



SUMMARY REPORT

**Pasture legume choices,
establishment and persistence for
the Murray Plains**

Palmer, South Australia, 2021

Protocol Number:
MPF2021

Trial ID:
AGX21099

Date:
21 January 2022

AgXtra

Research Partners
for Crop Innovation

6 Pattinson Rd
Newton SA 5074 Australia
+61 8 8365 7070
agxtra@agxtra.com.au
www.agxtra.com.au

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OBJECTIVES

- Which legume pasture species are suitable to our LRZ environment?
- How to maximise pasture production and seed set in the establishment year
- How can we maximise regeneration in subsequent years?
- What pasture species will provide the best disease break in the cropping rotation?

TRIAL PART A

Pasture demonstration: 11 cultivars x 4 reps

No.	Crop variety	Sowing rate
1	PM 250 Strand medic	5 kg/ha
2	Sultan SU medic	5 kg/ha
3	Scimitar spineless burr medic	5 kg/ha
4	Margurita - Serradella	7 kg/ha
5	Casblah - Biserrula	7 kg/ha
6	Bartolo Bladder clover*	20 kg/ha
7	Cefalu Arrowleaf clover^	4 kg/ha
8	Nitro Plus Persian clover	4 kg/ha
9	Volga vetch	30 kg/ha
10	Mawson sub clover	7 kg/ha
11	Studenica	30 kg/ha

* = Seeding rate increased due to poor germination of seed (51%)

^ = Poor establishment due to seed having 38% germination (test not available prior to seeding)

Trial plan

401 5	402 11	403 7	404 2	405 9	406 6	407 10	408 4	409 8	410 1	411 3
301 8	302 10	303 5	304 1	305 4	306 11	307 3	308 7	309 9	310 6	311 2
201 2	202 6	203 3	204 9	205 10	206 8	207 5	208 1	209 4	210 7	211 11
101 4	102 1	103 8	104 6	105 5	106 7	107 2	108 11	109 3	110 10	111 9

Trial details

Sowing Date	14 May 2021	
Variety	Pasture cv. Various	
Fertiliser	14 May 2021	95 kg/ha DAP
	10 July	75 kg/ha SOA
Seeding System	Plot Seeder: Knife point spreader boot + presswheels	

RESULTS

Table 1. Fresh weight biomass density in various crops, Palmer

No.	Treatment	Sowing rate (kg/ha)	Fresh weight (mean kg/ha)	
			31 Aug 2021	27 Sep 2021
1	PM 250 Strand medic	5	2055 c	4675 b
2	Sultan SU medic	5	1913 c	3350 bcd
3	Scimitar spineless burr medic	5	1443 cd	3450 bcd
4	Margurita - Serradella	7	303 fg	1125 f
5	Casblah - Biserrula	7	673 ef	2075 def
6	Bartolo Bladder clover	20	1925 c	3725 bc
7	Cefalu Arrowleaf clover	4	260 g	1550 ef
8	Nitro Plus Persian clover	4	565 efg	1775 ef
9	Volga vetch	30	5315 b	11225 a
10	Mawson sub clover	7	923 de	2675 cde
11	Studenica	30	7543 a	11650 a
		P-value	0.0001	0.0001
		CV	16.33	24.18
		LSD ($P \leq 0.05$)	tS	1500.48

* = Data failed Bartlett's test and cannot be transformed for homogeneity
 Means followed by the same letter are not significantly different ($P = 0.05$, LSD)
 tS = Data transformed using $x = \text{SQRT}(y + 0.5)$, original means presented

Table 2. Dry weight biomass density in various crops, Palmer

No.	Treatment	Sowing rate (kg/ha)	Dry weight (mean kg/ha)		
			31 Aug 2021	27 Sep 2021	02 Feb 2022
1	PM 250 Strand medic	5	411 c	1313 b	1115 bc
2	Sultan SU medic	5	459 c	1005 b	1533 b
3	Scimitar spineless burr medic	5	346 cd	900 b	1265 bc
4	Margurita - Serradella	7	61 g	225 d	703 c
5	Casblah - Biserrula	7	148 ef	478 c	1168 bc
6	Bartolo Bladder clover	20	385 cd	858 b	1665 b
7	Cefalu Arrowleaf clover	4	56 g	358 c	1700 b
8	Nitro Plus Persian clover	4	113 fg	445 c	1853 ab
9	Volga vetch	30	904 b	2920 a	2520 a
10	Mawson sub clover	7	240 de	563 c	1185 bc
11	Studenica	30	1282 a	3613 a	2588 a
P-value			0.0001	0.0001	0.0009
CV			16.36	5.13	35.84
LSD ($P \leq 0.05$)			tS	tL	813.64

Means followed by the same letter are not significantly different ($P = 0.05$, LSD)

tS = Data transformed using $x = \text{SQRT}(y + 0.5)$, original means presented

tL = Data transformed using $x = \text{Log}(y + 1)$, original means presented

Table 3. Drone assessments of various crops, Palmer

No.	Treatment	Sowing rate (kg/ha)	31 Aug 2021		
			Ground cover (mean % area)	NDVI (mean no.)	Crop height (mean height)
1	PM 250 Strand medic	5	50.3 a	1.4 bc	9.9 c
2	Sultan SU medic	5	39.1 bcd	1.3 c	8.4 c
3	Scimitar spineless burr medic	5	37.9 cd	1.4 bc	8.9 c
4	Margurita - Serradella	7	34.1 d	1.5 ab	8.3 c
5	Casblah - Biserrula	7	35.1 d	1.4 bc	8.4 c
6	Bartolo Bladder clover	20	46.7 abc	1.4 bc	9.3 c
7	Cefalu Arrowleaf clover	4	33.0 d	1.4 bc	9.5 c
8	Nitro Plus Persian clover	4	32.4 d	1.4 bc	8.0 c
9	Volga vetch	30	49.7 ab	1.5 a	16.7 b
10	Mawson sub clover	7	39.3 bcd	1.4 bc	9.4 c
11	Studenica	30	54.9 a	1.5 a	20.2 a
P-value			0.0006*	0.0038	0.0001
CV			17.96	4.55	19.24
LSD ($P \leq 0.05$)			10.66	0.09	2.96

* = Data failed Bartlett's test and cannot be transformed for homogeneity
Means followed by the same letter are not significantly different ($P = 0.05$, LSD)

Table 4. Groundcover assessments of various crops, Palmer

No.	Treatment	Sowing rate (kg/ha)	02 Feb 2022		
			Pasture cover (mean % area)	Bare ground cover (mean % area)	Weed cover (mean % area)
1	PM 250 Strand medic	5	30 fg	43 ab	28 ab
2	Sultan SU medic	5	36 ef	41 ab	23 abcd
3	Scimitar spineless burr medic	5	29 fg	45 ab	26 abc
4	Margurita - Serradella	7	20 g	50 a	30 a
5	Casblah - Biserrula	7	43 de	39 b	19 bcd
6	Bartolo Bladder clover	20	64 ab	23 d	14 d
7	Cefalu Arrowleaf clover	4	65 a	20 d	15 d
8	Nitro Plus Persian clover	4	64 ab	23 d	14 d
9	Volga vetch	30	58 abc	25 d	18 cd
10	Mawson sub clover	7	48 cd	36 bc	16 d
11	Studenica	30	54 bc	29 cd	18 cd
P-value			0.0001	0.0001	0.0068
CV			15.63	19.25	32.53
LSD ($P \leq 0.05$)			10.44	9.41	9.34

Means followed by the same letter are not significantly different ($P = 0.05$, LSD)

TRIAL PART B

Pasture demonstration: 3 cultivars x 3 sowing rates x 4 reps

No.	Crop variety	Sowing rate
1	PM 250 Strand medic	2.5 kg/ha
2	PM 250 Strand medic	5 kg/ha
3	PM 250 Strand medic	10 kg/ha
4	Bartolo Bladder clover*	10 kg/ha
5	Bartolo Bladder clover*	20 kg/ha
6	Bartolo Bladder clover*	30 kg/ha
7	Volga vetch	15 kg/ha
8	Volga vetch	30 kg/ha
9	Volga vetch	60 kg/ha

* = Seeding rate increased due to poor germination of seed (51%)

Trial plan

401 1	402 5	403 4	404 6	405 3	406 8	407 9	408 7	409 2
301 3	302 6	303 8	304 9	305 4	306 7	307 2	308 1	309 5
201 2	202 9	203 1	204 7	205 5	206 6	207 4	208 8	209 3
101 8	102 7	103 6	104 2	105 1	106 3	107 5	108 9	109 4

Trial details

Sowing Date	14 May 2021	
Variety	Pasture cv. Various	
Fertiliser	14 May 2021	95 kg/ha DAP
	10 July	75 kg/ha SOA
Seeding System	Plot Seeder: Knife point spreader boot + presswheels	

RESULTS

Table 1. Fresh weight biomass density in various crops, Palmer

No.	Treatment	Sowing rate (kg/ha)	Fresh weight (mean kg/ha)	
			31 Aug 2021	27 Sep 2021
1	PM 250 Strand medic	2.5	1778 ef	3900 c
2	PM 250 Strand medic	5	2370 de	4350 c
3	PM 250 Strand medic	10	3623 c	5825 b
4	Bartolo Bladder clover	10	780 g	2800 d
5	Bartolo Bladder clover	20	1530 f	3600 cd
6	Bartolo Bladder clover	30	2265 de	3850 c
7	Volga vetch	15	2805 cd	7200 b
8	Volga vetch	30	4633 b	10050 a
9	Volga vetch	60	6038 a	9750 a
P-value			0.0001	0.0001
CV			9.31	8.33
LSD ($P \leq 0.05$)			tS	tS

Means followed by the same letter are not significantly different ($P = 0.05$, LSD)
tS = Data transformed using $x = \text{SQRT}(y + 0.5)$, original means presented

Table 2. Dry weight biomass density in various crops, Palmer

No.	Treatment	Sowing rate (kg/ha)	Dry weight (mean kg/ha)		
			31 Aug 2021	27 Sep 2021	02 Feb 2022
1	PM 250 Strand medic	2.5	398 de	1093 d	1070 c
2	PM 250 Strand medic	5	521 cd	1350 d	1065 c
3	PM 250 Strand medic	10	869 ab	1863 c	895 c
4	Bartolo Bladder clover	10	173 f	645 f	1230 c
5	Bartolo Bladder clover	20	309 ef	793 ef	1723 b
6	Bartolo Bladder clover	30	471 cde	1040 de	1720 b
7	Volga vetch	15	567 c	1945 c	1955 b
8	Volga vetch	30	778 b	3418 a	2600 a
9	Volga vetch	60	1014 a	2730 b	2550 a
P-value			0.0001	0.0001	0.0001
CV			20.35	8.08	17.00
LSD ($P \leq 0.05$)			168.40	tS	408.2

Means followed by the same letter are not significantly different ($P = 0.05$, LSD)
tS = Data transformed using $x = \text{SQRT}(y + 0.5)$, original means presented

Table 3. Drone assessments of various crops, Palmer

No.	Treatment	Sowing rate (kg/ha)	31 Aug 2021		
			Ground cover (mean % area)	NDVI (mean no.)	Crop height (mean height)
1	PM 250 Strand medic	2.5	36.9 ef	1.3 d	6.1
2	PM 250 Strand medic	5	48.4 abc	1.4 cd	5.8
3	PM 250 Strand medic	10	53.5 a	1.4 bc	7.4
4	Bartolo Bladder clover	10	21.0 g	1.2 e	2.8
5	Bartolo Bladder clover	20	38.3 def	1.3 cd	4.0
6	Bartolo Bladder clover	30	45.6 bcd	1.4 cd	7.5
7	Volga vetch	15	32.5 f	1.4 cd	7.1
8	Volga vetch	30	42.8 cde	1.4 b	8.8
9	Volga vetch	60	51.7 ab	1.5 a	12.6
P-value			0.0001*	0.0001	0.0673
CV			12.45	3.59	55.45
LSD (P ≤ 0.05)			7.48	0.07	NSD

* = Data failed Bartlett's test and cannot be transformed for homogeneity
Means followed by the same letter are not significantly different (P = 0.05, LSD)
NSD = No significant difference due to a P-value > 0.05

Table 4. Groundcover assessments of various crops, Palmer

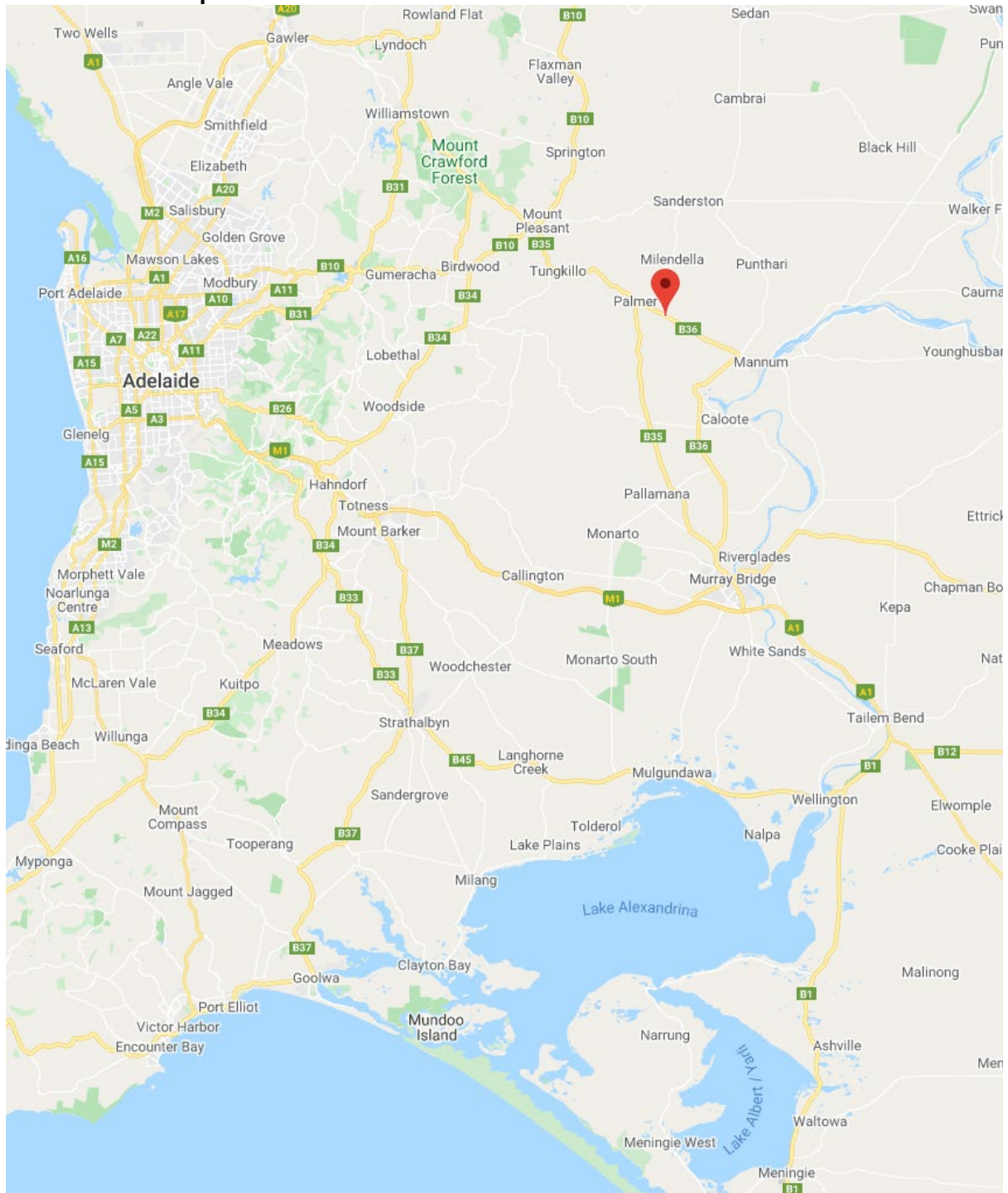
No.	Treatment	Sowing rate (kg/ha)	02 Feb 2022		
			Pasture cover (mean % area)	Bare ground cover (mean % area)	Weed cover (mean % area)
1	PM 250 Strand medic	2.5	18 c	46 abc	36 ab
2	PM 250 Strand medic	5	25 c	45 abcd	30 abc
3	PM 250 Strand medic	10	28 c	48 abc	25 bc
4	Bartolo Bladder clover	10	33 bc	28 d	40 a
5	Bartolo Bladder clover	20	48 ab	33 bcd	20 c
6	Bartolo Bladder clover	30	50 ab	30 cd	18 c
7	Volga vetch	15	15 c	63 a	23 bc
8	Volga vetch	30	25 c	50 ab	23 bc
9	Volga vetch	60	55 a	28 d	18 c
P-value			0.0004	0.0060	0.0404
CV			37.25	30.88	39.90
LSD ($P \leq 0.05$)			17.82	18.46	14.96

Means followed by the same letter are not significantly different ($P = 0.05$, LSD)

APPENDICES

Appendix i. Trial details

Trial location map



Germination results



GPO Box 1671
Adelaide
South Australia 5001

Tel: (08) 8303 9549
Fax: (08) 8303 9508
Email: seeds@ruralsolutions.sa.gov.au
Web: www.ruralsolutions.sa.gov.au/seeds

COMMERCIAL CERTIFICATE OF ANALYSIS

Cultivar name and sample details as stated by applicant
Analysis results relate only to the sample as received

Cultivar: Bartolo
Species Name: Bladder Clover / Trifolium spumosum

Line No: SWP10086
Lab No: 437216
Other ID:
Line Weight: 11900 kg
(11900 kg in 476 sack/s)

Sample Weight: 573g
Date Submitted: 25/03/2021
Issue Date: 23/04/2021

Applicant: S&W SEED COMPANY AUST PTY LTD

PURITY - % Weight			GERMINATION - % Number							
Pure Seeds	Inert Matter	Other Seeds	First Count		Final Count		Hard Seeds	Fresh Ungerminated Seeds	Abnormal Seedlings	Dead Seeds
			Day	Normal Seedlings	Day	Normal Seedlings				
99.9	0.1	trace	5	49	8	57	37	0	4	2

Other Seeds found in 70.0 grams

Botanical Name	Common Name	Status	Number
Trifolium michelianum	Balansa clover		-

Germ Method: TP,15C

Inert Matter

Chemical Particles, Broken Seed

Remarks

TREATED-GOLDSTRIKE This seed lot was sampled by a person recognised by AUDL01, ISTA station & tested in accordance with ISTA Rule weights. Bulk sample 70g, working sample 7g, submitted sample 573g. Bulk search carried out. NIL% soil. Pelleted seed-Coating not removed for

Nicholas Koch
Manager
SEED SERVICES AUSTRALIA



An Accredited I.S.T.A. Member Laboratory (AUDL01)

**CERTIFIED SEED
 CERTIFICATE OF ANALYSIS**

Cultivar: Studenica **Line No:** DM12037
Species Name: Common Vetch / Vicia sativa **Lab No:** 210082
Class: Basic **Line Weight:** 25000 kg
 (25000 kg in 1000 sacks)
Area No: SE 319 (SUNW)
Certificate No: 46381 **Labels:**
Issue Date: 29/01/2021
Result: Preliminary Result - Certification Not Final

PURITY - % Weight			GERMINATION - % Number							
Pure Seeds	Inert Matter	Other Seeds	First Count		Final Count		Hard Seeds	Fresh Ungerminated Seeds	Abnormal Seedlings	Dead Seeds
			Day	Normal Seedlings	Day	Normal Seedlings				
99.6	0.4	0.0	7	87	14	91	2	0	6	1

Other Seeds found in 1000.0 grams		Common Name	Status	Number
Botanical Name				

Sample as analysed contains nil other seeds

**** Preliminary Result - Certification Not Final ****

Germ Method: BP,20C

Inert Matter
 Broken Seed

Remarks



Nicholas Koch
 Manager
 SEED SERVICES AUSTRALIA



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**COMMERCIAL
CERTIFICATE OF ANALYSIS**

**Cultivar name and sample details as stated by applicant
Analysis results relate only to the sample as received**

Cultivar: Zulumax
Species Name: Arrowleaf Clover / Trifolium vesiculosum
Line No: SWP10101
Lab No: 437519
Other ID:
Line Weight: 22437 kg
 (22437 kg in 897 sack/s)
Sample Weight: 617g
Date Submitted: 14/04/2021
Issue Date: 10/05/2021
Applicant: S&W SEED COMPANY AUST PTY LTD

PURITY - % Weight			GERMINATION - % Number							
Pure Seeds	Inert Matter	Other Seeds	First Count		Final Count		Hard Seeds	Fresh Ungerminated Seeds	Abnormal Seedlings	Dead Seeds
			Day	Normal Seedlings	Day	Normal Seedlings				
99.8	0.2	0.0	4	68	11	83	13	0	4	0

Other Seeds found in 30.0 grams

Botanical Name	Common Name	Status	Number
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Sample as analysed contains nil other seeds

Germ Method: TP,15C

Inert Matter
Chemical Particles

Remarks
 Coated Seed. This seed lot was sampled by a person recognised by AUDL01, ISTA station & tested in accordance with ISTA Rule weights. Bulk sample 30g, working sample 3g, submitted sample 617g. Bulk search carried out. Nil% soil. Pelleted seed-Coating not removed for



Nicholas Koch
 Manager
 SEED SERVICES AUSTRALIA



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**COMMERCIAL
CERTIFICATE OF ANALYSIS**

**Cultivar name and sample details as stated by the applicant
Analysis results relate only to the sample as received**

Cultivar: Margurita
Species Name: Serradella / Ornithopus spp.
Line No: SWP10012
Lab No: 436212
Other ID:
Line Weight: 4100 kg
 (4100 kg in 164 sack/s)
Sample Weight: 620g
Date Submitted: 08/02/2021
Issue Date: 26/02/2021
Applicant: S&W SEED COMPANY AUST PTY LTD

PURITY - % Weight			GERMINATION - % Number							
Pure Seeds	Inert Matter	Other Seeds	First Count		Final Count		Hard Seeds	Fresh Ungerminated Seeds	Abnormal Seedlings	Dead Seeds
			Day	Normal Seedlings	Day	Normal Seedlings				
99.8	0.2	0.0	-	-	7	92	0	0	8	0

Other Seeds found in 90.0 grams

Botanical Name	Common Name	Status	Number
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Sample as analysed contains nil other seeds

Germ Method: BP,20C

Inert Matter
Chemical Particles

Remarks
 TREATED-GOLDSTRIKE. This seed lot was sampled by a person recognised by AUDL01, ISTA station & tested in accordance with ISTA Rule weights. Bulk sample 90g, working sample 9g, submitted sample 620g. Bulk search carried out nil% soil. Pelleted seed-Coating not removed for



Nicholas Koch
 Manager
 SEED SERVICES AUSTRALIA



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Appendix ii. Statistical analysis

Part A

Crop Name	Crop plants		Crop plants	Crop plants
Crop Variety	Various		Various	Various
Description	Drone - % cover		Drone - NDVI	Drone - height
Rating Date	31-Aug-21		31-Aug-21	31-Aug-21
Part Rated	PLOT, C		PLOT, C	PLOT, C
Rating Type	GROUND		NDVI	HEIGHT
Rating Unit/Min/Max	NUMBER, -, -		NUMBER, -, -	NUMBER, -, -
Sample Size	1 PLOT		1 PLOT	1 PLOT
ARM Action Codes				
Trt Treatment	Rate	Other	Other	
No. Name	Rate Unit	Rate	Rate Unit	
1PM 250 Strand medic	5kg/ha	11g/plot		9.88c
2Sultan SU medic	5kg/ha	11g/plot		8.37c
3Scimitar spineless burr medic	5kg/ha	11g/plot		8.88c
4Margurita - Serradella	7kg/ha	15g/plot		8.33c
5Casblah - Biserrula	7kg/ha	15g/plot		8.42c
6Bartolo Bladder clover	20kg/ha	44g/plot		9.32c
7Cefalu Arrowleaf clover	4kg/ha	8g/plot		9.54c
8Nitro Plus Persian clover	4kg/ha	8g/plot		8.00c
9Volga vetch	30kg/ha	63g/plot		16.66b
10Mawson sub clover	7kg/ha	15g/plot		9.42c
11Studenica	30kg/ha			20.19a
LSD P=.05				2.956
Standard Deviation				2.047
CV				19.24
Grand Mean				10.635
Bartlett's X2^				12.212
P(Bartlett's X2)				0.271
Rank X2				.
P(Rank X2)				.
Skewness^				-0.4858
Kurtosis^				-0.399
Replicate F				5.021
Replicate Prob(F)				0.0061
Treatment F				15.078
Treatment Prob(F)				0.0001

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

Crop Name					Crop plants	Crop plants	Crop plants
Crop Variety					Various	Various	Various
Description					Fresh weights (>	Fresh weights (>	Dry weights (g)
Rating Date					31-Aug-21	31-Aug-21	3-Sep-21
Part Rated					PLOT, C	PLOT, C	PLOT, C
Rating Type					WEIFRE	WEIFRE	WEIDRY
Rating Unit/Min/Max					KG/HA, -, -	KG/HA, -, -	KG/HA, -, -
Sample Size					1 PLOT	1 PLOT	1 PLOT
ARM Action Codes					T1	TS[2]	
Trt	Treatment	Rate	Other	Other	2	3	7
No.	Name	Rate	Unit	Rate	Rate	Unit	Unit
1	PM 250 Strand medic	5kg/ha		11g/plot	2055.0c	45.05c	411cd
2	Sultan SU medic	5kg/ha		11g/plot	1912.5cd	43.16c	459c
3	Scimitar spineless burr medic	5kg/ha		11g/plot	1442.5cde	37.23cd	346cde
4	Margurita - Serradella	7kg/ha		15g/plot	302.5f	16.88fg	61f
5	Casblah - Biserrula	7kg/ha		15g/plot	672.5ef	25.44ef	148ef
6	Bartolo Bladder clover	20kg/ha		44g/plot	1925.0cd	43.86c	385cd
7	Cefalu Arrowleaf clover	4kg/ha		8g/plot	260.0f	15.79g	56f
8	Nitro Plus Persian clover	4kg/ha		8g/plot	565.0ef	23.77efg	113f
9	Volga vetch	30kg/ha		63g/plot	5315.0b	72.42b	904b
10	Mawson sub clover	7kg/ha		15g/plot	922.5def	30.27de	240def
11	Studenica	30kg/ha			7542.5a	86.45a	1282a
LSD P=.05					1100.20	9.437	203.1
Standard Deviation					761.85	6.535	140.6
CV					36.57	16.33	35.13
Grand Mean					2083.18	40.029	400.4
Bartlett's X2^					38.202	15.538	33.658
P(Bartlett's X2)					0.00*	0.114	0.00*
Rank X2					.	.	.
P(Rank X2)					.	.	.
Skewness^					-0.2209	-0.3402	-0.2936
Kurtosis^					3.8236*	0.0933	2.4106*
Replicate F					0.462	0.531	0.464
Replicate Prob(F)					0.7110	0.6645	0.7094
Treatment F					36.423	46.432	29.201
Treatment Prob(F)					0.0001	0.0001	0.0001

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

Crop Name					Crop plants	Crop plants	Crop plants
Crop Variety					Various	Various	Various
Description					Dry weights (kg)	Fresh weights (>	Dry weights (kg)
Rating Date					3-Sep-21	27-Sep-21	19-Oct-21
Part Rated					PLOT, C	PLOT, C	PLOT, C
Rating Type					WEIDRY	WEIFRE	WEIDRY
Rating Unit/Min/Max					KG/HA, -, -	KG/HA, -, -	KG/HA, -, -
Sample Size					1 PLOT	1 PLOT	1 PLOT
ARM Action Codes					TS[7]	T3	T4
Trt Treatment	Rate	Other	Other		12	9	11
No. Name	Rate	Unit	Rate	Rate Unit	TS[7]		
1PM 250 Strand medic	5kg/ha		11g/plot		20.16c	4675.0b	1312.5c
2Sultan SU medic	5kg/ha		11g/plot		21.16c	3350.0bcd	1005.0cd
3Scimitar spineless burr medic	5kg/ha		11g/plot		18.25cd	3450.0bcd	900.0cde
4Margurita - Serradella	7kg/ha		15g/plot		7.58g	1125.0f	225.0g
5Casblah - Biserrula	7kg/ha		15g/plot		11.95ef	2075.0def	477.5fg
6Bartolo Bladder clover	20kg/ha		44g/plot		19.62cd	3725.0bc	857.5def
7Cefalu Arrowleaf clover	4kg/ha		8g/plot		7.33g	1550.0ef	357.5g
8Nitro Plus Persian clover	4kg/ha		8g/plot		10.65fg	1775.0ef	445.0fg
9Volga vetch	30kg/ha		63g/plot		29.87b	11225.0a	2920.0b
10Mawson sub clover	7kg/ha		15g/plot		15.45de	2675.0cde	562.5efg
11Studenica	30kg/ha				35.65a	11650.0a	3612.5a
LSD P=.05					4.246	1500.48	415.59
Standard Deviation					2.940	1039.04	287.79
CV					16.36	24.18	24.98
Grand Mean					17.969	4297.73	1152.27
Bartlett's X2^					14.718	11.079	13.596
P(Bartlett's X2)					0.143	0.351	0.192
Rank X2					.	.	.
P(Rank X2)					.	.	.
Skewness^					-0.3688	-0.574	-0.6947
Kurtosis^					-0.1367	0.2494	1.466*
Replicate F					0.560	6.491	5.762
Replicate Prob(F)					0.6456	0.0016	0.0031
Treatment F					36.520	50.272	58.779
Treatment Prob(F)					0.0001	0.0001	0.0001

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

Crop Name					Crop plants	Crop plants	Crop plants
Crop Variety					Various	Various	Various
Description					Dry weights (kg)	Dry weights (kg)	% Pasture cover
Rating Date					19-Oct-21	1-Feb-22	1-Feb-22
Part Rated					PLOT, C	PLOT, C	PLOT, C
Rating Type					WEIDRY	WEIDRY	GROUND
Rating Unit/Min/Max					KG/HA, -, -	KG/HA, -, -	%AREA, -, -
Sample Size					1 PLOT	1 PLOT	1 PLOT
ARM Action Codes					TL[11]	T5	
Trt No.	Treatment Name	Rate	Other Rate	Other Rate Unit	13 TL[11]	15	16
1	PM 250 Strand medic	5kg/ha		11g/plot	3.12b	1115.0bc	30.0fg
2	Sultan SU medic	5kg/ha		11g/plot	2.97b	1532.5b	36.3ef
3	Scimitar spineless burr medic	5kg/ha		11g/plot	2.95b	1265.0bc	28.8fg
4	Margurita - Serradella	7kg/ha		15g/plot	2.26d	702.5c	20.0g
5	Casblah - Biserrula	7kg/ha		15g/plot	2.66c	1167.5bc	42.5de
6	Bartolo Bladder clover	20kg/ha		44g/plot	2.92b	1665.0b	63.8ab
7	Cefalu Arrowleaf clover	4kg/ha		8g/plot	2.52c	1700.0b	65.0a
8	Nitro Plus Persian clover	4kg/ha		8g/plot	2.63c	1852.5ab	63.8ab
9	Volga vetch	30kg/ha		63g/plot	3.46a	2520.0a	57.5abc
10	Mawson sub clover	7kg/ha		15g/plot	2.69c	1185.0bc	47.5cd
11	Studenica	30kg/ha			3.55a	2587.5a	53.8bc
LSD P=.05					0.214	813.64	10.44
Standard Deviation					0.148	563.42	7.23
CV					5.13	35.84	15.63
Grand Mean					2.884	1572.05	46.25
Bartlett's X2^					16.394	7.473	7.053
P(Bartlett's X2)					0.089	0.68	0.72
Rank X2					.	.	.
P(Rank X2)					.	.	.
Skewness^					0.2661	0.7089	-0.3025
Kurtosis^					0.7563	0.5451	-0.6528
Replicate F					5.703	0.153	7.350
Replicate Prob(F)					0.0033	0.9270	0.0008
Treatment F					27.775	4.294	19.312
Treatment Prob(F)					0.0001	0.0009	0.0001

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

Crop Name					Crop plants	Crop plants
Crop Variety					Various	Various
Description					% Bare ground	% Weed cover
Rating Date					1-Feb-22	1-Feb-22
Part Rated					PLOT, C	PLOT, P
Rating Type					GROUND	GROUND
Rating Unit/Min/Max					%AREA, -, -	%AREA, -, -
Sample Size					1 PLOT	1 PLOT
ARM Action Codes						
Trt Treatment	Rate	Other	Other		17	18
No. Name	Rate Unit	Rate	Rate Unit			
1PM 250 Strand medic	5kg/ha		11g/plot		42.5ab	27.5ab
2Sultan SU medic	5kg/ha		11g/plot		41.3ab	22.5a-d
3Scimitar spineless burr medic	5kg/ha		11g/plot		45.0ab	26.3abc
4Margurita - Serradella	7kg/ha		15g/plot		50.0a	30.0a
5Casblah - Biserrula	7kg/ha		15g/plot		38.8b	18.8bcd
6Bartolo Bladder clover	20kg/ha		44g/plot		22.5d	13.8d
7Cefalu Arrowleaf clover	4kg/ha		8g/plot		20.0d	15.0d
8Nitro Plus Persian clover	4kg/ha		8g/plot		22.5d	13.8d
9Volga vetch	30kg/ha		63g/plot		25.0d	17.5cd
10Mawson sub clover	7kg/ha		15g/plot		36.3bc	16.3d
11Studenica	30kg/ha				28.8cd	17.5cd
LSD P=.05					9.41	9.34
Standard Deviation					6.52	6.47
CV					19.25	32.53
Grand Mean					33.86	19.89
Bartlett's X2^					7.89	8.584
P(Bartlett's X2)					0.64	0.572
Rank X2					.	.
P(Rank X2)					.	.
Skewness^					0.3082	0.275
Kurtosis^					-0.3054	0.2254
Replicate F					6.863	3.887
Replicate Prob(F)					0.0012	0.0185
Treatment F					10.337	3.179
Treatment Prob(F)					0.0001	0.0068

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
^Calculated from residual.

<u>Part Rated</u>
PLOT = plot
C = Crop is Part Rated
P = Pest is Part Rated
<u>Rating Type</u>
GROUND = groundcover
NDVI = normalized difference vegetation index
HEIGHT = height
WEIFRE = weight - fresh
WEIDRY = weight - dry / dry matter content
<u>Rating Unit/Min/Max</u>
NUMBER, , = number
KG/HA, , = kilograms per hectare
%AREA, , = percent of area
PLOT = total plot
<u>ARM Action Codes</u>
T1 = [C1]*10
TS[2] = SQR([2] + .5)
TS[7] = SQR([7] + .5)
T3 = [8]*10
T4 = [10]*10
TL[11] = LOG([11]+ 1)
T5 = [14]*10

Part B

Crop Name	Crop plants	Crop plants	Crop plants	Crop plants		
Crop Variety	Various	Various	Various	Various		
Description	Drone - % cover	Drone - NDVI	Drone - height	Fresh weights (>		
Rating Date	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21		
Part Rated	PLOT, C	PLOT, C	PLOT, C	PLOT, C		
Rating Type	GROUND	NDVI	HEIGHT	WEIFRE		
Rating Unit/Min/Max	NUMBER, -, -	NUMBER, -, -	NUMBER, -, -	KG/HA, -, -		
Sample Size	1 PLOT	1 PLOT	1 PLOT	1 PLOT		
ARM Action Codes				T1		
Trt Treatment	Rate	Other	Other			
No. Name	Rate Unit	Rate	Rate Unit			
1PM 250 Strand medic	2.5kg/ha	5.5g/plot	36.94ef	1.30d	6.09-	1777.5ef
2PM 250 Strand medic	5kg/ha	11g/plot	48.35abc	1.35cd	5.82-	2370.0de
3PM 250 Strand medic	10kg/ha	22g/plot	53.52a	1.39bc	7.39-	3622.5c
4Bartolo Bladder clover	10kg/ha	22g/plot	20.98g	1.22e	2.78-	780.0g
5Bartolo Bladder clover	20kg/ha	44g/plot	38.29def	1.34cd	4.03-	1530.0fg
6Bartolo Bladder clover	30kg/ha	88g/plot	45.61bcd	1.37cd	7.53-	2265.0def
7Volga vetch	15kg/ha	31g/plot	32.51f	1.36cd	7.07-	2805.0d
8Volga vetch	30kg/ha	63g/plot	42.75cde	1.44b	8.79-	4632.5b
9Volga vetch	60kg/ha	125g/plot	51.67ab	1.54a	12.59-	6037.5a
LSD P=.05			7.483	0.072	5.582	774.63
Standard Deviation			5.127	0.049	3.825	530.79
CV			12.45	3.59	55.45	18.5
Grand Mean			41.180	1.368	6.897	2868.89
Bartlett's X2^			15.979	12.99	3.526	17.03
P(Bartlett's X2)			0.043*	0.112	0.897	0.03*
Rank X2			.	.	.	.
P(Rank X2)			.	.	.	.
Skewness^			-1.0037*	-0.9369*	-0.4847	0.5653
Kurtosis^			3.1056*	2.1736*	-0.4101	1.6646*
Replicate F			1.092	3.026	32.706	1.905
Replicate Prob(F)			0.3716	0.0491	0.0001	0.1558
Treatment F			16.075	13.005	2.177	38.482
Treatment Prob(F)			0.0001	0.0001	0.0673	0.0001

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

Crop Name	Crop plants		Crop plants		Crop plants		Crop plants	
Crop Variety	Various		Various		Various		Various	
Description	Fresh weights (>		Dry weights (g)		Fresh weights (>		Fresh weights (>	
Rating Date	31-Aug-21		3-Sep-21		27-Sep-21		27-Sep-21	
Part Rated	PLOT, C		PLOT, C		PLOT, C		PLOT, C	
Rating Type	WEIFRE		WEIDRY		WEIFRE		WEIFRE	
Rating Unit/Min/Max	KG/HA, -, -		KG/HA, -, -		KG/HA, -, -		KG/HA, -, -	
Sample Size	1 PLOT		1 PLOT		1 PLOT		1 PLOT	
ARM Action Codes	TS[2]		T2		T2		TS[9]	
Trt No.	Treatment Name	Rate	Other Rate	Other Rate	3	7	9	12
		Unit	Unit	Unit	TS[2]			TS[9]
1	PM 250 Strand medic	2.5kg/ha	5.5g/plot		41.90ef	398de	3900.0cd	62.44c
2	PM 250 Strand medic	5kg/ha	11g/plot		48.67de	521cd	4350.0c	65.74c
3	PM 250 Strand medic	10kg/ha	22g/plot		59.55c	869ab	5825.0b	76.22b
4	Bartolo Bladder clover	10kg/ha	22g/plot		27.40g	173f	2800.0d	52.67d
5	Bartolo Bladder clover	20kg/ha	44g/plot		38.75f	309ef	3600.0cd	59.26cd
6	Bartolo Bladder clover	30kg/ha	88g/plot		47.54de	471cde	3850.0cd	62.00c
7	Volga vetch	15kg/ha	31g/plot		52.95cd	567c	7200.0b	84.64b
8	Volga vetch	30kg/ha	63g/plot		68.01b	778b	10050.0a	100.10a
9	Volga vetch	60kg/ha	125g/plot		77.62a	1014a	9750.0a	98.38a
LSD	P=.05				6.977	168.4	1462.03	8.936
	Standard Deviation				4.781	115.4	1001.80	6.123
	CV				9.31	20.35	17.57	8.33
	Grand Mean				51.376	566.8	5702.78	73.494
	Bartlett's X2^				10.43	20.542	14.611	10.492
	P(Bartlett's X2)				0.236	0.008*	0.067	0.232
	Rank X2				.	.	.	.
	P(Rank X2)				.	.	.	.
	Skewness^				0.4264	0.6322	0.7078	0.451
	Kurtosis^				-0.0565	2.6775*	1.1319	0.2352
	Replicate F				2.963	2.122	2.312	2.912
	Replicate Prob(F)				0.0524	0.1239	0.1016	0.0551
	Treatment F				41.146	22.450	29.342	32.138
	Treatment Prob(F)				0.0001	0.0001	0.0001	0.0001

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

Crop Name	Crop plants	Crop plants	Crop plants	Crop plants		
Crop Variety	Various	Various	Various	Various		
Description	Dry weights (g)	Dry weights (g)	Dry weights (kg)	% Pasture cover		
Rating Date	19-Oct-21	19-Oct-21	1-Feb-22	1-Feb-22		
Part Rated	PLOT, C	PLOT, C	PLOT, C	PLOT, C		
Rating Type	WEIDRY	WEIDRY	WEIDRY	GROUND		
Rating Unit/Min/Max	KG/HA, -, -	KG/HA, -, -	KG/HA, -, -	%AREA, -, -		
Sample Size	1 PLOT	1 PLOT	1 PLOT	1 PLOT		
ARM Action Codes	T3	TS[11]	T4			
Trt Treatment	11	13	15	16		
No. Name	Rate Unit	Rate Unit	Rate Unit	Rate Unit		
1PM 250 Strand medic	2.5kg/ha	5.5g/plot	1092.5de	33.05d	1070.0c	17.5c
2PM 250 Strand medic	5kg/ha	11g/plot	1350.0d	36.63d	1065.0c	25.0c
3PM 250 Strand medic	10kg/ha	22g/plot	1862.5c	43.11c	895.0c	27.5c
4Bartolo Bladder clover	10kg/ha	22g/plot	645.0f	25.28f	1230.0c	32.5bc
5Bartolo Bladder clover	20kg/ha	44g/plot	792.5ef	27.80ef	1722.5b	47.5ab
6Bartolo Bladder clover	30kg/ha	88g/plot	1040.0def	32.23de	1720.0b	50.0ab
7Volga vetch	15kg/ha	31g/plot	1945.0c	44.00c	1955.0b	15.0c
8Volga vetch	30kg/ha	63g/plot	3417.5a	58.37a	2600.0a	25.0c
9Volga vetch	60kg/ha	125g/plot	2730.0b	52.06b	2550.0a	55.0a
LSD P=.05	411.78	4.620	408.20	17.82		
Standard Deviation	282.16	3.166	279.71	12.21		
CV	17.07	8.08	17.0	37.25		
Grand Mean	1652.78	39.171	1645.28	32.78		
Bartlett's X2^	13.286	9.539	12.838	9.038		
P(Bartlett's X2)	0.102	0.299	0.118	0.339		
Rank X2	.	.	.	.
P(Rank X2)	.	.	.	.
Skewness^	0.6919	0.4568	0.0135	-0.3911		
Kurtosis^	0.9916	0.1218	-0.7366	-0.544		
Replicate F	2.361	2.943	5.192	6.981		
Replicate Prob(F)	0.0966	0.0534	0.0066	0.0015		
Treatment F	43.591	49.298	20.710	5.720		
Treatment Prob(F)	0.0001	0.0001	0.0001	0.0004		

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

Crop Name	Crop plants		Crop plants	
Crop Variety	Various		Various	
Description	% Bare ground		% Weed cover	
Rating Date	1-Feb-22		1-Feb-22	
Part Rated	PLOT, C		PLOT, P	
Rating Type	GROUND		GROUND	
Rating Unit/Min/Max	%AREA, -, -		%AREA, -, -	
Sample Size	1 PLOT		1 PLOT	
ARM Action Codes				
Trt Treatment	Rate	Other	Other	
No. Name	Rate Unit	Rate	Rate Unit	
1PM 250 Strand medic	2.5kg/ha	5.5g/plot		17
2PM 250 Strand medic	5kg/ha	11g/plot		18
3PM 250 Strand medic	10kg/ha	22g/plot		
4Bartolo Bladder clover	10kg/ha	22g/plot		
5Bartolo Bladder clover	20kg/ha	44g/plot		
6Bartolo Bladder clover	30kg/ha	88g/plot		
7Volga vetch	15kg/ha	31g/plot		
8Volga vetch	30kg/ha	63g/plot		
9Volga vetch	60kg/ha	125g/plot		
LSD P=.05				18.46
Standard Deviation				12.65
CV				30.88
Grand Mean				40.97
Bartlett's X2^				1.343
P(Bartlett's X2)				0.995
Rank X2				.
P(Rank X2)				.
Skewness^				0.3261
Kurtosis^				-0.7121
Replicate F				2.920
Replicate Prob(F)				0.0547
Treatment F				3.707
Treatment Prob(F)				0.0060

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

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

^Calculated from residual.

<u>Part Rated</u>
PLOT = plot
C = Crop is Part Rated
P = Pest is Part Rated
<u>Rating Type</u>
GROUND = groundcover
NDVI = normalized difference vegetation index
HEIGHT = height
WEIFRE = weight - fresh
WEIDRY = weight - dry / dry matter content
<u>Rating Unit/Min/Max</u>
NUMBER, , = number
KG/HA, , = kilograms per hectare
%AREA, , = percent of area
PLOT = total plot
<u>ARM Action Codes</u>
T1 = [C1]*10
TS[2] = SQR([2] + .5)
T2 = [8]*10
TS[9] = SQR([9] + .5)
T3 = [10]*10
TS[11] = SQR([11] + .5)
T4 = [14]*10