Project Catalyst Trial Report

Mixed biodiversity legume cover crop Trial 3

Grower Information	
Grower Name:	Lawrence Di Bella
Entity Name:	RGS Farming Co.
Trial Farm No/Name:	Farm # 0135A, B#1-2
Mill Area:	Victoria
Total Farm Area ha:	100ha
No. Years Farming:	4th generation Cane Farmers
Trial Subdistrict:	Forest Home
Area under Cane ha:	96 hectares under cane

Background Information

Aim: Trial hypothesis:
Does a mixed fallow crop increase soil biodiversity leading to improvements in soil health and a reduction in the use of inorganic nutrient inputs.

Background: (Rationale for why this might work)

- It is known that legume fallow crops can reduce soil and nutrient loss from fallow blocks when compared to a bare fallow.
- It is well documented that monoculture farming systems create unhealthy soil conditions by removing specific nutrients from the soil and there becomes an increase in the number of pathogenic organisms that have a negative impact on cane yield.
- It is also well documented that legumes have the potential to fix atmospheric nitrogen in there root systems and provide nitrogen for the subsequent crop.

Potential Water Quality Benefit:

- Less soil and nutrient runoff by having a cover crop instead of a bare fallow
- Improvements to soil health to enable the soil to better hold onto nutrients instead of being lost into the environment

Less reliance on unstable inorganic sources of nitrogen (like urea) through the introduction of organic forms of nitrogen inputs into the farming system

Expected Outcome of Trial:

- Improved soil health
- Reduced sediment and nutrient loads being exported from the field, especially in the fallow and plant cane phase
- Reduction of inorganic forms of nitrogen
- Improvement in farm economics
- Improvements in cane yield

Service provider contact: Megan Zahmel 0447 317 102

Where did this idea come from: Lawrence DiBella

Plan - Project Activities	Date : (mth/year to be undertaken)	Activities :(breakdown of each activity for each stage)
Stage 1	Trial Established 2018-19	Baseline soil nutrition test taken – 20th of Dec 2018 Baseline *Pachymetra* sample taken - 2nd of Nov 2018 Baseline nematode sampling taken – 2nd of Nov 2018 Trial planted on the 21st of Dec 2018 – by hand
Stage 2	Monitoring, 2019 biomassing and sampling on legume crop 2019	- 2nd Nematode testing – 15th April 2019 - Legume biomass – total nutrient analysis for each legume treatment. Nutrient analysis will be done by volume kg/Ha – 12th April 2019 - Soil samples for incubation and mineralised N content. 15th April 2019
Stage 3	Establish plant cane crop. Sampling activities proposed for 2019/2020	- Stalk counts at 14 days, 28 days, 122 days, and 224 days – Jan 2012 over a 10m section. - 3rd Nematode testing – July 2019 - Worm population test in cane – Oct 2019 - 3rd leaf nutrient analysis - late 2019 - 7mth biomass of cane crop – late 2019 - Assessment of the root biosphere for microzial populations at 10 weeks after cane planting and annually there after - CCS and cane yield assessment of cane harvest in 2020
Stage 4	Economics analysis 2020	DAF
Stage 5		
Stage 6		

Project Trial site details

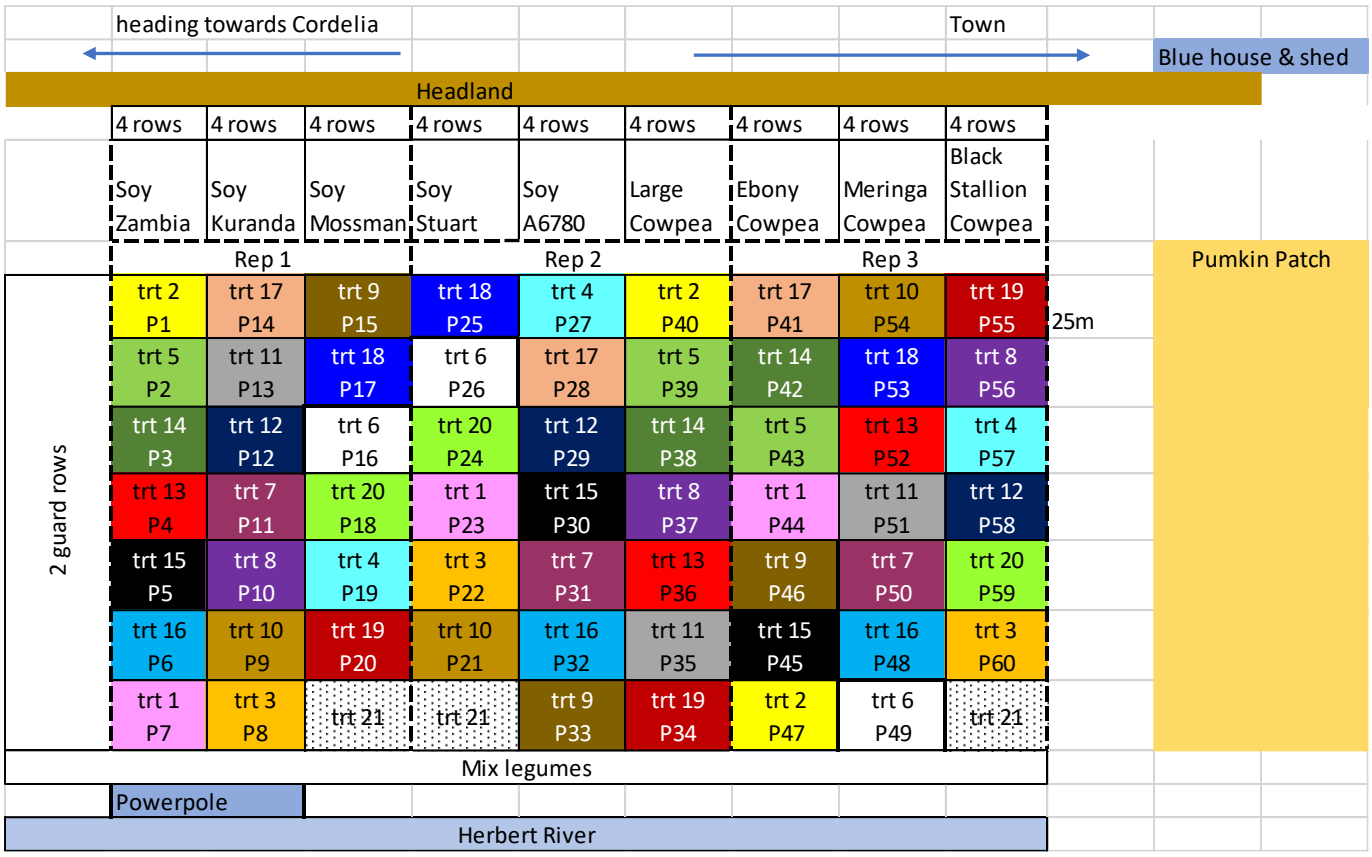
Trial Crop:	Mixed fallow crop
Variety: **Rat/Plt:**	Plant to sugarcane in 2020
Trial Block No/Name:	Biodiversity in Fallow
Trial Block Size Ha:	1.1ha
Trial Block Position (GPS):	Refer to google map
Soil Type:	Alluvial

Block History, Trial Design:

Block History:

1.83m row spacing since 2010

Previous crop was Q237



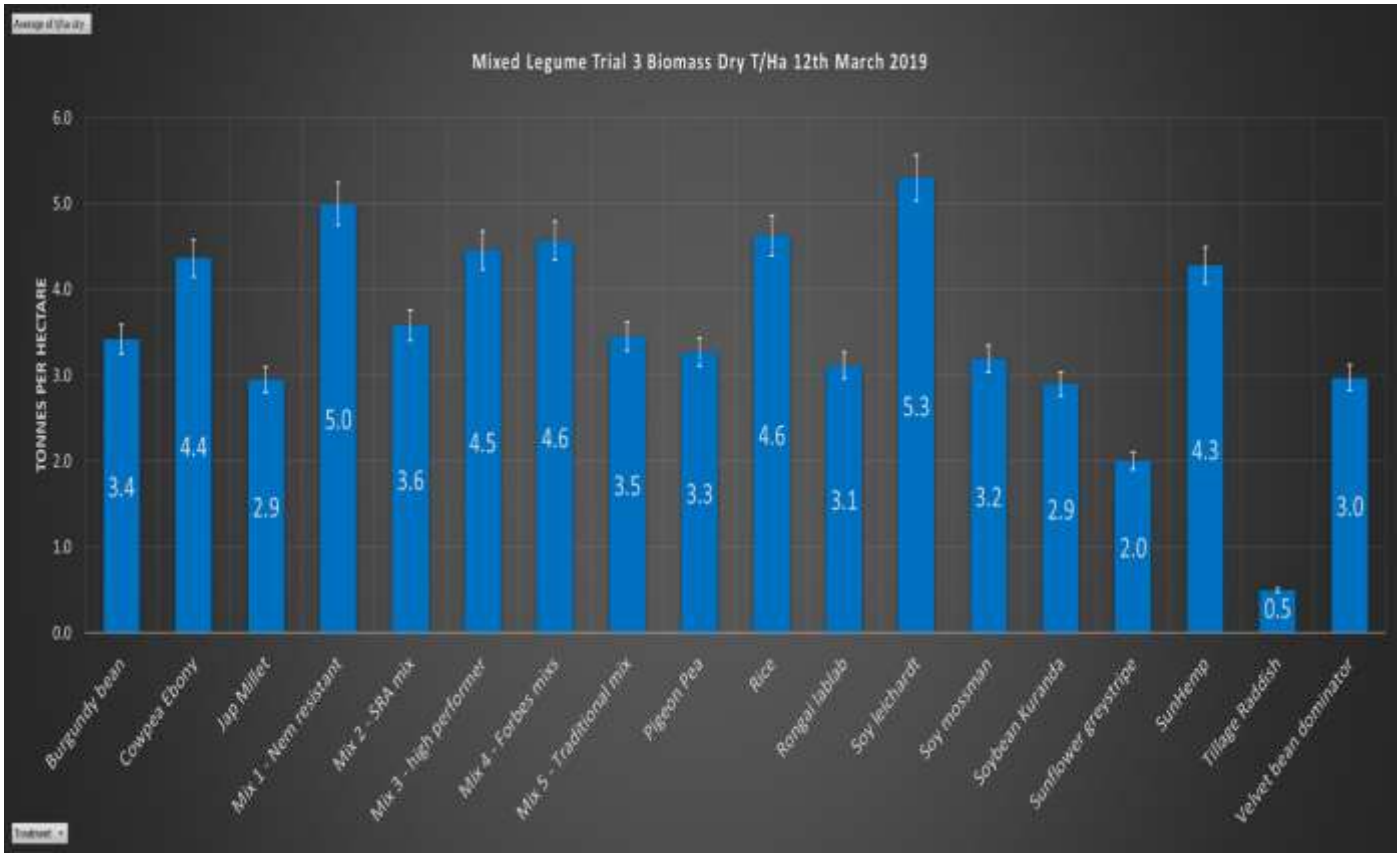
Treatments:

Treatment	Trt #	
Bare fallow	1	
Soy Leichardt	2	
Cowpea Ebony	3	
Rongai lablab	4	
Jap Millet	5	
Sun Hemp	6	
Sunflower Greystripe	7	
Sweet Potato	8	
Velvet Bean cv Dominator	9	
Tropical Mustard	10	
Bergundy bean	11	
Pigeon Pea	12	
Tillage Raddish	13	
Rice	14	
Soybean Mossman	15	
Mix 1 - Nem resistant mix	16	SunHemp - **M**, Ebony cowpea -**I**, Rongai Lablab - **J**
Mix 2 - SRA mix	17	Sunflower, Cowpea Ebony - **I**, Soybean Leichardt - **H**, Jap Millet, Tropical Mustard, Tillage Raddish
Mix 3 - High performer	18	Soybean Leichardt - **H**, Cowpea Ebony & Meringa - **I**, Sunhemp - **M**, Rongai Lablab - **J**
Mix 4- Forbes & Gramenoid Mix	19	Sunhemp - **M**, soybean Leichardt - **H**, Pigeon Pea - **J**, Cowpea Ebony - **I**, Sunflower, Jap Millet, Tillage Raddish
Mix 5 - Traditional mix	20	Cowpea Ebony & Meringa - **I**, Rongai Lablab - **J**
Soybean Kuranda	21	

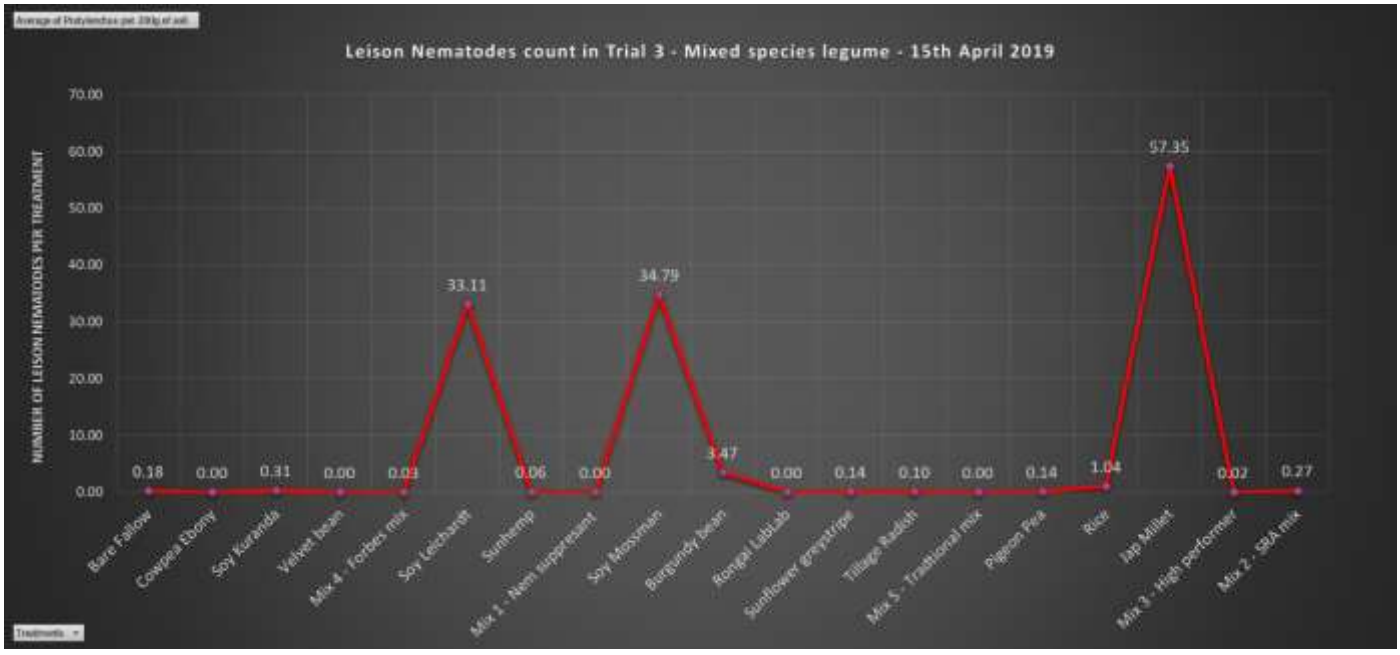
Results:

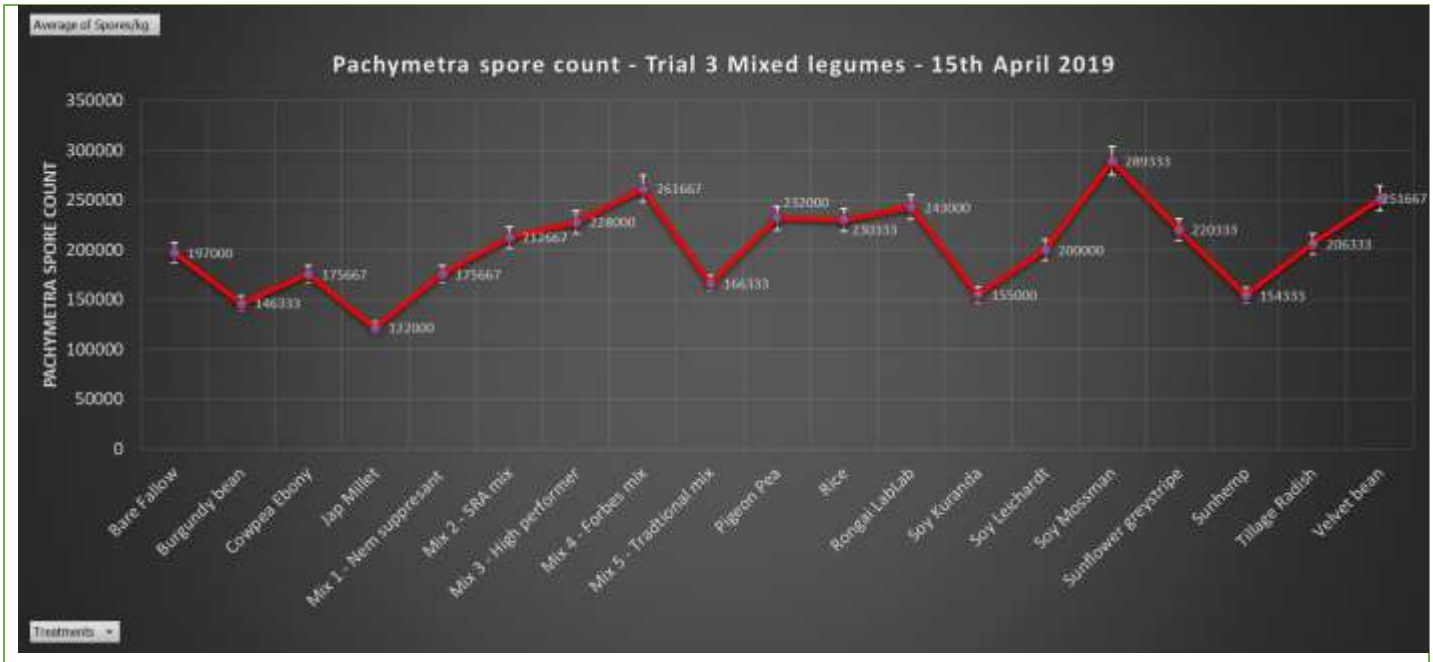
This trial was planted on the 21st of December, 2018.

Legume Biomass results 12th April 2019

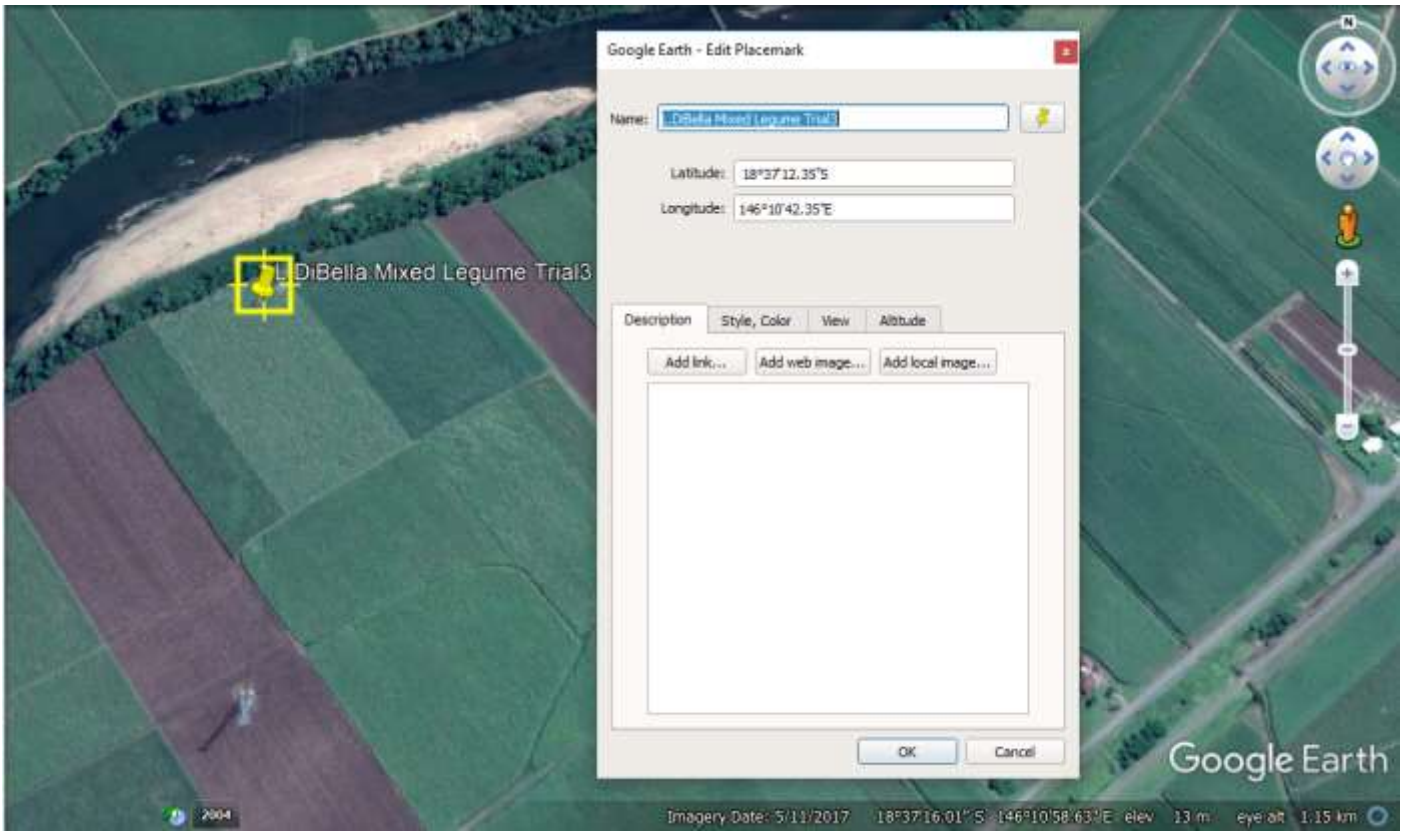


Pathogenic Nematode & Pachymetra results in mixed legume crop April 2019





Google Earth Reference Map



Conclusions and comments

This trial has now become one of the CRC for High Performing Soils (HPS) projects. Funding from the CRC HPS will enable root sampling of the biosphere to assess the impact of different fallow plant species.
It has been a very wet season ,but the mixed species crops have done well as the different legumes types dominated in the extreme weather events. The cover crops were also successfully at reducing erosions under extreme wet weather compared to the bare fallow polts. We have seen differences in pachymetra spore counts in different legume plots and are hoprful that we can use this in future farming practices. These finding will be followed up with the next trial.

Advantages of this Practice Change:
The mixed fallow plots have been very successful in shading out weed species. The crop has provided organic nutrients back to the soil and the grower should be able to reduce the rate of inorganic fertiliser inputs.

Disadvantages of this Practice Change:

- Some legume seeds can be costly.
- The smaller seeded varieties of legumes can be more difficult to spread through a bean planter. Though if weather conditions and soil health permits, seed can be spread with a spinner spreader and harrowed in, which is much easier.

The risk of crop failure would causeloss of income and advantage provided by the fallow crop will not be realised

Will you be using this practice in the future: YES

% of farm you would be confident to use this practice:
All fallow blocks will have a mixed legume crops in the future.