



bugs & biology grower group

"Roots Shoots and Leaves"

Farmers growing perennials for soil health



Overview

The Roots Shoots and Leaves project was about increasing farmer knowledge and knowhow in assessing the impact of land management techniques on soil health and to provide them with specific information about four different perennial pasture establishment methods at a commercial scale.

This report, outlines the history, establishment process, seasonal conditions and final results that will assist with on ground decision making. It is a useful guide in assessing temperate perennial pasture options including use of biological liquid nutrition and other soil conditioners, dry sowing, no kill establishment, using cereal cover crops, conventional autumn sowing, and the effect of tagasaste wind breaks.

Summary

The trial began in 2011 with Phil Barrett-Lenard (from Evergreen Farming) consulting with the participating 4 farmers on species, trial design and timing.

2012 saw the sites planted with some site preparation work, being done in 2011.

The impact that the establishment of these perennial pastures will have on soil health will take time to become fully evident. The immediate results have been, improved ground cover, soil stabilization, mineral cycling and soil moisture retention. The soil health will continue to be monitored as part of the farmers standard farm monitoring programs.

For more information go to www.bugsandbiology.org.au



Westendale — Site 1-“Poplar” 25Ha

Rainfall – 365mm for the year

Overview

Site		Poplar A
Depth		0-10
Soil type		Loam
Nitrogen	mg/Kg	82.00
Phosphorus Colwell	mg/Kg	71.68
Potassium	mg/Kg	47.8
Sulphur	mg/Kg	10.80
Organic Carbon	%	1.72
Conductivity	dS/m	0.05
pH Level (H2O)	pH	5.2

Sorghum was sown the previous spring as a way of drying out the site which was prone to getting too wet to get on at sowing time. The Sorghum was grazed in Summer and allowed to re shoot.

Method

- 14/5/2012 - 1.5L Glyphosate
- 31/5/2012 - 1.0L Glyphosate + insecticide
- 31/5/2012 - Sown
 - 30kg of Barley
 - 1kg Phalaris
 - 1.6kg Veldt
 - 1.6kg Fescue
 - 30kg Agras
- 25/7/2012- Tigrex for broadleaf and water weed control

Results

Barley was harvested and yielded 1.7t/ha

Good establishment of perennials

Comments

The Sorghum worked in drying the paddock out probably to the detriment of the Barley crop.

The second knockdown was ineffective because the sorghum had gone dormant with the cooler weather. This meant that a large proportion of it re shot.

The large root mass of the sorghum in the lighter soils did caused problems at seeding time with the stems and roots being pulled out by the tines and causing large trenches to form. This made accurate seed placement difficult.

Sown into sorghum
with a barley cover
crop



Westendale Junction B- 9Ha

Rainfall -365mm for the year

Overview

Site		Junction B
Depth		0-10
Soil type		Loam
Nitrogen	mg/Kg	43.00
Phosphorus Colwell	mg/Kg	38.75
Potassium	mg/Kg	12.2
Sulphur	mg/Kg	7.1
Organic Carbon	%	0.55
Conductivity	dS/m	0.04
pH Level (H2O)	pH	4.9

The paddock was sown to perennials 10yrs ago and the stand had thinned as unsuitable species died out over time. Sorghum was sown in the Spring/Summer of 2011 as a way of controlling weeds and drying the site out. Perennial seed was broadcast into the standing sorghum and then heavily stocked to eat down the sorghum and incorporate the perennial seed.

Method

14/4/2012 - Spread

2kg Veldt Grass
2kg Tall Wheat Grass
Mixed with Super and Lime

15/4/2012 Crash grazed

25/7/2012 24D Amine for broad leaf weed control

8/2012 Grazed

9/2012 Grazed

11/2012 Grazed

Results

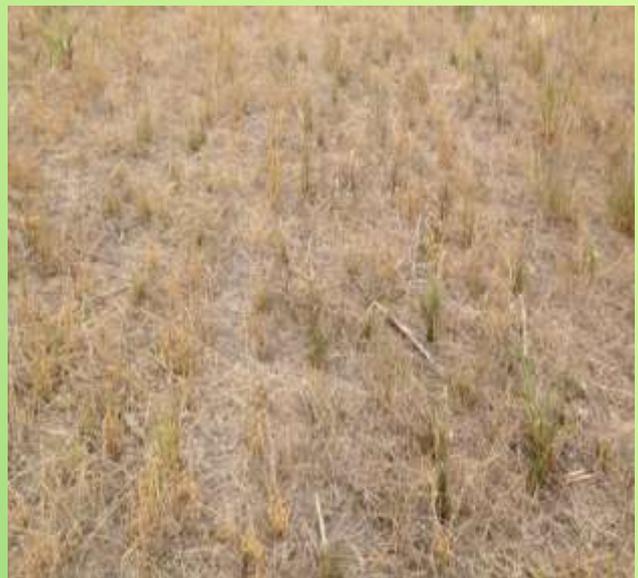
Seed did not spread evenly especially the Veldt grass which resulted in some banding.

1977 grazing days/Ha = 10dse/ha which means there was no reduction in the stocking rate on the paddock in the establishment year.

Comments

The fact that the seed used was harvested on farm and not cleaned made the high sowing rate viable.

Broadcast seed and crash grazed



Westendale Junction A – 28Ha

Rainfall- 365mm for the year

Overview

Site		Junction B
Depth		0-10
Soil type		Loam
Nitrogen	mg/Kg	95.00
Phosphorus Colwell	mg/Kg	56.25
Potassium	mg/Kg	53.60
Sulphur	mg/Kg	11.80
Organic Carbon	%	2.38
Conductivity	dS/m	0.11
pH Level (H2O)	pH	5.6

The oat stubble was grazed in summer then left until 40 days after the break of the season. It was then grazed again in June and July before being sprayed out and sown.

Method

- 4/2012- 200kg HiCal
100kg Sulfate of Ammonia
- 11/12/2012 -1L Glyphosate
- 30/7/2012- 1L Gramoxone with Cypermethrin
- 31/8/2012- Sown
 - 25kg Tritacale
 - 5kg Veldt
 - 2kg Fescue
 - 2kg Phalaris
 - 80kg Agras
 - 7 L Calsup

Results

1832 winter grazing days/Ha and good establishment of perennials.

Comments

This strategy of grazing early and sowing late worked well. By having different establishment times it spreads the risk because you can never pick what will happen.

Late sown with a Triticale cover crop



Westendale Back of Sheds- 5.5ha

Rainfall- 376ml for the year

Overview

Site		Back of Sheds
Depth		0-10
Soil type		Loam
Nitrogen	mg/Kg	44.00
Phosphorus Colwell	mg/Kg	19.58
Potassium	mg/Kg	23.80
Sulphur	mg/Kg	16.60
Organic Carbon	%	0.69
Conductivity	dS/m	0.05
pH Level (H2O)	pH	4.6

Acid tolerant phalaris sown into lupin stubble, with a wheat cover crop.

Method

4/2012 250kg HiCal

20/5/2012- 1L Glyphosate + Cypermethrin

27/5/2012- Sown

30kg Mace Wheat

2kg AT phalaris

30kg Super (mixed with seed)

20L Flexi N

35L Trace element, Phosphate and Calcium mix

Results

Wheat yield 2.72 T/Ha

Comments

There was a dry period during late winter which made the phalaris really struggle. Late rain got it going again but the dry spell did reduce the phalaris numbers.

Due to this being a phalaris only planting, which has a below the surface growing point the stubble was grazed hard over summer.

With this being a very clean pdk from a weed perspective made establishment easier.

Sown into lupin stubble with wheat cover crop



Yarrabee CB Junction- 40Ha

Overview

Site		CB Junction
Depth		0-10
Soil type		sand
Nitrogen	mg/Kg	77.00
Phosphorus Colwell	mg/Kg	27.50
Potassium	mg/Kg	33.87
Sulphur	mg/Kg	9.09
Organic Carbon	%	1.49
Conductivity	dS/m	0.06
pH Level (H2O)	pH	5.00

The site was not a good cropping paddock consisting of sand over gravel soil and prone to water logging. Sorghum was sown in the spring of 2011 as a way of drying the site out and controlling weeds. The sorghum was grazed over summer before being sprayed out and sown.

Method

- 4/2012- 500kg of Dolomite
- 17/5/2012 1.5L Glyphosate
- 6/6/2012- 1.5L Glyphosate
- 7/6/2012- Sown
 - 30kg Triticale
 - 1.5 Kg Veldt
 - 2.5 Kg Tall Wheat Grass
 - 0.3 Kg Acid Tolerant Phalaris
 - 0.3 Kg Fescue
 - 35kg Agras
 - 20L Flexi N
 - 36L Phosphate, Potassium, Calcium and Biological Brew

Results

1.3T/Ha Triticale

Comments

This site had multiple problems.

By the time the crop was sown the sorghum had gone dormant making controlling it very difficult. The Sorghum became a major competitor to the triticale hence the lower than expected yield.

The sandy soil at the site and large root balls of the sorghum, which were pulled up by the seeder tines, made accurate seed placement difficult.

Sown into sorghum with
triticale cover crop and
biological brew



Yarrabee Site 2 Pirramimma – 32 ha

Overview:

Site		Pirramimma
Depth		0-10
Soil type		Sandy loam
Nitrogen	mg/Kg	810
Phosphorus Colwell	mg/Kg	27.50
Potassium	mg/Kg	65.15
Sulphur	mg/Kg	9.71
Organic Carbon	%	1.63
Conductivity	dS/m	0.09
pH Level (H2O)	pH	4.6

The paddock was spray topped in 2011 to assist with weed control.

Method

- 4/2012- 500kg of Dolomite
- 17/5/2012 1.5L Glyphosate
- 6/6/2012- 1.5L Glyphosate
- 7/6/2012- Sown
 - 30kg Barley
 - 1.5 Kg Veldt
 - 2.5 Kg Tall Wheat Grass
 - 0.3 Kg Acid Tolerant Phalaris
 - 0.3 Kg Fescue
 - 35kg Agras
 - 20L Flexi N
 - 36L Phosphate, Potassium, Calcium and Biological Brew
- 7/2012 Tigrex

Results 1.1T/Ha Barley

Comments

This site had a big weed problem. Even though the site was spray topped the non-wetting soil had built up a large seed bank. The cultivation from sowing the perennials caused the germination of this dormant seed bank. 2010 header trails were visible through the site.

Even with this heavy weed burden the perennials still established but at a lower density. Barley yield was also affected.

There were a lot of blockages at seeding time which resulted in large areas not being seeded. This was caused by the Veldt seed not being cleaned. The veldt that did establish, set seed and is expected to fill in the unsown areas quickly.

Sown into annual pasture paddock on non wetting sand



Yarrabee – 11ha

Overview

This paddock was used to confine feed the flock, at the break of the season to allow the other paddocks feed to get away.

Method

4/2012 500kg Dolomite
21/6/2012 1L Glyphosate + Dimenthoate
2/7/2012 Gramoxone
2/7/2012 Sown
2kg yellow serradella
2kg Veldt
30kg Agras
25/7/2012 Lemat

Result

Not grazed since sowing, so no direct income, but returns came from allowing the other pasture to get away. Good establishment of Veldt.

Comments

With the late sowing and red legged earth mite attack, the serradella struggled but still set a good lot of seed, which will thicken up the stand in 2013.

Perennials sown into a sacrificial feed lot paddock with no cover crop.



Carmoning West Site – 21ha

Rainfall- 371mm for the year

Overview

The site was sown using conventional techniques and equipment.

Sown into pasture with an oat cover crop using conventional techniques



Site		48-4	54-1	54-2
Depth		0-10	0-10	0-10
Colour		GR	DKGR	GR
Gravel	%	0	0	0
Texture		1.5	1.5	1.5
Ammonium Nitrogen	mg/Kg	3	14	7
Nitrate Nitrogen	mg/Kg	6	54	31
Phosphorus Colwell	mg/Kg	8	25	16
Potassium Colwell	mg/Kg	65	75	76
Sulphur	mg/Kg	3.8	7.9	6.0
Organic Carbon	%	0.75	1.50	1.45
Conductivity	dS/m	0.025	0.200	0.093
pH Level (CaCl2)	pH	4.4	4.4	4.7
pH Level (H2O)	pH	5.3	5.0	5.4
PBI		7.7	28.2	17.6

Method

14/6/2012- 1L Glyphosate

1% Wetter

1% SofA

100ml Dimethoate

4/8/2012 1.5L Glyphosate

100ml Goal

100ml Dimethoate

100ml Cypermethrin

Seeding

The area was seeded with an air seeder on the 6th August. The air seeder has knife points and Agmor sowing boots at 9 inch spacing. The air tank is a forward bin, delivering seed via a metering wheel and fertilizer via belt drive and calibration door. Calibration is difficult with this type of bin, particularly with the finer seeds.

Seeding was carried out with the following

40kg/ha Wandering Oats

1kg/ha Whittet Kikuyu

4kg/ha Tall Wheat Grass



1kg/ha Chicory

10kg/ha Margarita Seradella pod

8kg/ha Group S Alosca

40kg/ha CSBP MAP

All seeds other than the oats were mixed with the MAP fertilizer for seeding to assist with calibration. Upon seeding the entire area, it was found the calibration was not quite right so some of the area was double seeded to sow all the seeds.

Comments

Soil type had a greater effect on establishment than sowing rate.

The oats will be grazed in Autumn to trample in the oat and seradella seed in, as a way of getting a second germination of the cover crop in areas of low establishment

The area will have rows 25m apart of tagasaste direct sown in Autumn 2013 to provide windbreaks.



Kunmallup Site – Paradise

Rainfall– 358mm

Overview

Perennials sown into a pasture paddock using no kill technique.



Site		1	2
Depth		0-10	0-10
Colour		DKGR	GR
Gravel	%	0-10	0-10
Texture		1.5	1.5
Ammonium Nitrogen	mg/Kg	19	8
Nitrate Nitrogen	mg/Kg	11	9
Phosphorus Colwell	mg/Kg	17	37
Potassium Colwell	mg/Kg	72	98
Sulphur	mg/Kg	28.4	7.8
Organic Carbon	%	1.46	2.05
Conductivity	dS/m	0.542	0.089
pH Level (CaCl2)	pH	5.1	4.6
pH Level (H2O)	pH	6.1	5.6
PBI		62.4	55.4



Method

The site was sown using no knock down herbicide or weed control measures. The previous year some pasture manipulation was conducted to control broadleaf weeds. The site was split in two with an upper slope and lower slope mixes used. Sowing rate was 8.5kg/Ha

Seeding 8/6/2012

Upper mix	6.25kg	Tall wheat grass
	6.25kg	Fescue
	6.25kg	Veldt Grass
	1.50kg	Rhodes Grass
	6.25kg	Balansa



Lower mix

12.5kg	Tall Wheat Grass
6.25kg	Veldt Grass
1.50kg	Rhodes Grass
6.25kg	Balansa

The area was seeded with a standard air seeder using knife points and press wheels.

Result

The area has not been grazed since sowing to allow for good root development.

The no kill option has been very effective but it does make it difficult to identify and monitor the establishment and development of the plants.

Establishment has varied across the site from 20—45 plants m², with different soil types influencing what species have established.



While the direct costs of these establishment methods have not been listed in the report they can be worked out by costing the components listed in each trial, at today's prices.

Establishing perennials has been and still is an expensive process. The hidden cost traditionally has been the loss of production in the establishment year. Each of these trials has shown a different way of establishment and in most cases there was some direct income from the area in the first year.

Every year is different, as is every paddock, so choosing a system that is in line with the seasonal conditions, budget constraints and paddock history is always going to be good.

Some final comments from the farmers

Always do something different because you can never pick it, what worked last year may not work this year and by using different techniques, timing, varieties and management you spread your risk and reduce your failures.

Be patient and never write it off, sometimes the establishment looks disappointing but in 12 months time you end up with a great result.

Perennials are a medium to long term project and if you are used to the explosive growth of annuals, a change in thinking may be required. **The benefits of extended growing season, improved ground cover, higher carbon and soil fertility at depth, reduced wind erosion, and improved soil health, far out weigh the challenges of establishment.**

