

## 5. CONTROLLED TRAFFIC AND RAISED BED TRIALS

### 5.1 BALLIANG CONTROLLED TRAFFIC AGRONOMY PROJECT

**Location:** Balliang (40km North of Geelong)

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**Growing Season Rainfall:**

	mm	
Dec 1999	153.0	
Jan 2000	22.8	
Feb 2000	17.0	
Mar 2000	7.2	
Apr 2000	37.0	Apr-Nov 376mm
May 2000	53.0	
June 2000	15.0	
July 2000	30.0	
Aug 2000	19.6	
Sept 2000	83.6	
Oct 2000	116.0	
Nov 2000	21.6	
Dec 2000	12.6	

**Aim:**

To investigate the effect controlled traffic and shallow raised beds has on soil structure and grain yields/quality on a Balliang sandy loam overlying a clay loam.

**Treatments:**

The following diagram illustrates the soil management treatments of raised beds, controlled traffic and cultivated/direct drilled flat. Three replications with treatments being 6 x 1.7m (beds and controlled traffic) wide or a flay 10.8m.

**Background:**

The area north of Geelong and south of the Western Highway is generally a low rainfall zone with an average for approximately 400-450mm per annum.

Over the years the Balliang area has been intensively cropped and excellent quality malting barley has been consistently produced. Animal production has declined in recent years due to poor wool prices, rustling and an increased number of dog attacks. Hobby farms have mushroomed and many new farmers to the area rely on traditional croppers to work their land to earn some money as well as to keep the land weed free; Serrated Tussock is an ongoing problem and part of the reason why the cropping is so intensive.

The intensive cropping program has led local farmers to approach Southern Farming Systems to help investigate methods to improve soil structure, which has declined over the years. Overlying the soil structure investigation, the group is keen to look at a range of agronomic practices which will improve crop yields.

**Sowing Date:** 14<sup>th</sup> July 2000

**Seeding Rate:** 100 kg/ha

**Variety (Barley):** Franklin

**Harvest Date:** 16<sup>th</sup> January 2001

**Fertiliser:** 100 kg/ha MAP at sowing

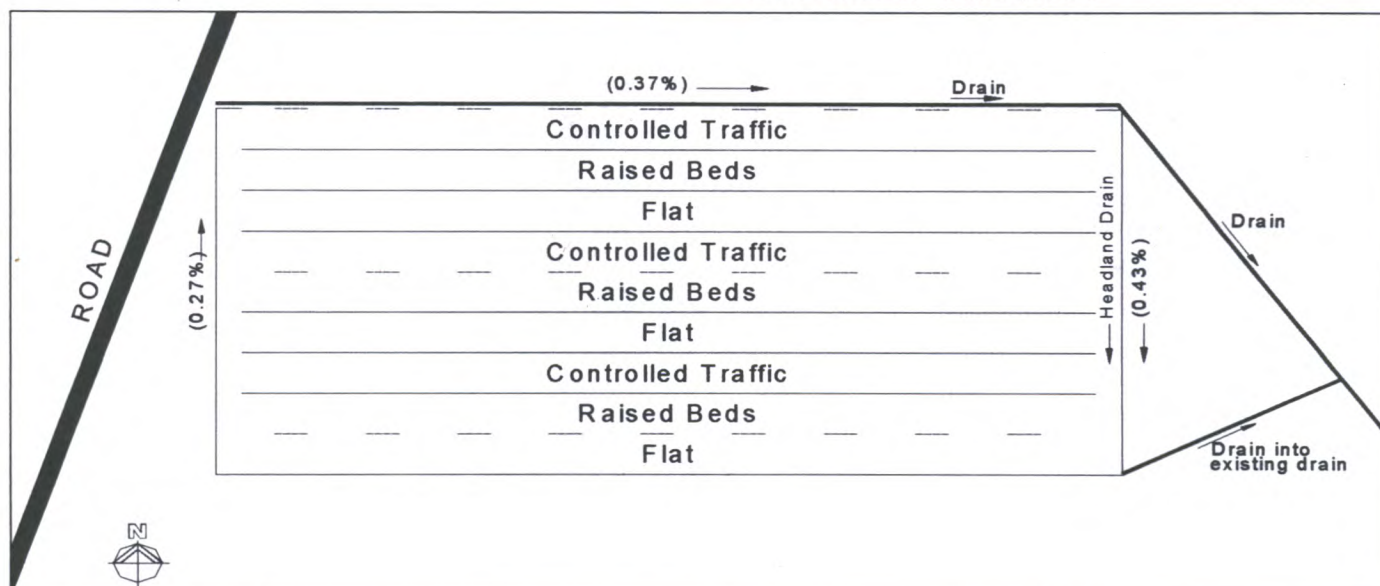
**Weed Control:** 18<sup>th</sup> May Round-up xtra 1-5 litres/ha

13<sup>th</sup> July Round-up CT 1.0 litres/ha

4<sup>th</sup> Oct 2-4-D amine500

@1.5 litres/ha for wild radish and hogweed.

**Pest Control:** Not required.



**Balliang Site Layout**



**Results and Measurements:****Soils of site prior to bed formation: the physical and chemical status**

Soil Depth cm	Colour	Coarse Sand %	Fine Sand %	Silt %	Clay %	pH (water)	pH CaCl2	Organic matter %	Olsen P	GWC pF2.5	GWC pF4.2
0-10	Light greyish brown	6.3	26.2	28.5	35.0	6.3	5.4	3.3	19	30.4	13.1
10-20	Greyish brown	3.7	14.2	16.0	63.5	6.9	5.9	2.5	2.0	36.5	22.2
20-30	Dark greyish brown	2.5	9.7	11.5	72.0	7.6	6.9	2.7	1.0	45.2	26.8
30-40	Greyish brown	2.2	8.2	11.0	75.5	8.2	7.4	2.3	1.0>	45.4	26.9
40-60		3.4	10.8	16.5	67.0	8.9	8.3			42.9	24.4
60-80		3.0	11.4	16.0	67.0	9.1	8.6			46.0	24.7
80-100		1.7	9.0	16.0	69.5	9.2	8.7			48.0	26.7

**Soil Description:**

Soil Colour Description: dry [402]

Soil Texture – Field [403]

Gravel Content – Volume Estimate [404]

Visual Carbonates [409]

Yellowish greyish brown

Light clay (fine sandy)

less than 5%

Negligible

Test	Result	Comment
pH – 1:5 water [ 053]	6.2	Slightly acid
pH – 1:5 CaCl2 [053]	5.4	
Aluminium (Al) – KCl Exchange. [405]	<10 mg/kg	Low and harmless
Electrical Conduct. 1:5 water [048]	0.19 DS/m	
ECe – Saturation Extract calc [1035]	1.6 dS/m	May harm sensitive species
Total Soluble Salts calc. [035]	0.06 % w/w	Slightly higher than normal
Organic Matter calc. [035]	3.6 % w/w	Moderate
Total Carbon (C) – Leco [113]	1.9 % w/w	
Total Nitrogen (N) – Leco [027]	0.17 % w/w	Normal
Phosphorus (P) – Olsen [054]	23 mg/kg	High
Potassium (K) – Skene Estim. [1035]	360 mg/kg	High
Sulphur (S) – CPC by ICP [1013]	24 mg/kg	High
Calcium (Ca) – NH4OAc Exchange. [008]	5.4 meq/100g	
Magnesium (Mg) – NH4OAc Exchange [008]	2.3 meq/100g	
Sodium (Na) – NH4OAc Exchange [008]	0.92 meq/100g	
Potassium (K) – NH4OAc Exchange [008]	0.93 meq/100g	Satisfactory for plants
Sum of Cations calc. [035]	9.6 meq/100g	
Calcium:Magnesium Ratio [035]	2.4	Unfavourable for structure
Calcium % of Cations [035]	57 %	
Magnesium % of Cations [035]	24 %	
Sodium % of Cations [035]	10 %	Unfavourable for structure
Potassium % of Cations [035]	10 %	



**Soil Structure:**

Dry Aggregate Slaking [406] Water Stable  
 Dry Aggregate Dispersion [406] Nil (2 hours), Nil (20 hours)  
 Remoulded Aggregate Dispersion [406] Nil (2 hours), Nil (20 hours)

**Soil Density: Balliang (December 2000)**

Depth (cm)	Conventional Cropping g/cm <sup>3</sup>	Controlled Traffic g/cm <sup>3</sup>	Raised Beds g/cm <sup>3</sup>
0 – 5	1.27	1.05	1.08
5 – 10	1.39	1.26	1.27

Data obtained from 4 cores per treatment.

The site was harvested by taking one cut (1.8m wide) out of each plot using the DNRE's experimental header. Grain quality was commercially assessed by the ABB.

Treatment	Grain Yield t/ha	Grain Quality			
		Moisture	Weight	Screenings	Protein
Flat Ground	3.79	11.3	65	26.5	9.2
Controlled Traffic	3.80	11.3	63	32.4	9.7
Raised Beds & Controlled Traffic	3.66	11.3	63	41.3	10.2

**Comments:**

The site became very wet in October and the controlled traffic and flat ground was inundated for at least 48 hours. However, the water was moving at all times and very little crop damage occurred due to waterlogging. The raised beds were above the waterline at all times.

Very dry conditions occurred during November and December and the soil in the beds did appear to dry out more quickly than the controlled traffic and flat treatments. This appears to have affected grain yield and grain quality.

The bulk soil densities were measured after the heavy rainfall event and during the dry period of December. These figures confirm a number of other findings where bulk densities in controlled traffic and raised bed soils are generally lower than soil where vehicles traverse. The lower bulk density means that the controlled traffic and raised bed soils contained more air and were less compacted than the flat treatment.

**Further Information:**

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