Producer Demonstration Site

MEAT & LIVESTOCK AUSTRALIA

Lower Blackwood Catchment Land Conservation District Committee

Lower South West Growers Group

FILLING THE AUTUMN FEED GAP

First Year Case Study

PGG Wrightson Seeds

PIONEER BRAND · PRODUCTS

BELL PASTURE seeds

CSBP

This Producer Demonstration Site is funded by Meat & Livestock Australia

Project Aim

To demonstrate the potential of autumn grazed fodder crops that will provide a lower cost and more productive (measured by pasture quality, quantity, animal performance and cost benefit analysis) alternative to supplement feeding with conserved fodder for beef in the high rainfall Lower South West region in WA.

This project was also made possible with assistance from the following sponsors:

- PGG Wrightson
- Bell Seeds
- Pioneer Seeds
- CSBP

Thankyou for your support!

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Project Structure

This is a four-year project which commenced in January 2020 and will complete in December 2023.
In 2020, two strip demonstration sites were established at different locations within the Lower South West region. 15 different autumn fodder varieties (and 2 mixes) in total were seeded across the two sites to see how they performed.
At one of the sites (situated in the Scott River area), pasture quality and dry matter were measured and at both sites season length, timing and persistence of each variety was observed.

Years 2 to 4 (2021-2023) will then see potential well-performing varieties selected and rolled out at five different farm sites across the Lower South West Region at a paddock scale.

The project will also include a number of field days throughout the four years as well as case studies and a producer project guide to provide an information hub for Lower South West Growers on Autumn Fodder crops.

Site 1

Andrew McNab Scott River

Site Characteristics

Landscape

Low lying flats with a slight rise to drier upslope

Soil

- Sandy
- Very Low PBI but optimum P levels
- Potassium levels a little low
- Sulphur levels ok
- Very good Organic Carbon
- No salinity issues
- Low pH

pH	4.35
PBI	1.95
P (Colwell-mg/kg)	10.5
K (Colwell-mg/kg)	86
S (mg/kg)	9
Organic Carbon (%)	4.95

Farming Operation

- FAMILY FARM
- FARMING SINCE 2000
- 600 HECTARES OF PASTURE
- COMMERCIAL HERD OF ANGUS CATTLE AND PRIME LAMB FLOCK
- TYPICAL WINTER PASTURES OF RYEGRASS AND SUB-CLOVER

Inputs and their costs

Operation	**Time**	**Cost ($/ha)**
Knockdown	Early Sept	$15
Lime - 4t/ha (1/10yr cost)	Sept	$11
Hayburst - 250kg/ha	Late Sept	$165
Cultivations	Sept/Oct	$40
Seeding	2nd & 26th Oct	$15
Insect Control x 3	Oct & Nov	$95
Urea - 100kg/ha	Early Nov	$75
Fertiliser - shed cleanout	Oct	$75
Total (ex seed)		**$491**

Demo Site Layout

FENCE
Plot 1: **Fodder Beet** (Geronimo - *Bell Seeds*)
Plot 2: **Perennial Rye** (Base - *PGG Wrightson*)
Plot 3: **Fescue** (Quantica - *PGG Wrightson*)
Plot 4: **Cocksfoot** (Aurus - *PGG Wrightson*)
Plot 5: **Chicory** (Puna11 - *PGG Wrightson*)
Plot 6: **Plantain** (Ecotain - *PGG Wrightson*)
Plot 7: **Raphno** (Pallaton - *PGG Wrightson*)
Plot 8: **Raphno** (Pallaton - *PGG Wrightson*)
Plot 9: **Turnip** (Appen - *PGG Wrightson*)
Plot 10: **Forage Brassica** (Pillar - *Bell Seeds*)
Plot 11: **Millet** (Shiroie - *PGG Wrightson*)
Plot 12: **Super Sweet Sudan** (SSS - *Pioneer. Seeded 26/10/20. Soil temp 18C*)
Plot 13: **Sorghum** (Sprint - Bell Seeds. *Seeded 26/10/20. Soil temp 18C*)
Plot 14: **Lablab** (Highworth - PGG Wrightson. *Seeded 26/10/20. Soil temp 18C*)
ROAD

Seeding Day 02/10/2020 & 26/10/2020

Lower Blackwood Catchment

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Seeding Day

Varieties

Varieties: 10 different varieties were seeded on 02/10/2020. The remaining 3 varieties (SSS, Sorghum and LabLab) had higher soil temperature requirements. Therefore they were seeded later on the 26/10/20 when the soil temp measured 18C

Measurements: 3 pasture quality and dry matter cuts were taken at this site over the growing season.

Demo Layout

Site Prep: To prepare for the demo, the site was sprayed out for weeds in early September and cultivated in September & October which resulted in a lovely seedbed. Lime was applied in September and fertiliser applied just prior to seeding.

Strip size : Each strip was aproximately 3m wide and 360m long

Logistics

Seeder: Speed Tiller.

Seeding steps: The seeding rates for each variety were calculated, the seed required weighed out and then due to the different size of each seed, the seeder roller settings needed to be adjusted and calibrated on each run to account for the differing sizes. After each run the remaining seed was removed and weighed to calculate actual seeding rate. The seeder was then cleaned out to avoid cross contamination of species.

Site 1

Asher Cohen Forest Grove

Site Characteristics

Landscape

Range of good loam soil types some wet areas

Soil

- Loamy Clay
- Very High PBI but very low P levels
- Potassium levels ok
- Sulphur levels ok
- Good Organic Carbon
- No salinity issues
- Borderline pH (on the low side)

pH	4.9
PBI	740
P (Colwell-mg/kg)	12
K (Colwell-mg/kg)	136
S (mg/kg)	19.6
Organic Carbon (%)	4.12

Farming Operation

- FARMING SINCE 2017
- APROX 65 HECTARES
- CURRENTLY 30 CATTLE BUT INCREASING THE HERD
- TYPICAL PASTURES OF CLOVER, RYE, SOME CHICORY AND KIKUYU

Inputs and their costs

Operation	**Time**	**Cost ($/ha)**
Two weed control cultivations	Sept	$20
Lime - 3t/ha (1/10yr cost)	Sept	$11
Fertiliser 200kg/ha Super CZM + 300kg/ha MAP	Pre seeding	$330
Seeding	5th Oct	$15
Insect Control x 2	Oct & Nov	$260
Urea - 100kg/ha	Early Nov	$75
Total (ex seed)		**$711**

Demo Site Layout

FENCE
Plot 1: **Fodder Beet** (Geronimo - *Bell Seeds*)
Plot 2: **Perennial Rye** (Base - *PGG Wrightson*)
Plot 3: **Fescue** (Quantica - *PGG Wrightson*)
Plot 4: **Cocksfoot** (Aurus - *PGG Wrightson*)
Plot 5: **Lucerne** (Stamina - *PGG Wrightson*)
Plot 6: **Chicory** (Puna11 - *PGG Wrightson*)
Plot 7: **Plantain** (Ecotain - *PGG Wrightson*)
Plot 8: **Perennial Mega Mix**
Plot 9: Sorghum (**Sprint** - *Bell Seeds*)
Plot 10: Raphno (**Pallaton** - *PGG Wrightson*)
Plot 11: Turnip (**Appen** - *PGG Wrightson*)
Plot 12: Forage Brassica (**Pillar** - *Bell Seeds*)
Plot 13: Millet (**Shiroie** - *PGG Wrightson*)
Plot 14: **Summer Mix** (*Bell Seeds*)
FENCE

Seeding Day 05/10/2020

Lower Blackwood Catchment

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Seeding Day

Varieties

Varieties: 12 different varieties plus 2 mixes (Summer mix and a perennial mix) were seeded on 05/10/2020.

Measurements: Pasture quality and dry matter cuts were not taken at this site. It was an observation site only.

Demo Layout

Site Prep: To prepare for the demo, the site was cultivated twice in Sept. This site wasn't sprayed for weeds as Asher preferred to just use mechanical cultivation for weed control. Lime was applied in September and fertiliser applied just prior to seeding.

Strip size : Each strip was aproximately 2.3m wide and 200m long

Logistics

Seeder: Duncan Duel Box Eco Seeder.

Seeding steps: The seeding rates for each variety were calculated, the seed required weighed out and then due to the different size of each seed, the seeder settings needed to be adjusted and calibrated on each run to account for the differing sizes. After each run the remaining seed was removed and weighed to calculate actual seeding rate. The seeder was then cleaned out to avoid cross contamination of species.

Varieties

Perennial Rye

Variety : Base, PGG Wrightson

Suggested Seeding Rate : 25kg/ha

Actual Seeding Rate : Scott River - 30kg/ha, Forest Grove - 31.6kg/ha

Cost per ha : $350 at 25kg/ha and $420 as seeded

+ Good early vigour and yield

+ Preferred by sheep

- Did not survive heavy grazing (more potential)

Needs good management to protect investment

Fescue

Variety : Quantica, PGG Wrightson

Suggested Seeding Rate : 21kg/ha

Actual Seeding Rate : Scott River - 9.3kg/ha, Forest Grove - 12.4kg/ha

Cost per ha : $270 at 15kg/ha and $170-$220 as seeded

-Poor establishment not competitive

- Did not survive heavy grazing

Needs careful management

Varieties

Cocksfoot

Variety : Aurus PGG Wrightson

Suggested Seeding Rate : 5kg/ha

Actual Seeding Rate : Scott River - 5kg/ha, Forest Grove - 10kg/ha

Cost per ha : $100 at 5kg/ha and $100-$200 as seeded

- Poor establishment, not competitive
- Did not survive heavy grazing

Needs careful management and higher seed rates?

Chicory

Variety : Puna II, PGG Wrightson

Suggested Seeding Rate : 5kg/ha

Actual Seeding Rate : Scott River - 6.26kg/ha, Forest Grove - 6kg/ha

Cost per ha : $130 at 5kg/ha and $160 as seeded

+ Good establishment, yield and feed quality
+ Survived heavy grazing and still growing
- Limited broad leaf weed control options

Varieties

Plantain

Variety : Ecotain, PGG Wrightson

Suggested Seeding Rate : 4kg/ha

Actual Seeding Rate : Scott River - 5.5kg/ha, Forest Grove - 6kg/ha

Cost per ha : $90 at 4kg/ha and $124 as seeded

+ Good establishment and early yield/quality, preferred by sheep

- Did not survive heavy grazing (more potential)

- Limited weed control options

Raphno

Variety : Pallaton, PGG Wrightson

Suggested Seeding Rate : 8kg/ha

Actual Seeding Rate : Scott River - 7.72/ha, Forest Grove - 13.5kg/ha

Cost per ha : $285kg/ha and up to $430 as seeded

+ Good establishment and grazing survival

-Diamond back moth need management with insecticides or sowing time

Varieties

Forage Brassica

Variety : Pillar, Bell Seeds

Suggested Seeding Rate : 6kg/ha

Actual Seeding Rate : Scott River - 4.6kg/ha, Forest Grove - 4.34kg/ha

Cost per ha : $60 at 6kg/ha and $46 as seeded

+ Good establishment and grazing survival

- Diamond back moth need management with insecticides or sowing time

Turnip

Variety : Appen, PGG Wrightson

Suggested Seeding Rate : 4kg/ha

Actual Seeding Rate : Scott River - 3kg/ha, Forest Grove - 16kg/ha

Cost per ha : $60 at 4kg/ha and $45 as seeded up to $240

+ Good establishment

- Less tolerant of heavy grazing

- Diamond back moth need management with insecticides or sowing time

Varieties

Millet - Soil temp of 14C +

Variety : Shiroie, PGG Wrightson

Suggested Seeding Rate : 15kg/ha

Actual Seeding Rate : Scott River - 10kg/ha, Forest Grove - 17.8kg/ha

Cost per ha : $70 at 15kg/ha and $47 as seeded at Scott River

+ Good establishment and dry matter production

+ Can be sown at lower soil temp (earlier into better moisture)

-Lower feed quality

Low risk option

SSS - Soil temp of 17C and rising

Variety : Super Sweet Sudan, Pioneer Seeds

Suggested Seeding Rate : 5kg/ha

Actual Seeding Rate : Scott River - 5.2kg/ha (seeded 26/10/20)

Cost per ha : $70 at 5kg/ha

Did not get favourable conditions at this site (more potential though)

Varieties

Sorghum

Variety : Sprint, Bell Seeds

Suggested Seeding Rate : 5-10kg/ha

Actual Seeding Rate : Scott River - 8kg/ha (seeded 26/10/20), Forest Grove - 10kg/ha

Cost per ha : $90 as seeded

Did not get favourable conditions at this site (more potential though)

LabLab

Variety : Highworth, PGG Wrightson

Suggested Seeding Rate : 15kg/ha

Actual Seeding Rate : Scott River - 15.7kg/ha (seeded 26/10/20)

Cost per ha : $70 at 15kg/ha

Did not appear to be suited to our environment.

Perhaps Soil temperature was not sufficient.

Varieties

Lucerne

Variety : Stamina GT6, PGG Wrightson

Suggested Seeding Rate : 12kg/ha

Actual Seeding Rate : Forest Grove - 10.9kg/ha

Cost per ha : $120/ha

Poor establishment, possibly insect attack (Red Legged Earth Mite)

Summer Mix

Variety : Summer Mix, Bell Seeds. Contains Millet, Pillar Rape, Sunflower, Sorghum, Safflower, Mustard, Radish, Linseed and Purple Top Turnip

Suggested Seeding Rate : 25-30kg/ha

Actual Seeding Rate : Forest Grove - 30kg/ha

Cost per ha : $165/ha

Was not cut but looked good.

Pasture Cut Results - Scott River Site

The following pages show the Dry Matter and Pasture Quality Data from 3 pasture cuts that were taken at the Scott River Site. Not all varieties that were grown at the demo site appear in the testing table, this is because at the time of the pasture cut there was insufficient growth to warrant a cut. Despite the excellent seed bed preparation, Blackberry Nightshade germinated across the site. With so many species present herbicide control options were not possible. Heavy grazing was utilised as an alternative and some species were grazed harder than others. The effect of this heavy grazing was that some species did not survive the dry spell following grazing (see rainfall page 32). The species that did not survive the first graze could potentially produce a lot more dry matter when managed as an individual stand where grazing can be better controlled.

To briefly summarise the feed quality results:

- Generally broad leaf crops had higher energy, protein and digestibility than summer grasses. However, the broad leaf varieities alone may not provide a balanced diet for the animals and they most likely would need additional fibre to get that balance (perhaps including a summer grass or another fibre supplement).
- The Perennial Rye was on par with the broad leaf crops but there is data from one cut only

Note: No pasture cuts were taken from the Forest Grove Site as it was an observation only site.

1st Cut - 05/12/2020
Dry Matter

1st cut : **Dry Matter Yield**

Filling the Autumn Feed Gap
Scott River Strip Demo Site
Cut taken 05/12/2020

Species	Variety	DM yield (t/ha)
Plantain	Ecotain	3.15
Perennial Rye	Base	3.13
Millet	Shiroie	3.07
Turnip	Appen	2.91
Fescue	Quantica	2.73
Forage Brassica	Pillar	2.70
Cocksfoot	Aurus	2.68
Raphno	Pallaton	2.39
Chicory	Puna 11	2.12

1st Cut - 05/12/2020
Pasture Quality

1st cut : **Feed Analysis**

Filling the Autumn Feed Gap
Scott River Strip Demo Site
Cut taken 05/12/2020

Variety	ADF	Ash	OM	ME	CP	DMD	DOMD	Fat	NDF	WSC
Fescue	27	11	89	11.2	17.8	74	70	3	49	11.9
Cocksfoot	30	10	90	10.7	18.1	71	67	3.6	55	5.9
Perennial Rye	26	11	89	11.9	22.2	79	73	3.7	47	10.3
Chicory	22	13	87	12.2	22.4	80	75	3.7	37	7.7
Millet	36	9	91	9.8	17.3	66	63	2.4	60	7.4
Turnip	23	10	90	12.2	17.1	80	75	1.9	32	19.6
Plantain	26	9	91	11.8	20	78	73	2.9	41	10.9
Pillar	26	12	88	12.1	21.7	80	74	2.8	42	8.3
Raphno	25	11	89	12.2	22.3	80	75	2.7	38	8.8

2nd Cut - 01/03/2020
Dry Matter

2nd cut :**Dry Matter Yield**

Filling the Autumn Feed Gap
Scott River Strip Demo Site
Cut taken 01/03/2021

Species	Variety	DM yield (t/ha)
Millet	Shiroie	5.19
Raphno	Pallaton	1.99
Forage Brassica	Pillar	1.98
Super Sweet Sudan	SSS	1.67
Chicory	Puna 11	1.52
Sorghum	Sprint	1.46

2nd Cut - 01/03/2020
Pasture Quality

2nd cut : **Feed Analysis**

Filling the Autumn Feed Gap
Scott River Strip Demo Site
Cut taken 01/03/2021

Variety	ADF	Ash	OM	ME	CP	DMD	DOMD	NDF	WSC
Chicory	26	14	86	11.9	20	78	73	38	<4
Millet	35	8	92	9.3	13	63	60	61	8
SSS	33	9	91	9.4	16	64	61	61	6.7
Pillar	24	12	88	12.2	18	80	75	37	12.4
Raphno	20	11	89	12.9	15	85	79	29	19
Sorghum	33	10	90	9.7	16	66	63	60	6.5

3rd Cut - 23/04/2020
Dry Matter

3rd cut : **Dry Matter Yield**

Filling the Autumn Feed Gap
Scott River Strip Demo Site
Cut taken 23/04/2021

Species	Variety	DM yield (t/ha)
Super Sweet Sudan	SSS	1.62
Chicory	Puna 11	1.15

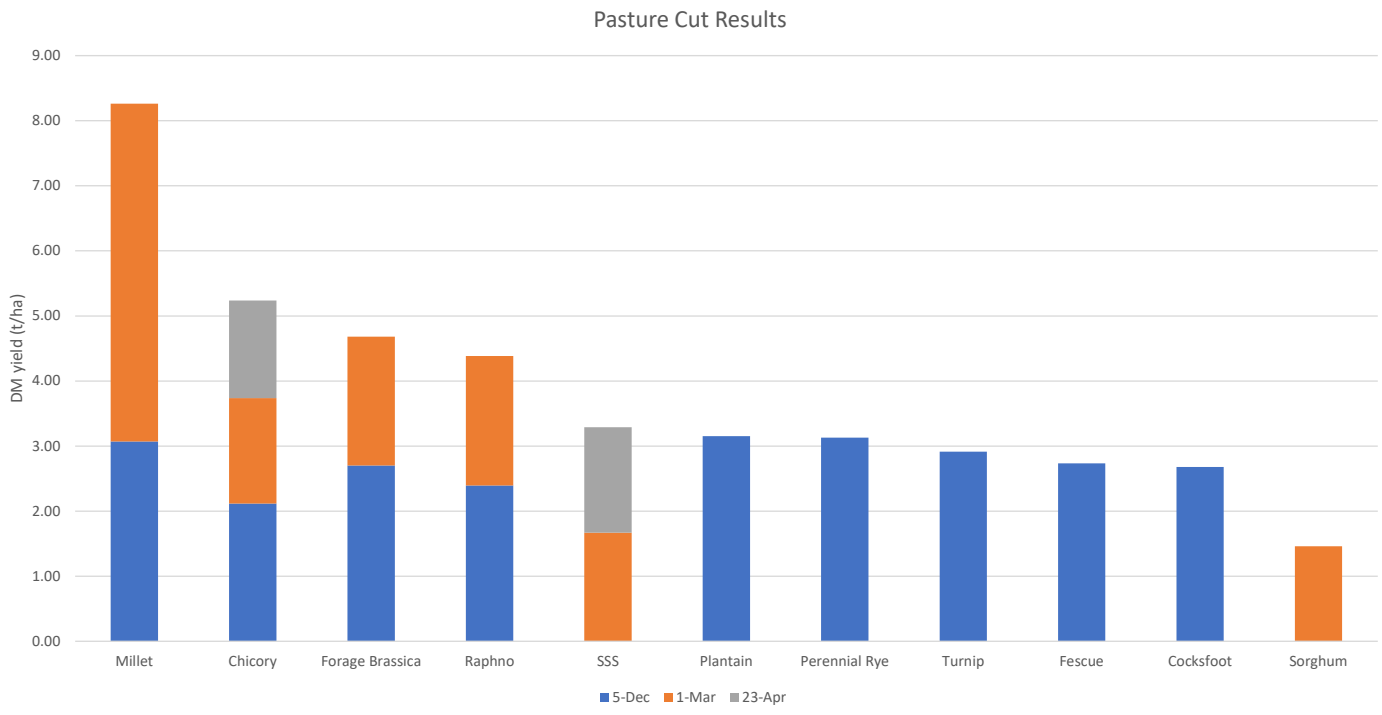
3rd Cut - 23/04/2020
Pasture Quality

3rd cut : **Feed Analysis**

Filling the Autumn Feed Gap
Scott River Strip Demo Site
Cut taken 23/04/2021

Variety	ADF	Ash	OM	ME	CP	DMD	DOMD	NDF	WSC
SSS	37	7	93	8.7	7.5	60	57	63	11.9
Chicory	25	15	85	11.8	17.8	78	73	38	6.9/10.1

Cumulative Pasture
Cut Results



The above graph shows the cumulative dry matter yields of species over the three cutting times. Only chicory produced dry matter at each cut. Other species either had not survived, gone reproductive (millet) or had insufficient density to obtain a representative cut.

Lower Blackwood Catchment

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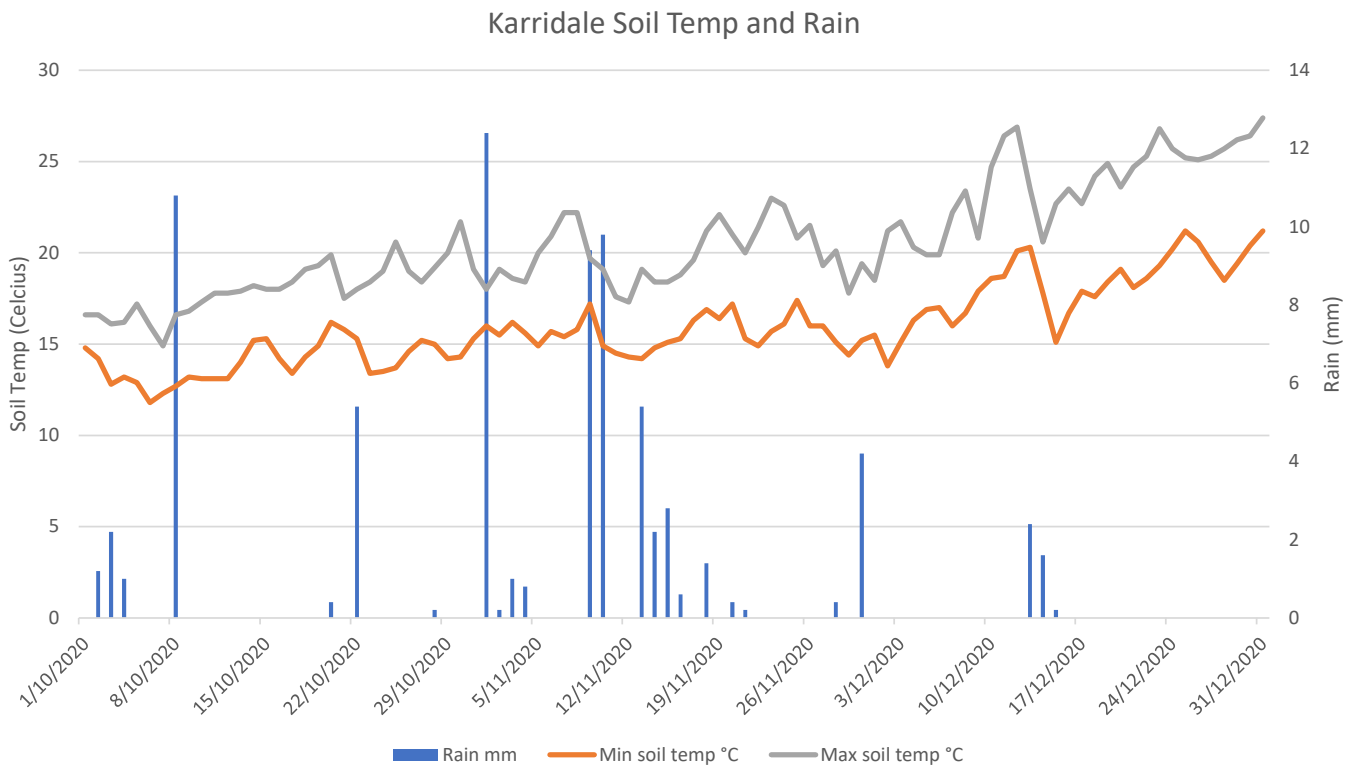
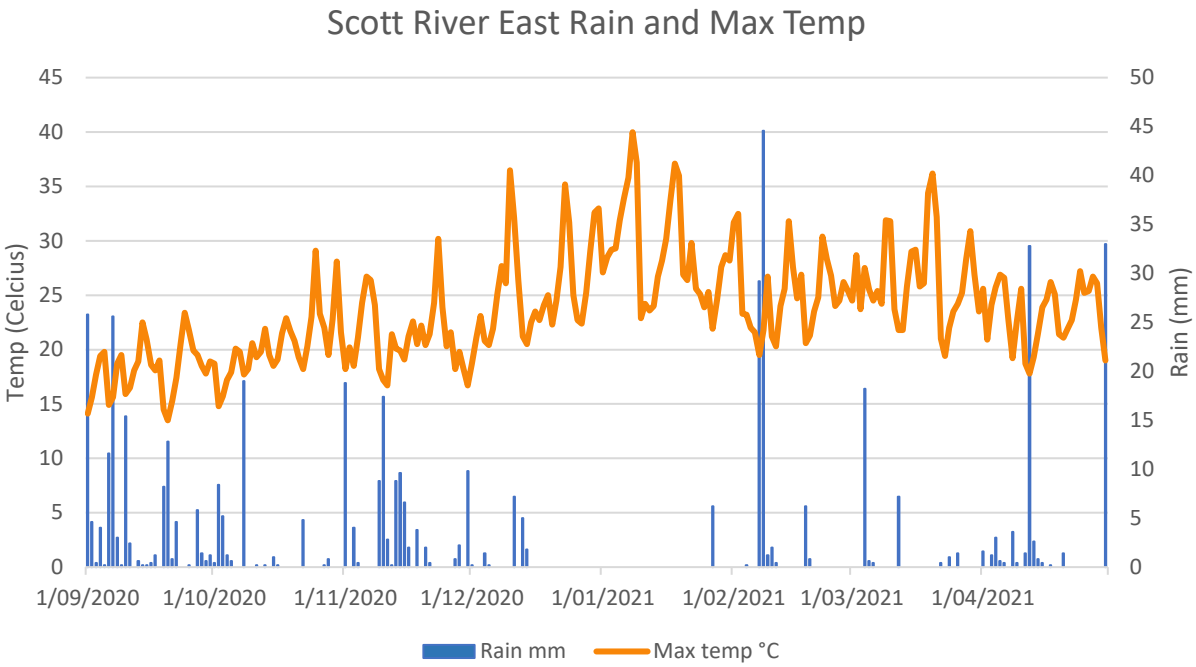
Soil Temperature



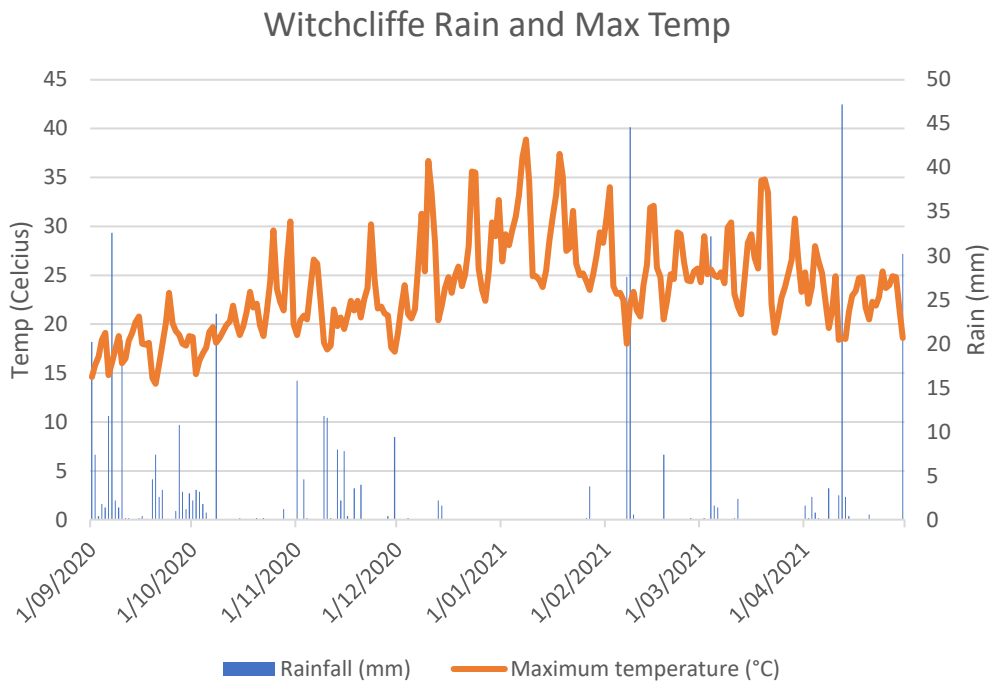
The above graph shows the Rainfall and soil temperatures for the seeding period. The dates that seeding occurred for the Scott River Site were 02/10/2020 and 26/10/2020 and the seeding date for the Forest Grove Site was 05/10/2020. Soil temperature data suggests that seeding of temperature dependent species could have been delayed until early December, however moisture availability for germination may have been limiting at this time.

Rain and Temperature



The above graph shows the Rainfall and soil temperatures for the growing period at the Scott River site. Note the dry period between December 2020 and February 2021.

Rain and Temperature



The above graph shows the Rainfall and soil temperatures for the growing period at the Forest Grove site. Note the dry period between December 2020 and March 2021.

Cost/Benefit: Cost per Tonne of Dry Matter

		Total Input Costs ($/ha)			
		$400	**$500**	**$600**	**$700**
DM Yield (t/ha)	**2**	$200	$250	$300	$350
	4	$100	$125	$150	$175
	6	$67	$83	$100	$117
	8	$50	$63	$75	$88
	10	$40	$50	$60	$70

The above table shows a sensitivity analysis for the cost per tonne of dry matter at various input costs and dry matter yields. Hay at $50/bale represents a dry matter cost of $150/t. Summer fodder species that can produce dry matter for less than $150/t can be considered a cost effective enterprise.

Summary

Soil Temperature

Soil temperature is a key factor in successful establishment establishment of certain species. Where others can be sown earlier into moisture with no or lower soil temperature requirements.

Species that have soil temperature requirement for good establishment may need late rains to ensure establishment and growth. Those species that can be sown into cooler soils can be planted on spring soil moisture, reducing risk of inadequate moisture for establishment.

There is also the need to consider the potential loss of existing spring production when chasing good establishment of some these. In the Scott River demonstration, 3t/ha of dry matter was produced in the first cut in early December, making up for some of the lost production from paddock preparation. autumn fodder varieties.

Pest Control

Diamond Back Moth management for forage brassicas is critical.

Need to consider options such as chemical and biological controls but also planting time.

Grazing

Need to consider the grazing tolerance of each variety. Some of the varieties seeded had better grazing tolerance than others

Varieties that did not handle heavy grazing still have potential but just need careful grazing management.