

Cereal on Cereal - managing a rotation

SUMMARY

Wheat on wheat can be successfully grown with relatively low risk if all factors that influence disease are considered. The most important are: disease carry-over, variety selection, sowing time, seed treatment and burning stubbles. Barley on wheat is less of a problem, except for self-sown wheat in the barley sample.

The need to rotate crop types to minimise the carry-over effects of disease is well known and widely adopted by the farming community. The great success in the 1980's of minimising the effects of cereal cyst nematode (CCN), also known as eelworm, in the Mallee was primarily due to improved rotation planning and reducing the level of grass weeds in the year prior to sowing wheat. However, there has been a noticeable change in attitude in the farming community in relation to sowing cereal on cereal. Three consecutive dry years and a cost-price squeeze has meant that pulse crops are seen as high risk and pastures are not seen as a viable alternative. The other change has been in new technology. CCN tolerant varieties (eg: Frame), better disease soil testing facilities (DNA testing at SARDI, SA) and farmers monitoring crops for diseases (through programs such as TopCrop) has resulted in a much better knowledge on when a disease problem is likely to strike.

The aim of our work was to investigate some options in trial work in relation to sowing cereal on cereal and review farmers' experience with cereal on cereal. Best bet management options are also provided.

METHOD

Frame wheat and Schooner barley were sown into a previous wheat crop at the Birchip and Charlton sites. The treatments included:

- Sowing times - early and late (Charlton – May 12 and June 23; Birchip – June 7 and June 25)
- Stubble - sowing into undisturbed standing stubble and into cultivated stubble
- Fungicides - Impact (400ml/ha) treated fertiliser; Folicur (290ml/ha) at the 3-5 leaf stage; and untreated controls

Prior to sowing the wheat and barley seed had been treated with Armour. All treatments were sown in a replicated design.

RESULTS

Sowing time: At Charlton the early sowing time yielded significantly better than the late sowing time (1.83 vs 1.56 t/ha for wheat, and 1.72 vs 1.61 t/ha for barley). At Birchip there was no difference in crop yield when crops were sown on June 7 or June 25. The differences between the sites was probably due to the larger gap in sowing time at Charlton (6 weeks) compared to Birchip (2 weeks).

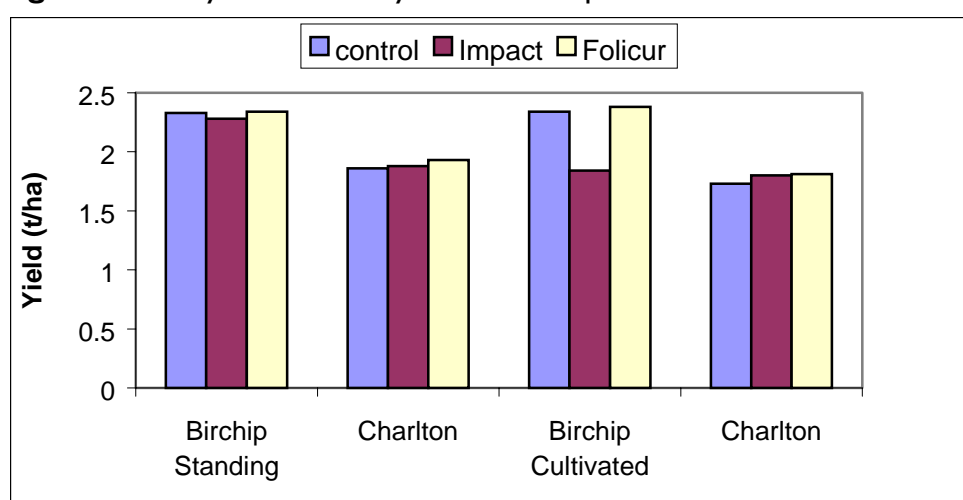
Stubble: At Birchip there were no differences in wheat and barley yields when sown into standing or cultivated wheat stubble. At Charlton there was a significant difference especially for the late sown crops. Wheat and barley both performed better when sown into standing stubble compared to cultivated stubble. This may

have been due to slightly better moisture retention in the late sown crops where the stubble had been left standing and the cultivation had not dried out the soil.

Fungicide: There were few differences between the fungicide applications (Impact with the fertiliser and Folicur applied as a foliar spray) and the controls. At the early sowing time there were no significant differences between the treatments (see Figure 3.7).

The only difference was in a better yield with the late sown wheat at Charlton from the application of Folicur (control 1.7 t/ha, Impact 1.5 t/ha and Folicur 2.1 t/ha). This effect only occurred in wheat, not in barley and was only observed at Charlton.

Figure 3.7 Early sown wheat yields at Birchip and Charlton



INTERPRETATION

Sowing time: sowing early (the May 12 sown crop at Charlton was dry sown) was beneficial.

Stubble: Frame wheat at both Charlton and Birchip was effected by yellow leaf spot, this effect was worse in the stubble compared to the cultivated treatment. The crop grew out of the effect of yellow leaf spot and the disease did not appear to have a long term damaging effect on the crop.

Fungicide: the fungicide application work was not clear. Impact is known to reduce the effect of take-all, however this disease did not manifest itself in 1999. A foliar application of Folicur did appear to benefit the late sown wheat crop at Charlton. There were no obvious differences in disease levels between the early and late sown crops and it is not clear why this was the case.

FARMERS' EXPERIENCE OF WHEAT ON WHEAT

There are quite a few paddocks in which wheat is grown on cereal stubble. The examples in the table are from one paddock each in the Birchip, Charlton and Swan Hill districts. In the Birchip and Charlton paddocks, wheat has been grown for three

years, while in the Swan Hill paddock wheat had been grown for two consecutive years.

Table 3.7 Yields of wheat in three separate paddocks

	Birchip		Charlton		Swan Hill	
	Yield t/ha	WUE % of potential [#]	Yield t/ha	WUE % of potential	Yield t/ha	WUE % of potential
1997	1.7	86	1.9	91		
1998	1.4	115	1.8	77	1.2	102
1999	2.6	110	3.1	119	2.5	121

[#] WUE as a % of potential was worked out as the achieved water use efficiency as a percentage of the optimum WUE attainable (20 kg/mm/ha).

These three isolated examples demonstrate that wheat can be successfully grown following wheat (even in cases of three consecutive years of wheat). There are also plenty of examples where wheat on wheat rotation has failed. These failures are due to one or more management issues that may have been avoidable.

COMMERCIAL PRACTICE

Sowing wheat on wheat can be a viable option if the following are considered:

- **Paddock selection** - is critical. Any paddock with a history of barley grass and brome grass should not be considered because disease levels will probably be high and both of these grasses are difficult to control in wheat
- **Variety selection** is critical. It is our opinion that Silverstar wheat is a good option, especially when sown in June. Silverstar has reasonable resistance to yellow leaf spot in the seedling stage, and because it is an early variety it is well suited to sowing in June, which allows for extra time in the break down of take all. However, Silverstar is resistant but not tolerant to CCN so varieties such as Frame (both resistant and tolerant to CCN) still have a place when considering wheat on wheat. Frame is not resistant to yellow leaf spot and in a wet winter this variety may suffer when sown on stubble.
- **DNA soil test** - if the level of take-all and CCN are low then wheat is still an option.
- **Seed treatment** - with Armour or Baytan to reduce leaf disease problems. In this case do not use trifluralin because both seed dressing products shorten the coleoptile of wheat, which will result in crop damage.
- **Sowing time** - leave sufficient time to reduce levels of take-all. Immediately following rain in autumn the fungal disease take-all starts to break down. The longer the period between the first rains and sowing the better.
- **Nutrition** – fertilise according to need, based on a soil nitrate test and previous phosphorus fertiliser history. There is no need to over fertilise.
- **Fungicides** - Impact is known to reduce the effect of take-all in wheat. However, whether it is cost effective to use at this stage has not been clearly demonstrated. In high-risk situations it is worth considering.
- **Disease** - observe and monitor root and foliar disease levels prior to flowering in wheat in those paddocks earmarked for wheat in the following year. For example, if even low levels of CCN are present to follow with wheat would be a high-risk strategy.
- **Burn stubble** - to reduce the carry over of yellow leaf spot (carried on stubble).