

## The control of take-all in the Victorian Mallee

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The traditional rotation used in the Victorian Mallee has been that of a cereal crop grown on fallow, followed by a medic-based pasture of one to two years' duration. This form of agriculture has been highly successful over the years, but as fertility has increased the pasture and crop phase has been progressively dominated by grass species.

This situation has exacerbated the problem of take-all (*Gaeumannomyces graminis*) in the principal cereal crops, wheat and barley. In 1978/79, the value of lost wheat production due to this disease was estimated at \$26 million in the Mallee. Records show that up to 80% of individual crops were affected in that year.

It was recognised that the elimination of host weed species, principally *Hordeum leporinum*, and replacement of certain cycles of cereal crops in the rotation by non-host crops, such as field peas, lupins or rapeseed, may provide the solution to this complex problem.

### Method

In 1980 a series of 12 rotations was established on wheat stubble known to have been infected with *G. graminis*. Each rotation was selected to provide a range of crop conditions which would either remove the host species, both crop and weed, for a specified duration, or continue the use of practices which have not proved efficient in their control of the disease.

Rotations used consist of combinations of the crops wheat (V), barley (B), rapeseed (R), lupins (L), field peas (P), medic pasture (M) and long fallow (F). The most important rotations are: MRLW, LWPW, FWFw, MLRW, WMFW and WWWW.

Each rotation has been replicated three times in each year and will be repeated for an additional three sequences in time. This technique will reduce the variability imposed due to environmental conditions. Thus, in each year from 1983 to 1985, all plots in one of the three sequences will be sown to wheat. Intensive sampling of these plots for detection of the disease will be carried out at that time. Crops are sown without fallow except where this is part of the treatment.

### Results and Discussion

At the present time, continuous and complete meteorological and soil temperature data are being collected. Soil moisture to one metre is being followed before, during and after each cropping phase, and total nitrogen, phosphate and mineral nitrogen are being monitored. Assessments for take-all are undertaken on cereal plots when the crops are at the 3-5 leaf and flowering stages of development. Grain production is measured from all crop plots and dry matter production at peak flowering from the medic pastures. Weed control is aimed at reducing the level of *H. leporinum*, *L. rigidum* and *Bromus* spp. to an absolute minimum within the rapeseed, medic, pea and lupin plots.

Sufficient data have not, as yet, been collected to enable consistent long-term responses to be defined. However, preliminary data showed that wheat yields were considerably lower when wheat followed wheat than when wheat followed medic pasture, lupins, rapeseed or long fallow. This was due in part to the high levels of take-all in the wheat-wheat rotations.