

## Brassica bio-fumigation - a demonstration.

### SUMMARY

Green manuring canola or mustard has not been proven to be beneficial to following wheat crops in the southern Mallee.

Wheat and barley establish easier when sown into a cultivated canola stubble rather than when these crops are direct drilled into canola stubble. In dry seasons, such as 2000, this will result in the direct drilled crops suffering a yield penalty.

### BACKGROUND

Some cereal crops appear to yield better when sown after an oilseed. A possible reason for this is that Brassica crops such as canola and mustards bio-fumigate or suppress root disease levels in the soil.

### METHOD

Two demonstrations were set up at the 1999 trial site to look at the bio-fumigation effects of canola and mustard varieties on root disease and the following cereal crops.

*Trial 1 Canola vs Mustard:* in 1999, two canola and two mustard varieties were sown on 3 different cultivation treatments (long fallow prepared in 1998, short summer fallow and direct drill). In late September 1999, the plots were green manured by slashing and discing. A comparable adjacent plot of medic was also disc'd. In 2000 Silverstar wheat was sown and root diseases monitored and plots were harvested.

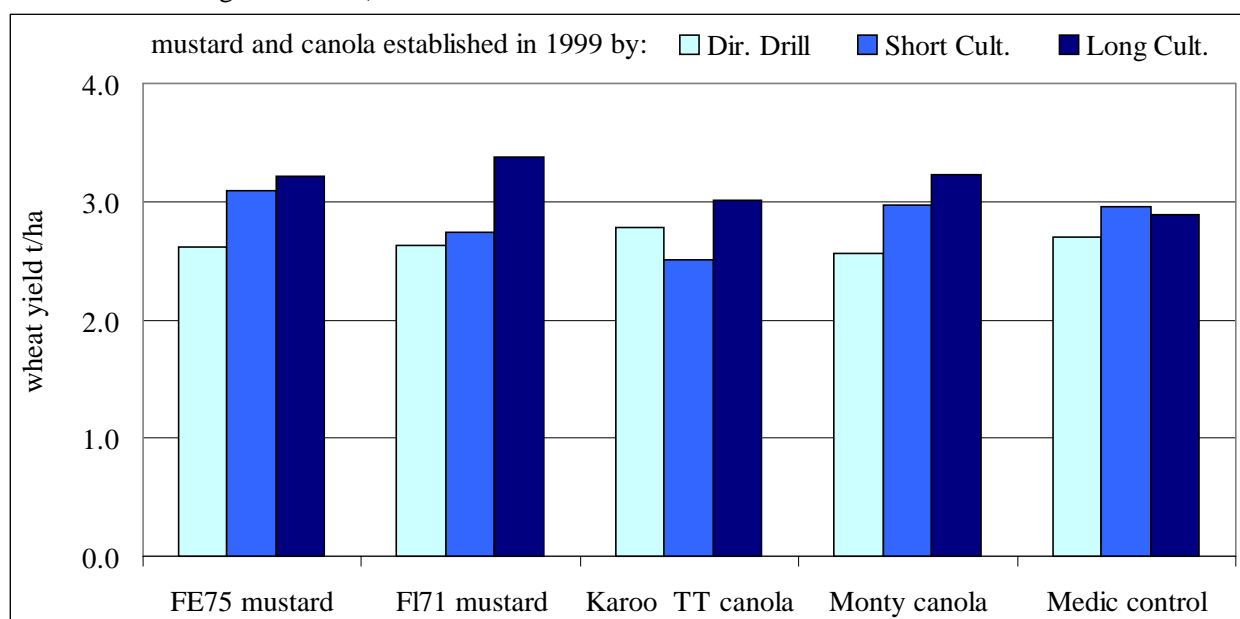
*Trial 2 Canola varieties:* Wheat and barley was established in 2000 on a canola demonstration trial from 1999 comparing IT, TT and conventional canola varieties. Following harvest of the canola, half of each plot was cultivated twice. Silverstar wheat and Schooner barley was sown in the cultivated plots and direct drilled in the un-cultivated plots in mid May, 2000.

### RESULTS

#### *Trial 1 Wheat on green manured Canola or Mustard*

There was no effect from green manuring mustard or canola on wheat yields compared to self sown medic. However the effect of the 1999 cultivation treatments was carried through into 2000 (Figure 1).

Figure 1. 2000 Wheat Yields after 1999 green manuring (1999 crops established by direct drill, on short cultivation and long cultivation)

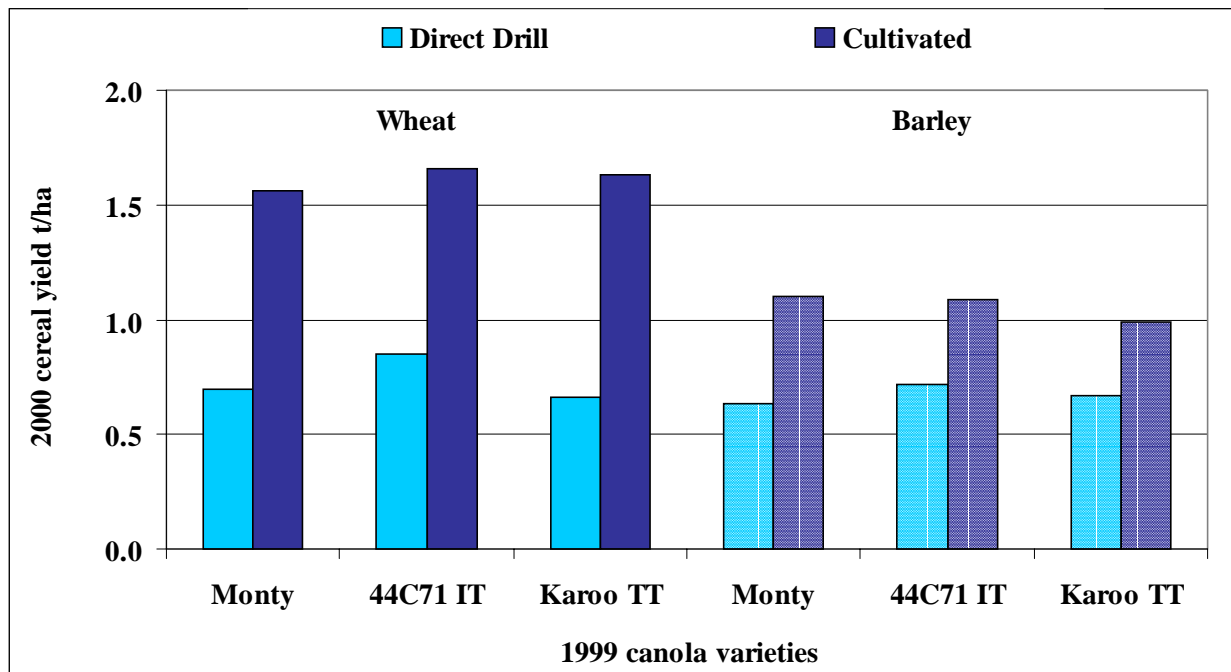


Root disease in the wheat crop was assessed on all treatments at flowering. Take-all, Rhizoctonia and Pratylenchus damage was identified on the roots at low to moderate levels but there was no trend in relation to either mustard, canola or medic green manure type.

### *Trial 2 Conventional and direct drilled wheat and barley on different Canola varieties*

There were no differences in wheat and barley yield established in 2000 in relation to the canola varieties sown in 1999. The main difference in yield was whether the crop was established on cultivated ground or if it was direct drilled. The establishment of wheat and barley on cultivated canola plots, compared to being direct drilled, increased yield of wheat by 0.8 t/ha and barley 0.4 t/ha. Wheat yielded more than barley (0.5 t/ha on the cultivated plots) (Figure 2).

Figure 2. Wheat and barley yields on direct drilled or cultivated canola stubbles.



### INTERPRETATION

Bio-fumigation effects of Brassica crops such as canola and mustard have been reported in work undertaken by John Kirkegaard from CSIRO. The Brassica crops release chemicals (glucosinolates) into the soil which reduce the effects of disease on the following cereal crop.

In the BCG demonstrations the effect of green manuring canola was compared to mustard. There were no differences in yield found between the control (medic) and green manured canola and mustard. Disease level of Take-All, Rhizoctonia and Pratylenchus were recorded but there were no strong trends between the wheat grown on green manured canola, mustard or medic.

There was a strong indication from the other demonstration plot that bio-fumigation is playing a role. When wheat or barley was direct drilled into canola stubble there was a large yield penalty compared to establishing wheat or barley in cultivated canola stubble. Commercially this effect has often been noticed - wheat direct drilled into canola stubble is slow to establish and early growth is poor. This effect is especially noticeable after a dry summer. On cultivated canola stubble ground wheat establishes quickly and early growth is good. Usually direct drilled wheat grows out of this effect. In the BCG demonstration the cereals were slow to establish on the direct drilled plots compared to the cultivated plots, and were unable to recover during the dry winter of 2000. Direct drilled cereal in canola stubble can suffer because the toxins released by canola stubble are not broken down in undisturbed dry soil. When the soil is cultivated, or if there is plenty of summer rain, these chemicals are broken down by soil microbes and the negative effects are not seen.

### COMMERCIAL PRACTICE

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