



Kalfresh Field Walk

June 2016

Background

Kalfresh was started in 1992 by father and son team, Barry and Robert Hinrichsen at Kalbar in the Fassifern Valley south-west of Brisbane. Six years ago, Rob and his team decided to focus on and adopt four key practices to improve the health of the soils and the business:

1. Controlled Traffic Farming (CTF)
2. Compost and biological fertilisers
3. Cover crops
4. Integrated Pest Management (IPM)

Rob and the team are now working together on the challenges of soil compaction, surface sealing and the soil-borne disease pythium. At the Kalbar site demonstrations are being conducted on the potential benefits of variable rates of compost, cover cropping and Serenade® Prime beneficial bacteria based on *Bacillus subtilis* QST713).

Details of the site progress are available at <http://www.soilwealth.com.au/demo-sites/kalbar-qld/>

Carrot demonstration trial 2015

The demonstration area was set up in 2015 and compared two rates of compost (4t/ha and 2t/ha) with conventional fertiliser. Serenade® Prime was applied to some treatments at planting plus another application with the irrigation (i.e. Serenade was applied twice).

Key date were:

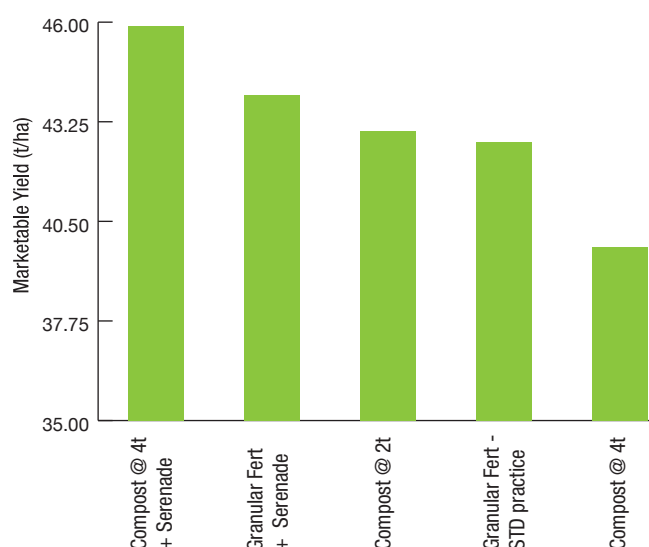
- 15 April – beds ploughed
- 17 April – 75cm rows formed (CTF)
- 20 April – Compost applied (2 t/ha and 4 t/ha)
- 21 April – Fertiliser broadcast. Granular fertiliser was applied to the compost treatments at a reduced rate. Total nutrients applied shown in Table 1.

- 22 April – Plantavator for incorporation of fertilizer and seedbed preparation
- 23 April – Carrots sown and Serenade® Prime banded at 5 L/ha with seeding (planter)
- 20 August – Carrots harvested and graded in to 7 size grades plus waste

Table 1. Total nutrients applied (kg/ha)

Treatment	N	P	K	S	Ca
Compost @ 4 t/ha +/- Serenade	123	96	123	52	295
Compost @ 2 t/ha	78	68	81.5	35	167.5
Granular Fertiliser +/- Serenade	91.5	60	142	111	60

Figure 1. Total carrot yields



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Results

Compost applied at 2t/ha resulted in similar yield compared to the control (granular fertiliser). Compost applied at 4t/ha plus Serenade® Prime resulted in a 7% greater yield compared to the control. Compost applied alone at 4t/ha resulted in a lower overall yield. The compost and Serenade® resulted in a change in the distribution in carrot sizes, i.e. more carrots in the desirable PPL and M categories.

The changes in yield and carrot size distribution impacted on the gross margin per hectare for the carrots. Three price scenarios were evaluated (35c/kg, 40c/kg and 45c/kg) based on prices from the AUSVEG website. The costs of fertilizer, composts and Serenade® were included in economic analysis. Compost was costed at \$80/t and Serenade® at \$160/ha (2 applications). The prices for each size category were based on the % changes in price for each size category.

Compost at 2 t/ha resulted in an additional \$362-420 per ha, and Serenade® Prime + compost at 4t/ha resulted in an additional \$1214-1469 per ha compared to standard granular fertilizer.

The lower returns for compost at 4t/ha were due to the unexplained lower yield for this treatment, and for the

Serenade® plus granular fertilizer treatment the lower gross margin was due to the cost of fertilizer + Serenade® and effects on size categories.

Important note: This was a large plot demonstration trial and not a randomised research trial. This means local soil variations could have been a factor in the results.

Figure 2: Carrot yield by size category

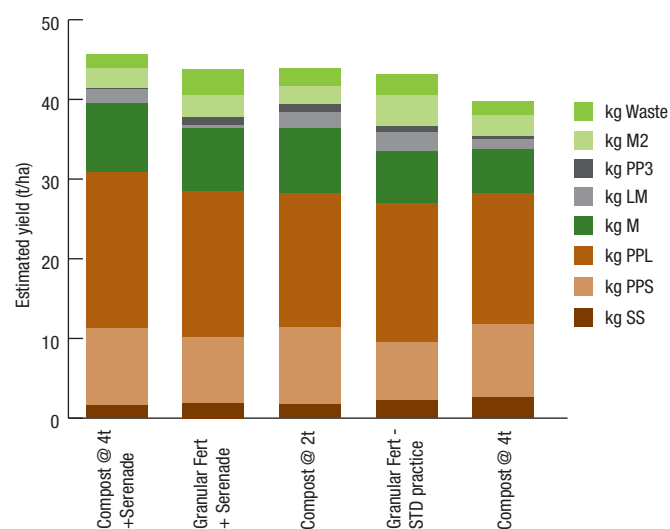
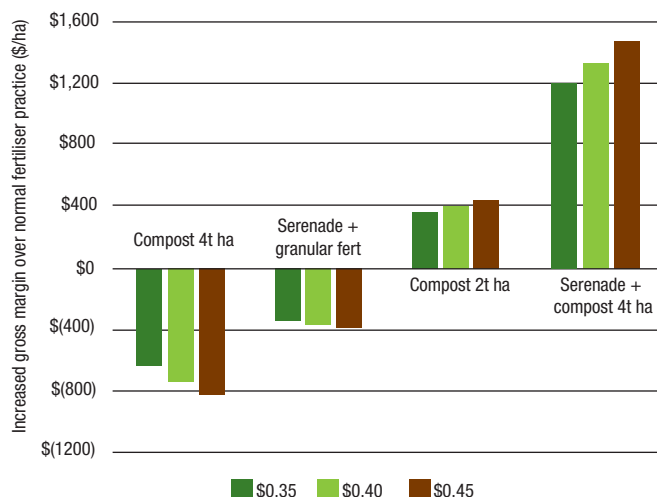


Figure 3. Economics: The increase or decrease in gross margin compared to normal fertilizer practice (granular fertilizer) of compost at 2 or 4 tonnes/ha +/- Serenade® Prime. Includes cost of compost, fertilizer, labour.



Cover Crops

Following the carrot crop, a mix of cover crops was planted on part of the trial site. The trial site was divided into three areas as follows:

1. Cover crops plus compost at 2t/ha
2. Cover crops plus granular fertilizer
3. Granular fertilizer only

A mixed cover crop was planted on the 12th October 2015 at the following rates:

- Siberian millet @ 10 kg/ha
- Tillage Radish @ 4 kg/ha
- Sunn Hemp @ 2 kg/ha (inoculated)

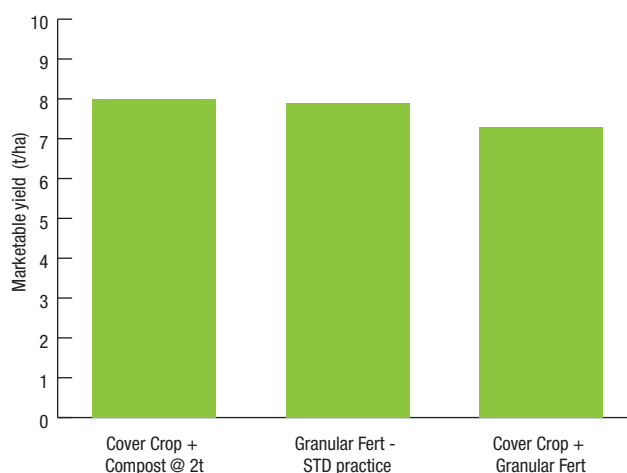
Cover crop biomass was 120 t/ha fresh weight on the 7th December 2015. The cover crop sprayed out on the 15th December and cultivated into beds, which were split into planting rows one month later.

Bean crop

Granular fertilizer (NPK 8.3:10:10) was applied on March 2016 at rate of 100 kg/ha. Compost was applied at a rate of 2 t/ha. Wyatt green beans were planted by direct seeding on the 24th March 2016. The beans were harvested on the 23rd May 2016. Four sections of row 1m in length was randomly selected from each of the 3 treatments, the beans were harvested by hand, graded and yields recorded. Soil and leaf tissue samples were collected from the trial area at harvest, and sent to a commercial testing laboratory for a standard soil test and a dry ash leaf analysis.



Figure 4. Bean marketable yields





Interpretation of bean crop results

Yield: The cover crop plus compost at 2 t/ha resulted in a similar yield to granular fertilizer only treatment. The cover crop plus granular fertilizer treatment area recorded a slightly lower (7%) yield than the standard control, and since this was a demonstration trial, field variability could have been a factor in this result.

Nitrogen drawdown: There was very little nitrate remaining in the soil at harvest in both the areas that included cover crops (3-4 mg/kg – Table 2). Where no cover crops were used, the soil nitrate level postharvest

was much higher at 22 mg/kg. One possible explanation for this result was a nitrogen drawdown effect where the soil microorganisms decomposing cover crop residues were taking nitrate at the expense of plant uptake. When non-leguminous cover crops are used, it can be necessary to add extra nitrogen to assist with breakdown, or include a legume in the mix.

Other possible explanations for the soil nitrate results include the previous history of the plots and variation across the paddock.

Table 2. Soil and leaf nitrogen at harvest.

Treatment	Soil nitrate (0-15cm) mg/kg	Soil nitrate (15-30cm) mg/kg	Leaf Nitrogen (%)	Soil organic carbon (%)
Cover crops plus compost at 2t/ha	3	4	3.9	2.15
Cover crops plus granular fertilizer	4	6	4.2	2.09
Granular fertilizer only	22	18	4.3	2.03