	19.8	3272.0	5666.7	17.5	991.7
					23	17.9	3006.0	19.8	3272.0	6000.0	16.8	1008.0
					Mean =	16.3	2782.0	19.1	3176.3	5851.9	17.3	1006.1

Part Rated
PLOT = plot
Rating Type
HEIGHT = height
YIELD = yield
Rating Unit
cm = centimeter
KILOHM = 1000 ohm
T-MET = ton (metric=1000 kg)
% = percent

Description Part Rated Rating Date Rating Type Rating Unit Trt-Eval Interval					PLOT - 26.09.2018 HEIGHT cm 30 DA-A	Plate meter PLOT - 26.09.2018 YIELD KILOHM 30 DA-A	PLOT - 26.09.2018 YIELD KG 30 DA-A	PLOT - 26.09.2018 DM % 30 DA-A	PLOT - 26.09.2018 Yield kg DM/ha 30 DA-A	
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	Plot					
1	Untreated				2	23.0	3720.0	8111.1	15.5	1257.2
					8	21.4	3496.0	6533.3	16.6	1084.5
					10	22.2	3608.0	6911.1	16.1	1112.7
					13	21.2	3468.0	7733.3	16.7	1291.5
					18	17.4	2936.0	5577.8	16.1	898.0
					21	21.7	3538.0	7955.6	15.0	1193.3
					Mean =	21.2	3461.0	7137.0	16.0	1139.5
2	Gibboost Surfactant	9.0 g/ha 0.025 % v/v		A A	4	25.0	4000.0	8688.9	15.9	1381.5
					7	22.9	3706.0	9622.2	16.1	1549.2
					12	22.1	3594.0	10177.8	15.8	1608.1
					15	27.4	4336.0	11911.1	14.0	1667.6
					20	20.5	3370.0	6733.3	16.9	1137.9
					22	24.7	3958.0	11400.0	14.2	1618.8
					Mean =	23.8	3827.3	9755.6	15.5	1493.9
3	Gibboost EnergHi Surfactant	9.0 g/ha 25 ml/ha 0.025 % v/v		A A A	1	25.6	4084.0	8488.9	15.0	1273.3
					6	27.7	4378.0	11600.0	14.8	1716.8
					9	23.5	3790.0	11955.6	13.5	1614.0
					14	26.4	4196.0	11622.2	14.2	1650.4
					19	20.4	3356.0	5800.0	16.8	974.4
					24	25.2	4028.0	9311.1	16.3	1517.7
Mean =	24.8	3972.0	9796.3	15.1	1457.8					
4	Gibboost EnergHi Surfactant	9.0 g/ha 50 ml/ha 0.025 % v/v		A A A	3	25.4	4056.0	9244.4	15.7	1451.4
					5	25.3	4042.0	9466.7	15.8	1495.7
					11	25.5	4070.0	11733.3	13.6	1595.7
					16	28.2	4448.0	9977.8	15.3	1526.6
					17	24.5	3930.0	9666.7	15.0	1450.0
					23	28.5	4490.0	11666.7	14.1	1645.0
Mean =	26.2	4172.7	10292.6	14.9	1527.4					