

# Annual Legume Results

Site: Te Kopuru  
A & M McCahon

Data covering growth rates and pasture composition from annual legumes in 2017

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## SUMMARY POINTS

- Annual legume plots sown 10<sup>th</sup> May 2017
- Field germination variable, by June-July
  - High field germination
    - Lusa Persian at 413 seedlings/m<sup>2</sup>
    - Arrowleaf at 325
  - Medium field germination
    - Viper balansa 269
    - Taipan balansa 156
    - Lightning Persian 200
    - Turbo Persian 238
    - Uncertified berseem 263
    - Bindoon sub clover 219
  - Low field germination
    - Monti sub 100
    - Antas sub 144
    - Crimson 88
    - Burr medic 75
    - Sweet white clover 0
- Growth rates from sowing up to mid-August were variable from a low of 13 kg DM/ha/day up to 26 kg DM/ha/day: total plant material growth.

Viper & Taipan balansa averaged	18 kg DM/ha/day
Lightning & Turbo Persian averaged	23 kg DM/ha/day
Uncertified Berseem averaged	19 kg DM/ha/day
Sub clovers averaged	14 kg DM/ha/day
- Dissection result as at 15<sup>th</sup> August showed major differences in presence of sown species:

Balansa	@	75%
Persian	@	56%
Berseem	@	53%
Sub Clover	@	8%
Crimson	@	30%
Burr Medic	@	47%

Note: Just 8% presence for the sub clovers

- Daily growth rates as at 28<sup>th</sup> September at 141 days post sowing for plant material cut for the first time. So growth from 8<sup>th</sup> May up to 28<sup>th</sup> September. This growth is for all plant material present – not just the sown species

Balansa	39 kg DM/ha/day
Persian	32 kg DM/ha/day
Arrowleaf	18 kg DM/ha/day
Berseem	26 kg DM/ha/day
Crimson	24 kg DM/ha/day
Burr medic	26 kg DM/ha/day

- Daily growth rates and presence of sown species for plant material harvested a second time on 28<sup>th</sup> September. Growth period being 44 days from 15<sup>th</sup> August to 28<sup>th</sup> September.

	Daily Growth Rate kg DM/ha		Presence of Sown Species
	Total Plant Material	Sown Species	
Balansa	55	50	90
Persian	55	39	71
Arrowleaf	13	7	57
Berseem	38	11	30
Sub Clover	19	2	11
Crimson	38	24	63
Burr Medic	38	31	81

- Growth comparison – Late September to early November 2017, between 3 cut and 2 cut material. Growth of only sown/target material only – other plant species have been deducted.

	Growth – kg DM/ha/day	
	3 cut material	2 cut material
Viper Balansa	78	72
Taipan balansa	73	68
Lightning Persian	88	76
Turbo Persian	93	87
Arrowleaf	70	83
Uncertified Berseem	29	26
Crimson	10	12
Spineless Burr medic	52	54

### Comment

- Small advantage in slightly higher growth rates per day for this 40-day period, for plants that had been cut three times compared to two times, for both Balansa cultivars.
- Lightning Persian showing a large advantage for three cuts compared to two cuts. Arrowleaf showing an advantage to being cut just twice compared to three times.
- The two Persian cultivars showing the highest growth rate during this 40-day period covering October and very early November, and Turbo showing slightly higher growth rates than lightning. Note: Lightning Persian was fully in flower whereas Turbo Persian was partly in flower.
- Flowering as at 7<sup>th</sup> November 2017:
  - Viper balansa fully in flower
  - Taipan balansa partly in flower
  - Lightning Persian fully in flower
  - Turbo Persian partly in flower
  - Crimson clover fully in flower
  - Spineless Burr Medic fully in flower
- Sown material remaining “pure” to species sown: Dissection data 7<sup>th</sup> November 2017. This is from material cut three times.

Species	Dissection - % of sown/target species being present
Balansa	97
Persian	89
Arrowleaf	93
Berseem	35
Sub Clovers	4
Crimson	16
Spineless Burr medic	79

## RESULTS

Seed and Field germination – Te Kopuru 2017				
	% Germination at 18 days in the lab	Seeding Rate – Total seed sown kg/ha	Seeding Rate – Viable seed sown kg/ha	Te Kopuru field germination seedlings per m <sup>2</sup>
Viper balansa	72	7.2	5.2	269
Taipan balansa	56	7.2	4	156
Lusa Persian	85	9.6	8.2	413
Lightning Persian	92	9.6	8.8	200
Turbo Persian	93	9.6	8.9	238
Arrotas arrowleaf	75	7.2	5.4	325
Uncertified Berseem	79	12	9.5	263
Monti sub	29	12	3.5	100
Antas sub	55	12	6.6	144
Bindoon sub	79	12	9.5	219
Crimson	89	10	8.9	88
Sweet white clover	4	13.4	0.5	0
Spineless Burr medic	65	6	3.9	75

The above germination % and sowing rate of viable seed do not take into account any hard seed that may be present and may germinate in the future. This could be especially important for sub clover balansa and arrowleaf, being those species with a significant presence of hard seed.

**Annual Legume Data**  
**Harvest date 15<sup>th</sup> August 2017**  
**Sowing date 10<sup>th</sup> May 2017 – 97 day establishment period**  
**First cut for one area of each plot**

Species & Cultivars	Growth – kg DM/ha		Dissection %
	Total	Per Day	
Viper Balansa	1,823	19	79
Taipan Balansa	1,653	17	70
Lightning Persian	2,542	26	43
Turbo Persian	1,989	20	68
Arrotas Arrowleaf	1,448	15	55
Uncertified Berseem	1,815	19	53
Monti sub	1,361	14	13
Antas sub	1,421	14	5
Bindoon sub	1,301	13	6
Crimson clover	1,315	13	30
Sweet white clover	1,318	13	11
Spineless Burr medic	1,514	15	47

**Annual Legume Data**  
**Harvest date 28<sup>th</sup> September 2017**  
**44 days between first harvest and 28<sup>th</sup> September**

	Plant Growth kg DM/ha Total		Dissection % from 2 <sup>nd</sup> cut material	Daily Growth	
	First cut material	Material Having second cut (Total since sowing)		First cut material	Material heavy second cut
Viper Balansa	5,344	4,360	82	38	58
Taipan Balansa	5,483	4,002	97	39	53
Lightning Persian	5,163	5,123	59	36	59
Turbo Persian	3,993	4,248	82	28	51
Arrotas Arrowleaf	2,517	2,003	57	18	13
Uncertified Berseem	3,636	3,495	30	26	38
Monti Sub	3,150	2,396	3	22	24
Antas Sub	2,527	2,314	21	18	20
Bindoon sub	2,091	1,872	10	15	13
Crimson clover	3,464	3,008	63	24	38
Sweet white clover	2,734	2,700	5	19	31
Spineless Burr medic	3,719	3,170	81	26	38

## Daily Growth:

Daily growth for First cut material is the growth from sowing (10<sup>th</sup> May) up to this harvest being 28<sup>th</sup> September. Daily growth for second cut material is from 15<sup>th</sup> August (First cut) up to 28<sup>th</sup> September (second cut).

<b>Annual Legume data – Growth and Dissection data</b>					
<b>Harvest date 7<sup>th</sup> November 2017</b>					
<b>Growth period 40 days from 28<sup>th</sup> September to 7<sup>th</sup> November</b>					
	<b>Total Pasture Mass kg DM/ha</b>		<b>Dissection %</b>	<b>Daily growth: total pasture material</b>	
	<b>Cut two times</b>	<b>Cut three times</b>		<b>Cut two times</b>	<b>Cut three times</b>
Viper Balansa	8,240	7,501	99	72	79
Taipan Balansa	8,344	7,083	95	72	77
Lightning Persian	7,898	9,026	90	68	98
Turbo Persian	7,961	7,529	88	99	82
Arrotas Arrowleaf	6098	5,027	93	90	76
Uncertified Berseem	6,608	6,755	35	74	81
Monti Sub	5,685	4,828	2	63	61
Antas Sub	5,163	4,682	6	66	59
Bindoon sub	4,559	4,473	3	62	65
Crimson clover	6,363	5,532	16	72	63
Sweet white clover	5,592	5,441	2	71	69
Spineless Burr medic	6,445	5,815	79	68	66

### Flowering Comment:

- Viper balansa in fully in flow early November
- Taipan balansa partly in flow
- Lightning Persian fully in flower
- Turbo Persian partly in flower
- Crimson clover fully in flower
- Sweet white clover partly in flower
- Spineless Burr medic fully in flower

**Annual Legume Data Te Kopuru**  
**From Pasture Growth of Species sown as at 7<sup>th</sup> November 2017**  
**Sown 10<sup>th</sup> May 2017 up to 7<sup>th</sup> November**  
**Third harvest – 7<sup>th</sup> November 2017**

Species	Dissection % of plant mass present on 7 <sup>th</sup> November	Total Pasture Growth from sowing of species sown: Third Harvest Material kg DM/ha (excludes non target/sown species)	
		Kg DM/ha	Kg/day
Viper Balansa	99	7,426	41
Taipan Balansa	95	6,729	37
Lightning Persian	90	8,123	45
Turbo Persian	88	6,626	37
Arrotas Arrowleaf	93	4,675	26
Uncertified Berseem	35	2,364	
Monti Sub	2	96	
Antas Sub	6	281	
Bindoon sub	3	134	
Crimson clover	16	885	
Sweet white clover	2	109	
Spineless Burr medic	79	4,594	

Note: Dissection and growth rate shown above are taken from the areas cut for the third time on 7<sup>th</sup> November.

**Growth – Late September to early November 2017 of “three cuts” material**  
**40 day period**

	3 <sup>rd</sup> cut material: Total material kg DM/ha	Growth of sown material only kg DM/ha	Growth of sown/target legume only kg DM/ha/day
Viper Balansa	3,141	3,110	78
Taipan Balansa	3,081	2,927	73
Lightning Persian	3,903	3,516	88
Turbo Persian	3,281	3,728	93
Arrotas Arrowleaf	3,024	2,812	70
Uncertified Berseem	3,260	1,141	29
Crimson	2,524	404	10
Spineless Burr medic	2,645	2,090	52

**Growth – Late September to early November 2017 of “two cuts” material  
40 day period**

	<b>2<sup>nd</sup> cut material: Total material kg DM/ha</b>	<b>Growth of sown material only kg DM/ha</b>	<b>Growth per day of sown/target material kg DM/ha/day</b>
Viper Balansa	2,896	2,867	72
Taipan Balansa	2,861	2,718	68
Lightning Persian	2,735	3,039	76
Turbo Persian	3,968	3,492	87
Arrotas Arrowleaf	3,581	3,330	83
Uncertified Berseem	2,972	1,040	26
Crimson	2,899	464	12
Spineless Burr medic	2,726	2,154	54

Assumption for the table above is that the presence of the sown species is the same as it was in the “three cuts” material: dissections were not undertaken for this “two cut” material.

### **ANNUAL LEGUME DATA – Te Kopuru**

Sown 10<sup>th</sup> May 2017 – Last harvest 12<sup>th</sup> December 2018

Table below shows the pasture mass grown by the sown or target species: it has other volunteer species production excluded.

<b>Species</b>	<b>Dissection % of plant mass present on 12<sup>th</sup> December 2017</b>	<b>Pasture mass by sown species kg DM/ha production for 12 months under a four cut treatment</b>
Viper Balansa	43	3,714
Taipan Balansa	13	612
Lusa Persian	80	10,637
Lightning Persian	12	1,461
Turbo Persian	63	6,072
Arrotas Arrowleaf	84	11,751
Uncertified Berseem	9	431
Monti Sub	0	0
Antas Sub	0	0
Bindoon sub	0	0
Crimson clover	0	0
Sweet white clover	0	0
Spineless Burr medic	69	69

Lusa Persian under a one cut treatment.

## ANNUAL LEGUME YIELD DATA – Te Kopuru

Cuts dated 12<sup>th</sup> December 2017

Pasture mass includes all material present – not just target/sown species. See elsewhere for dissection data. Data is shown for stripes within the plots that had been cut just once, cut three times and cut four times.

Species	Pasture Mass kg DM/ha		
	Cut once	Cut three times	Cut four times
Viper Balansa	8,638	8,984	8,638
Taipan Balansa	4,712	9,075	7,605
Lusa Persian	13,296	-	-
Lightning Persian	12,179	9,454	11,192
Turbo Persian	9,638	11,234	10,385
Arrotas Arrowleaf	13,889	7,619	6,415
Uncertified Berseem	4,790	8,946	9,086
Monti Sub	5,665	8,059	7,083
Antas Sub	4,471	7,102	6,293
Bindoon sub	4,572	6,642	6,243
Crimson clover	5,282	7,493	6,961
Sweet white clover	8,666	8,209	7,773
Spineless Burr medic	5,516	7,905	7,437

Other Comments results:

- For the one cut data to 12<sup>th</sup> December, we were 30 days too late for this cut: plant material was disintegrating from flowering in late October to late November. This would have particularly impacted on:
  - Viper and especially Taipan Balansa
  - Lightning Persian (the earlier flowering Persian)
  - Uncertified Berseem

Annual Legume Dissection Data – Te Kopuru 2017				
Species	% of Plant Material Harvested being the down/target species			
	15 <sup>th</sup> August	28 <sup>th</sup> September	7 <sup>th</sup> November	12 <sup>th</sup> December
Viper Balansa	79	82	99	43
Taipan Balansa	70	97	95	13
Lightning Persian	43	59	90	12
Turbo Persian	68	82	88	63
Arrotas Arrowleaf	55	57	93	84
Uncertified Berseem	53	30	35	9
Monti Sub	13	3	2	0
Antas Sub	5	21	6	0
Bindoon sub	6	10	3	0
Crimson clover	30	63	16	0
Sweet white clover	11	5	0	0
Spineless Burr medic	47	81	79	69

Dissection result is for the plant material that has been harvested “each time”. 15<sup>th</sup> August harvest was the first cut for all species: just one area/strip of each plot. 28<sup>th</sup> September harvest was the second cut for the plant material that had been cut on the 15<sup>th</sup> August – it was this area’s material where the dissection was undertaken.



7<sup>th</sup> November harvest was the:

- Third harvest for one area/strip
- Second harvest for another strip
- First harvest for another strip

The dissection was taken from the material that had had three harvests.

## Daily Growth Rates Composite Pasture Data – Te Kopuru

One plot each of the species shown below was excluded from the general plot data because they were “contaminated” by strong tall fescue, white and red clover and annual clover that had been sown in the paddock beside the plots.

Note: the data below is from one plot only.

Growth Data – Composite Plot kg DM/ha/day				
	From 10 <sup>th</sup> May up to 15 <sup>th</sup> August	From 15 <sup>th</sup> August up to 28 <sup>th</sup> Sept	From 28 <sup>th</sup> Sept to 7 <sup>th</sup> Nov	From 7 <sup>th</sup> Nov to 12 <sup>th</sup> Dec
Monti Composite	24	25	68	48
Crimson Composite	17	23	49	44
Lusa Persian Composite	27	51	56	41
Turbo Persian Composite	27	38	80	78
Sweet white clover composite	21	35	69	53

Total Growth and Dissection Data – Composite Pasture Plots, Te Kopuru				
	Total Growth kg DM/ha			Dissection 12 <sup>th</sup> Dec on 4 cut material
	One Cut	Three Cuts	Four Cuts	Sown/Target Species
Monti Sub Composite	4,666	8,021	7,760	0
Crimson Sub Composite	4,786	10,094	5,915	0
Lusa Persian Composite	8,563	8,421	9,290	37
Turbo Persian Composite	8,632	7,871	9,559	33
Sweet white clover composite	4,103	8,117	7,994	0

Dissection Detail – 12 <sup>th</sup> December from material cut four times Composite Pasture Plots					
	Sown/Target Species	Grass	White Clover	Red Clover	Lucerne
Monti Sub			83	8	9
Crimson		26	71	3	
Lusa Persian	37	3	37	21	2
Turbo Persian	33	1	38	28	
Sweet White Clover		32	43	25	

Factors impacting on these dissection results:

- Early flowering sown species, being crimson and sweet white clover had “disappeared” by 7<sup>th</sup> December
- Monti sub clover did not feature from after August

- Lusa and Turbo Persian being later flowering, Persian cultivars were still present, growing and flowering in early December
- An inadvertent spray for grass control in these composite plots in early-spring, would have impacted on the grass content.

## **Annual Legumes – Te Kopuru**

Sowing date 10<sup>th</sup> May 2017

First harvest - 15<sup>th</sup> August @ 98 days  
Second harvest - 28<sup>th</sup> September @ 44 days  
Third harvest - 7<sup>th</sup> November @ 40 days  
Fourth (last) harvest - 12<sup>th</sup> December @ 35 days

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